

A Survey of Open Source Geospatial Software

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access this presentation here:

<http://www.muug.mb.ca/meetings/os-geospatial-sw.pdf>

There are many web addresses given in this presentation. In order to save you from writing them all down, I have provided you with the address to download this presentation.

A Survey of Open Source Geospatial Software

Outline of Presentation

- **What open source software is and how it is licensed**
- **The organizations supporting open source geospatial software and some Canadian companies and consultants working in this field**
- **WWW standards for accessing geospatial data**
- **Some interesting and well known open source geospatial software applications**
- **The use of open source geospatial software to support the spatial infrastructure in a government organization**
- **Where you can get more information**

A Survey of Open Source Geospatial Software

Some popular, successful open-source projects



OpenOffice.org – is a multi-platform office suite which is compatible with all other major office suites.



Firefox – a web browser from the Mozilla Foundation – has second largest usage worldwide



Thunderbird – is a full-featured email application

The open-source software field has a multitude of applications that mirror nearly every successful commercial field. Here are some high-profile applications that are free and can be used for common functions needed in computers:

OpenOffice can replace Microsoft Office, it comes with a document editor (like Word), a spreadsheet, a presentation manager and a database manager and other utilities. This suite can edit documents in its own format or MS Office formats and save documents to MS Office formats. I used the OpenOffice presentation creator, Impress, to create this presentation.

The Mozilla Foundation has produced a highly successful web browser, Firefox, that has captured the second largest market share. It has also produced the Thunderbird email client application which has most of the functionality of MS Outlook.

A Survey of Open Source Geospatial Software

- Open Source Software grants the user freedom to:
 - Make unlimited copies of the software and use it on whatever computers they wish,
 - Redistribute the software as long as they acknowledge the source and distribute the license with it
 - Modify the software to work the way that they want it to (and the user is **not required** to distribute their changes)
 - Usually referred to as Free and Open Source Software (FOSS)

If you redistribute modified (GPL licensed) software then you are required to distribute your changes.

Users can freely use the software at home or at the office and use it on whatever computers they want to.

Users can give the software to whoever they want to

Users can make programming changes to the software, adding features that may be missing or even change the way some features work

Usually the licenses for this software prevent you from restricting the freedom of people who may receive the software from you.

There are a large number of different open-source licenses, the most popular is the GPL, the GNU Public License. The LGPL, the Lesser GNU Public License allows mixing of proprietary and open source components without having to release the source to the proprietary components. The components under the LGPL must still be "source available", including changes or improvements.

A Survey of Open Source Geospatial Software

Open Source vs “No Cost” Software

- Open-Source Software allows the user to make functional changes
- FOSS allows the user community the freedom to maintain and enhance the software when the original developers 'disappear'
- “No Cost” Software often does not distribute source code and thus has **'locked functionality'**
- “No Cost” software can be withdrawn by the developer at any time, leaving the software in a 'frozen state'

“No cost” software has a limited amount of freedom attached to it. Many times the vendor may choose to discontinue a particular piece of free software or they may choose to commercialize it once it has been tried and tested by the user community or when it begins to compete with the income generating line of software of the company.

Often there is a strong user community supporting open-source software and this community will be free to maintain it.

A Survey of Open Source Geospatial Software

Open Source Licensing:

- GPL – GNU Public License – is a copyleft license
- LGPL – Lesser GNU Public License
- Other Licenses:
 - BSD
 - Mozilla Public License
 - Apache Software License
 - Creative Commons License
 - and many, many others

Under the GNU license the user has the right to a copy of the source code so that they can change it. If they decide to redistribute their changes then they have to redistribute their copy of the changes thus giving the receivers of their changes the freedom to change the software again.

Software licensed under the LGPL makes the source code freely available to the user and allows the user to add functionality to it and to create proprietary and commercial software using the LGPL licensed software as a **component** of their product.

The BSD license allows users to create proprietary products from the BSD licensed software.

The Mozilla license, which the Netscape browser and the Wikipedia online encyclopedia are licensed under, keeps the original software open source but allows it to be combined with proprietary, commercial software.

The Creative Commons License has been used for both software and literature (I have heard of novels that have been licensed under this). It contains clauses that may be included, at the users option, that keep all derivative works open, you have to read the specific form of this license carefully to see what rights you have.

A Survey of Open Source Geospatial Software

Canadian Companies Developing Open Source Geospatial Software

- DM Solutions - Ottawa - develops enhancements to MapServer
- Refrations Research - Victoria - develops PostGIS & uDig
- Mapgears - Chicoutimi - develops enhancements to MapServer
- Vivid Solutions - Victoria - develops Java Topology Suite (JTS)
- Frank Warmerdam, independant contractor - Ontario - develops proj library, GDAL/OGR

Directions Magazine has an interesting article about Canadians who contribute to open source geospatial software.

DM Solutions contributed to the development of MapServer from the early stages of its development, they have developed kaMaps, an open source tool for generating websites like Google Maps and Chameleon, a tool for developing layouts for MapServer based websites.

Refrations Research works with the PostgreSQL open source database and has developed the GIS extension, PostGIS, that is used by many people. They are now developing the uDig internet GIS client

Mapgears was started by Daniel Morrissette who developed Mapscript, the PHP programming interface to MapServer

The JTS developed by Vivid Solutions has been used in several software applications

The libraries and programs developed and maintained by Frank Warmerdam have been used in many commercial and open source projects

These companies derive income in a variety of ways such as custom software development, contract development of enhancements to open source software, consulting and support for the use of the software,

A Survey of Open Source Geospatial Software



OSGeo.org - Open Source Geospatial Foundation

To support the development of open source geospatial software, and promote its widespread use

- Open source Geospatial Projects become project members of OSGeo
- Currently there are 5 Web Mapping, 3 Desktop Mapping, 3 Geospatial Libraries and 1 Metadata Catalog project members



FreeGIS.org - The FreeGIS Project

- promote the use, development and support of Free GIS Software,
- promote the use and release of publicly available geographic data in the same sense of freedom as for Free Software,
- promote the use, writing, translation and extending of free documents in the GIS field

OSGeo:

- began in 2006 with 9 projects forming the foundation
- projects must be licensed with an OSI-compliant license in order to be an OSGeo member. They are encouraged to use an LGPL or similar license so that libraries can be reused by non-GPL projects
- provides resources (such as funding and infrastructure) to member projects
- provide support for the use of OSGeo software in education
- operates the annual OSGeo conference
- promotes the use of all open source software in the geospatial industry

FreeGIS.org is an comprehensive source of information about free geospatial software, Geo-Data and documents. This is an excellent location to consult when searching for free geospatial software, bearing in mind that there is a wide range of software maturity.

Another site is: <http://opensourcegis.org/> which “represents an attempt to build a complete index of Open Source / Free GIS related software projects.”

A Survey of Open Source Geospatial Software

OGC Web Services – Some Definitions

OGC – Open Geospatial Consortium

Encourages the development and implementation of standards for geospatial content and services - www.opengeospatial.org^W

OGC – Geography Markup Language (GML)

An XML based modeling language for geographic systems as well as an open interchange language for geographic transactions on the internet^W

^W Definition taken from Wikipedia.org

OGC - an international voluntary consensus standards organization encouraging the development and implementation of standards, has developed MANY standards for describing, styling and exchanging geographic information. This presentation only describes a few of them.

The GML is the standard language used by web services for serving geospatial data on the web.

I am discussing this topic area in order to provide a background on them because later I show how the open source geospatial applications support them.

A Survey of Open Source Geospatial Software OGC Web Services – continued

OGC Web Map Services (WMS)

This service produces maps of spatially referenced data dynamically from geographic information. WMS-produced maps are generally rendered in a pictorial format such as PNG, GIF or JPEG, or occasionally as vector-based graphical elements in Scalable Vector Graphics (SVG) or Web (WebCGM) formats.^W

The Manitoba Land Initiative (MLI) provides a WMS server which can be accessed at:

<http://mlidata.gov.mb.ca/wms/request.aspx>

^W Definition taken from Wikipedia.org

WMS - This international standard defines a "map" to be a portrayal of geographic information as a digital image file suitable for display on a computer screen. A map is not the data itself.^W

The MLI provides a WMS server (built with proprietary software) that can be used with open source software, which will be shown later in this presentation.

A Survey of Open Source Geospatial Software

OGC Web Services – continued

OGC Web Map Services (WMS) (continued)

The MLI WMSrver can serve images directly using a call via a URL, here is an example of a direct request to the MLI:

- http://mlidata.gov.mb.ca/wms/request.aspx?SERVICE=WMS&VERSION=1.1.1&REQUEST=GetMap&BBOX=631854,5547777,679264,5577771&SRS=EPSG:26914&WIDTH=843&HEIGHT=471&LAYERS=Orthos1,MLIDATA_B500K_SEC_LN,MLIDATA_B500K_HYD_R,MLIDATA_B500K_HYD_PY,MLIDATA_REF_TWP_RNG_PY,MLIDATA_REF_TWP_RNG_PY_LABELS,MLIDATA_BDY_PROVINCE,MLIDATA_TRN_HIGHWAYS&STYLES=Default&FORMAT=image/png&TRANSPARENT=TRUE

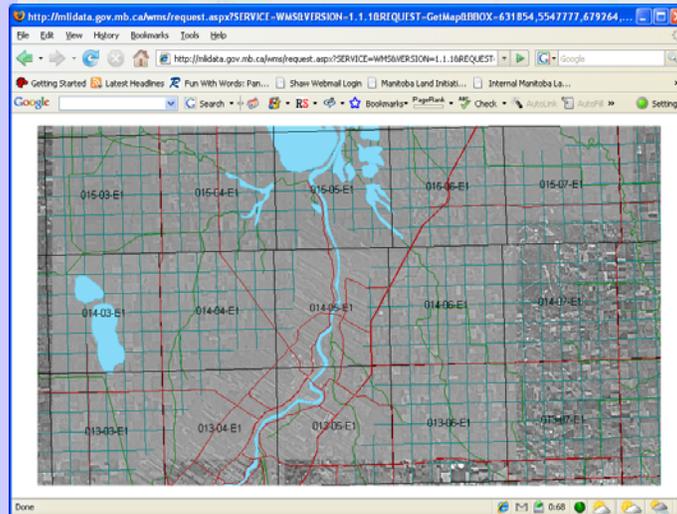
This request specifies a geographical area (BBOX=**631854,5547777,679264,5577771**) and that the image returned will be in NAD83 UTM Zone 14 coordinates (SRS=EPSG:26914) the size of the image to be returned (WIDTH=843&HEIGHT=471) and the layers from the MLI to be returned (LAYERS=**Orthos1,MLIDATA_B500K_SEC_LN,MLIDATA_B500K_HYD_R,MLIDATA_B500K_HYD_PY,MLIDATA_REF_TWP_RNG_PY,MLIDATA_REF_TWP_RNG_PY_LABELS,MLIDATA_BDY_PROVINCE,MLIDATA_TRN_HIGHWAYS**) and the image type (FORMAT=image/png) and that the background will be transparent. Providing a transparent background will allow images from different sources to be stacked on top of each other.

A Survey of Open Source Geospatial Software

OGC Web Services – continued

OGC Web Map Services (WMS) (continued)

Here is the image created by this request string:



The layers from the MLI were overlaid in the order that they were requested with the Orthos first and at the bottom and the Road Network requested last and overlaid on the top of everything else. Here you can see the water layer covering part of the orthophotography.

(LAYERS=*Orthos1,MLIDATA_B500K_SEC_LN,MLIDATA_B500K_HYD_R,MLIDATA_B500K_HYD_PY,MLIDATA_REF_TWP_RNG_PY,MLIDATA_REF_TWP_RNG_PY_LABELS,MLIDATA_BDY_PROVINCE,MLIDATA_TRN_HIGHWAYS*) and the image type (FORMAT=image/png)

The image shown here results from this request string.

A Survey of Open Source Geospatial Software

OGC Web Services – continued

OGC Web Feature Services (WFS)

- Serves actual geospatial features across the net
- Features may be used for map display, querying or manipulation
- Usually provided via GML format but also may be sent via SHAPE files

OGC Web Feature Services Transactional (WFS-T)

A web service that extends the WFS to provide the ability to update, delete or create features

OGC Catalog Services

Allows for the discovery, browsing and querying of metadata about data and services

Another lesser known OGC service is the Web Processing Service (WPS) allows clients to provide a predefined set of inputs and have the service perform a calculation and then provide output data. A Swiss agency is beginning to use this service for doing cadastral mapping via the web.

A Survey of Open Source Geospatial Software An (incomplete) List of Open Source Geospatial Software

Internet Map Servers:

MapServer

- “renders data for spatially-enabled Internet applications”, has excellent cartographic output
- can be used both as a WMS and WFS server and client
- deals with a large amount of vector and raster data formats
- supports many scripting languages for developing Internet applications, e.g. PHP, Python, C, C++, C#, Perl, Ruby, Java
- on-the-fly map projection

There are some tools for formatting websites for MapServer, namely Cartoweb from Camp to Camp in Switzerland and Chameleon from DM Solutions in Ottawa.

The user doesn't need to set up their own web server, there are hosting environments where they can get MapServer hosting along with other tools like PostGIS, the PostgreSQL spatial data extension.

A Survey of Open Source Geospatial Software

An (incomplete) List of Open Source Geospatial Software

MapServer

<http://mapserver.umn.gis.edu>

Has an gallery of the many websites that use it



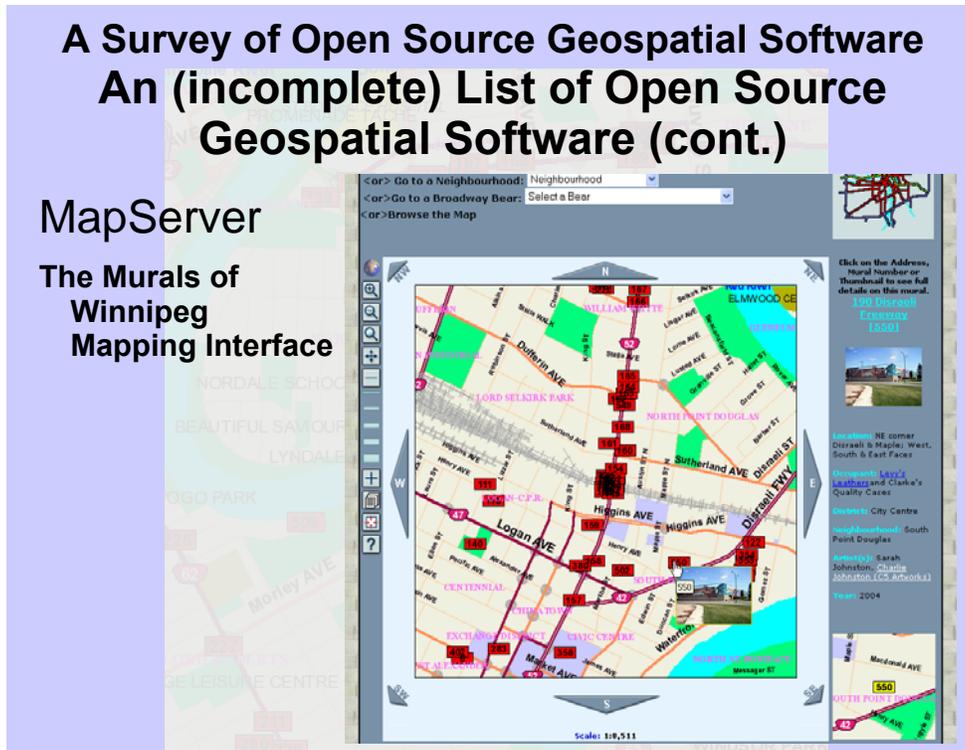
There are some tools for formatting websites for MapServer, namely Cartoweb from Camp to Camp in Switzerland and Chameleon from DM Solutions in Ottawa.

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A Survey of Open Source Geospatial Software An (incomplete) List of Open Source Geospatial Software (cont.)

MapServer

The Murals of
Winnipeg
Mapping Interface



The red boxes are murals with a mouseover action displaying the thumbnail photos. Clicking on a box renders the mural information at the right. The streets are cartographically rendered by MapServer.

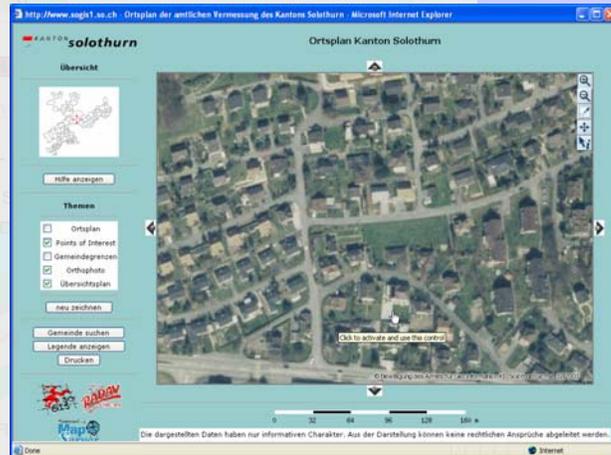
This website is currently hosted by a Winnipeg company, www.epic.ca. It uses data stored in a MySQL database and the programming is done in PHP and JavaScript. Since it was built prior to AJAX it relies heavily on locally downloaded images and it takes a little while to send down a web page with the amount of murals shown.

A Survey of Open Source Geospatial Software

An (incomplete) List of Open Source Geospatial Software (cont.)

MapServer

The Swiss Kanton
of Solothurn
Mapping Interface



The kanton of Solothurn is a similar jurisdiction to a Canadian province. This kanton has an entire infrastructure based on open source geospatial software. This slide shows their web browser interface to their system.

A Survey of Open Source Geospatial Software Internet Map Servers (cont.):

MapGuide Open Source

- Originally sold by Autodesk, recently became open source - <http://mapguide.osgeo.org>
- produces cartographic quality output
- programmers can develop applications in PHP, ASP .NET and Java/JSP
- has a web based design studio
- supports WMS and WFS standards
- supports a variety of raster formats via GDAL
- offers an AJAX viewer (pure DHTML) or an DWF Viewer that uses an ActiveX Control

This Internet map server came with its own user community that it inherited from being an Autodesk product.

This was released to open source in the fall of 2005.

Supports some spatial analysis functions such as buffering and querying features within selected polygons

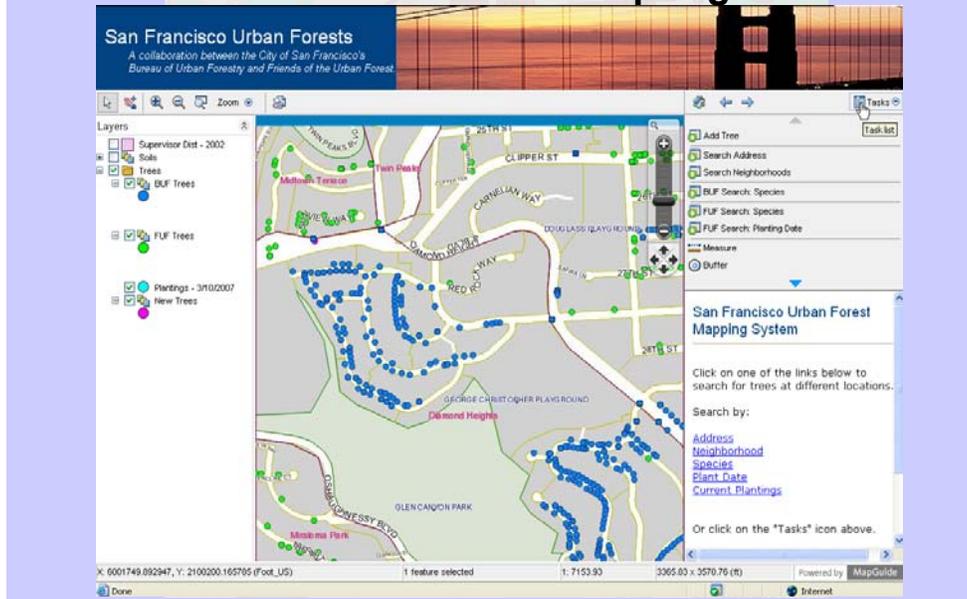
Now contains both Oracle and PostGIS support, both developed by outside developers.

There is a commercial version of this product called MapGuide Enterprise and there is a commercial workstation-base version of the design studio

A Survey of Open Source Geospatial Software

MapGuide Open Source

www.urbanforestmap.org

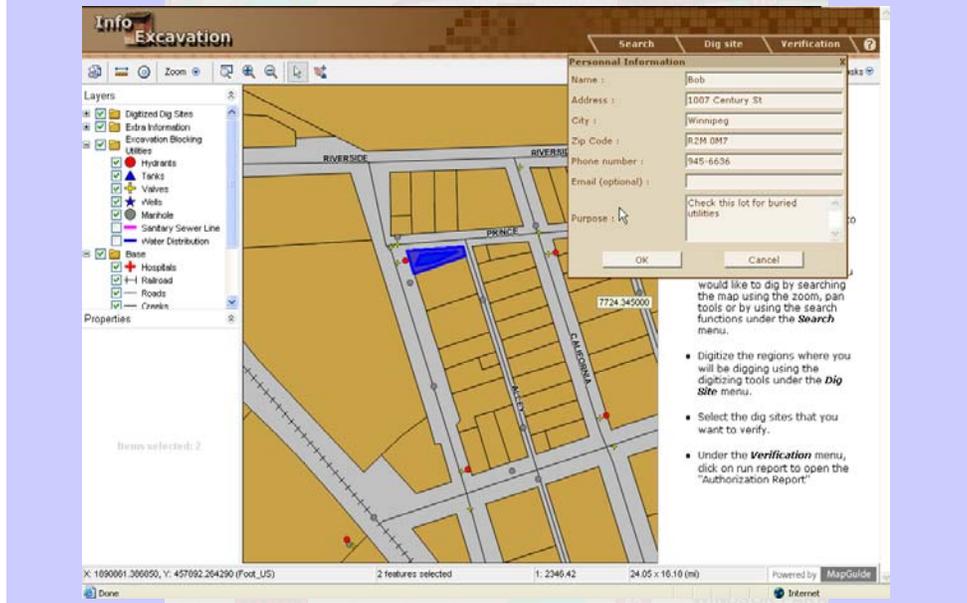


This website was built with MapGuide open source.

“This is a tool for tree maintenance and management, enabling urban forest managers to inventory and map existing, future and past tree locations. This will also be a tool for citizens to access tree data, report problems and upload personal tree information such as photos and stories and input privately owned tree information”

A Survey of Open Source Geospatial Software

MapGuide Open Source



This is the “Call Before You Dig” website and it was built with MapGuide open source.

This is the AJAX version of the web application that uses MapGuide to show how it can be verified that a site is suitable for excavation by checking the proposed site for existing utilities. In this map you can see how an area has been identified and a report is being formatted.

This application was built by Geomap, Quebec.

A Survey of Open Source Geospatial Software Internet Map Servers (cont.):

GeoServer

- is an open source server built in Java that publishes geodata using WMS, WFS and WFS-T (transactional web services) services
- often used as the basis for many open source applications that need to use data served across the Internet
- it allows users to update, insert and delete geographical data across the Internet
- outputs map data in a variety of image formats as well as KML (works with Google maps)

A Survey of Open Source Geospatial Software Internet Map Servers (cont.):

AJAX Mapping Type Interfaces

Built as open-source alternatives to
Google Maps

- Ka-Maps built in Canada, provides map browsing capabilities but no API
- OpenLayers provides AJAX capabilities with an API for developing custom applications similar to developing with Google Maps API

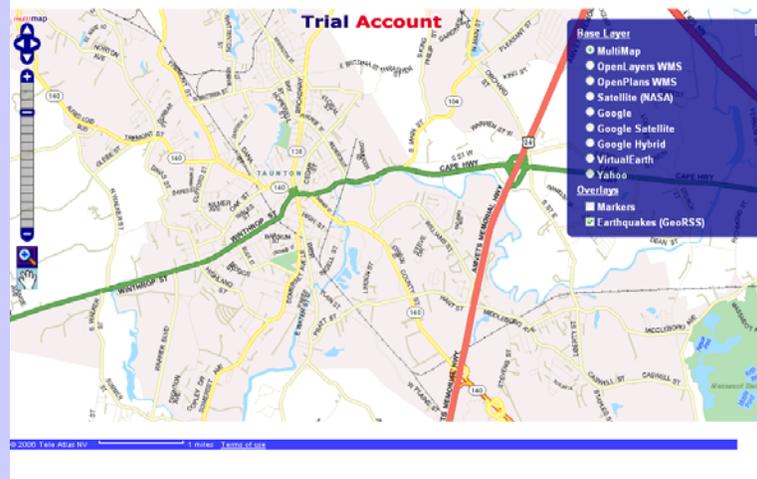
The introduction of Google Maps revolutionized internet map servers and lent a very high profile to AJAX web applications. In response to this Ka-Maps was developed but seems to be limited to tiling maps and as a web browser. Subsequently OpenLayers was developed as a full API for developing web applications. So when you have your own web map data that you want to serve out in an AJAX-like manner you should consider using OpenLayers.

A Survey of Open Source Geospatial Software Internet Map Servers (cont.): AJAX Mapping Type Interfaces (cont.)

<http://openlayers.org/gallery/multiple.html>

OpenLayers: Multiple Providers

With the click of a button, OpenLayers can change between a half dozen providers.



This application can use geodata from a variety of sources including Google Maps. It is very responsive and an excellent example of using OpenLayers.

A Survey of Open Source Geospatial Software An (incomplete) List of Open Source Geospatial Software (cont.)

Raster and Vector Format Transformation via GDAL/OGR

- supports many different raster & vector data formats
- is used as an API in many different open source and commercial applications
- has a command line mode that can be used to translate and transform geodata

This software is relied upon by many geospatial applications, and by high-profile commercial applications

A Survey of Open Source Geospatial Software An (incomplete) List of Open Source Geospatial Software (cont.)

Raster and Vector Format Transformation via GDAL/OGR

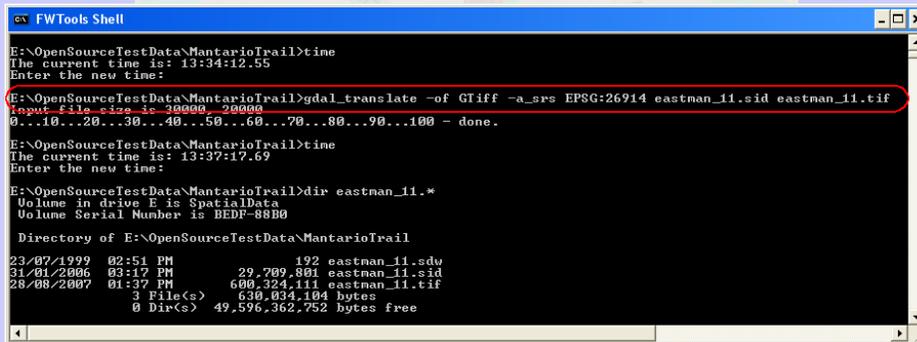
- * gdalinfo - report information about a file.
- * gdal_translate - Copy a raster file, with control of output format.
- * gdaladdo - Add overviews to a file.
- * gdalwarp - Warp an image into a new coordinate system.
- * gdaltindex - Build a MapServer raster tileindex.
- * gdal_contour - Contours from DEM.
- * rgb2pct.py - Convert a 24bit RGB image to 8bit paletted.
- * pct2rgb.py - Convert an 8bit paletted image to 24bit RGB.
- * gdal_merge.py - Build a quick mosaic from a set of images.
- * gdal_rasterize - Rasterize vectors into raster file.
- * nearblack - Convert nearly black/white borders to exact value.
- * gdal-config - Get options required to build software using GDAL.

This is a list of the various command line utilities for GDAL for working with raster data.

A Survey of Open Source Geospatial Software

An (incomplete) List of Open Source Geospatial Software (cont.)

Raster and Vector Format Transformation via GDAL/OGR (via the FWTools Shell)



```
FWTools Shell
E:\OpenSourceTestData\MantarioTrail>time
The current time is: 13:34:12.55
Enter the new time:
(E:\OpenSourceTestData\MantarioTrail>gdal_translate -of GTiff -a_srs EPSG:26914 eastman_11.sid eastman_11.tif
Input file size is 30000 20000
0..10..20..30..40..50..60..70..80..90..100 - done.
E:\OpenSourceTestData\MantarioTrail>time
The current time is: 13:37:17.69
Enter the new time:
E:\OpenSourceTestData\MantarioTrail>dir eastman_11.*
Volume in drive E is SpatialData
Volume Serial Number is BEDF-88B0

Directory of E:\OpenSourceTestData\MantarioTrail

23/07/1999  02:51 PM                192 eastman_11.sdv
31/01/2006  03:17 PM           29,709,801 eastman_11.sid
28/08/2007  01:37 PM           600,324,111 eastman_11.tif
             3 File(s)           630,034,104 bytes
             0 Dir(s)          49,596,362,752 bytes free
```

The `gdal_translate` command specifies a translation from one raster format to another

`-of` = output format system `-a_srs` = output coordinate reference
`eastman_11.sid` = input file `eastman_11.tif` = output file

This instance of the `gdal_translate` command translates from MrSID format to GeoTIFF format specifying that the output image is in the EPSG 26914 coordinate reference system (NAD83 UTM Zone 14)

The MrSID format is proprietary to LizardTech. FWTools has incorporated their SDK to allow the reading of this format. The amount of image compression in the MrSID format can be seen by comparing the file sizes of the `.sid` and `.tif` files.

A Survey of Open Source Geospatial Software

An (incomplete) List of Open Source Geospatial Software (cont.)

Raster and Vector Format Transformation via GDAL/OGR – listing raster image information

```
Command Line Environment
C:\OpenSourceTestData\MantarioTrail>gdalinfo eastman_11.tif
Driver: GTiff/GTiff
Size is 30000, 20000
Coordinate System is:
PROJCS["unnamed",
  GEOGCS["NAD83",
    DATUM["North American Datum 1983",
      SPHEROID["GRS 1980", 6378137, 298.257222, 0, 10002,
        AUTHORITY["EPSG","7819"]],
      PRIMEM["Greenwich", 0],
      UNIT["degrees", 0.0174532925199433],
      AUTHORITY["EPSG","4269"]],
    PROJECTION["Transverse_Mercator",
      PARAMETER["latitude_of_origin", 0],
      PARAMETER["central_meridian", -99],
      PARAMETER["scale_factor", 0.9996],
      PARAMETER["false_easting", 500000],
      PARAMETER["false_northing", 0],
      UNIT["metre",
        AUTHORITY["EPSG","9001"]],
      AUTHORITY["EPSG","26914"]],
    Origin = (720300, 0000000000000000, 5590000, 0000000000000000)
  ], Pixel Size = (2.000000000000000, 2.000000000000000)
Metadata:
  AREA_OR_POINT=Area
  IMAGE_INPUT_NAME=D:\compres_mrsid\7205550.tif, D:\compres_mrsid\7205560.tif, D:\compres_mrsid\7205570.tif, D:\compres_mrsid\7205580.tif, D:\compres_mrsid\7305550.tif, D:\compres_mrsid\7305560.tif, D:\compres_mrsid\7305570.tif, D:\compres_mrsid\7305580.tif, D:\compres_mrsid\7405550.tif, D:\compres_mrsid\7405560.tif, D:\compres_mrsid\7405570.tif, D:\compres_mrsid\7405580.tif, D:\compres_mrsid\7505550.tif, D:\compres_mrsid\7505560.tif, D:\compres_mrsid\7505570.tif, D:\compres_mrsid\7505580.tif, D:\compres_mrsid\7605550.tif, D:\compres_mrsid\7605560.tif, D:\compres_mrsid\7605570.tif, D:\compres_mrsid\7605580.tif, D:\compres_mrsid\7705550.tif, D:\compres_mrsid\7705560.tif, D:\compres_mrsid\7705570.tif, D:\compres_mrsid\7705580.tif
  STW.tif, D:\compres_mrsid\7705590.tif
  INPUT_FILES=SIZE=600963928, 0000000
  IMAGE_COMPRESSION_VERSION=1.9.0
  IMAGE_LARGE_COMPRESSION_RATIO=20.0000000
  IMAGE_COMPRESSION_NLEV=6
  IMAGE_COMPRESSION_HEIGHT=4, 0000000
  IMAGE_COMPRESSION_GWMA=2, 0000000
  IMAGE_COMPRESSION_BLOCK_SIZE=1024
  IMAGE_CREATION_DATE=Fri Jul 23 14:07:51 1999
  IMAGE_WIDTH=30000
  IMAGE_HEIGHT=20000
  IMAGE_NO_DATA_VALUE=0
```

The GDALINFO command lists information about a raster image

This is the GeoTIFF image that was created by the gdal_translate function

A Survey of Open Source Geospatial Software An (incomplete) List of Open Source Geospatial Software (cont.)

Raster and Vector Format Display and
Processing via FWTools

website: <http://fwtools.maptools.org/>

- is a custom built package containing OpenEV, GDAL/OGR, PROJ.4, MapServer
- supports many different raster & vector data formats
- Provides a GUI interface to many of the GDAL/OGR facilities
- Supports interactive vector data editing
- Many raster image processing functions are available

This package installed in Windows provides a GUI environment called OpenEV and a command shell which can be used to access the GDAL and OGR utilities.

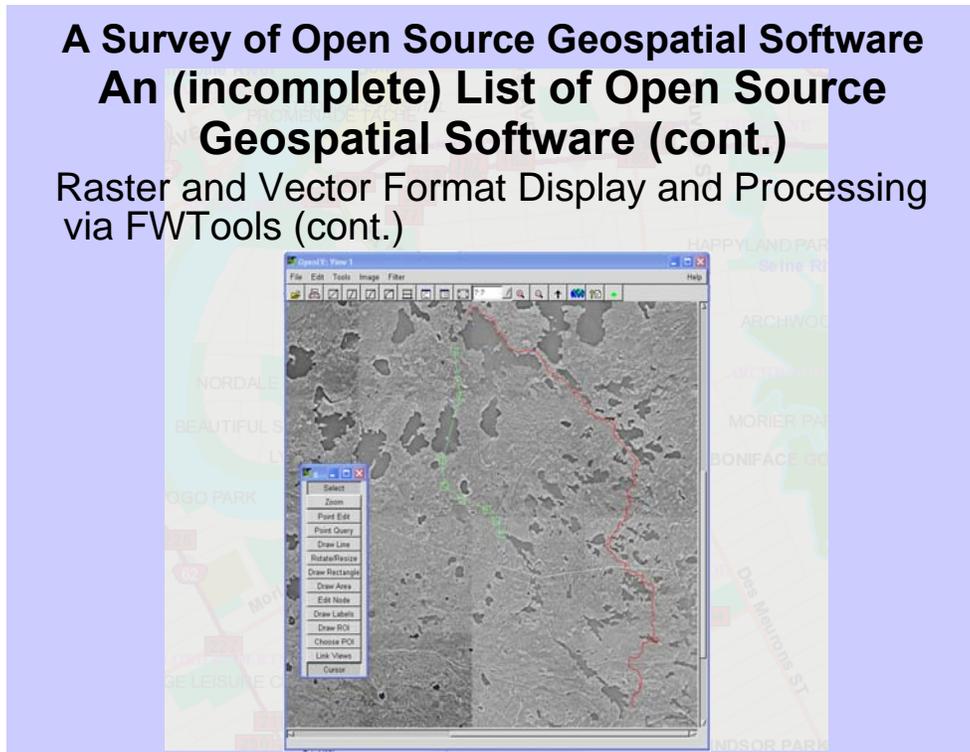
This software has many external libraries packaged with it which support additional raster formats such as MrSID, MODIS HDF, ECW, and JPEG2000. These libraries are not included in the release of GDAL and have to be acquired separately.

Raster data format conversion and processing can be done via a GUI interface

Some basic vector editing can be done visually

A Survey of Open Source Geospatial Software An (incomplete) List of Open Source Geospatial Software (cont.)

Raster and Vector Format Display and Processing
via FWTools (cont.)



This display shows two MrSID images with the Mantario trail drawn in red. The green line is a new line created in OpenEV on a new layer.

A Survey of Open Source Geospatial Software An (incomplete) List of Open Source Geospatial Software (cont.)

Spatial Databases

- PostgreSQL PostGIS Geospatial Extension
 - supports OGC geometry types
 - supports spatial queries
 - is supported by open source map servers
 - is supported by GDAL/OGR
 - forms the backbone of spatial infrastructures in many organizations
 - is used/supported by many commercial systems

This spatial database is the most widely used next to Oracle.

This supports buffering and spatial selection of features that intersect polygons

A Survey of Open Source Geospatial Software An (incomplete) List of Open Source Geospatial Software (cont.)

Spatial Databases (cont.)

- MySQL
 - has limited spatial capabilities
 - no support for spatial queries other than spatial extent

MySQL has not benefited from the spatial development that PostGIS has. It is a popular database and it has been available in native Windows and Unix versions for longer than PostgreSQL has and has built up a large user base.

A Survey of Open Source Geospatial Software An (incomplete) List of Open Source Geospatial Software (cont.)

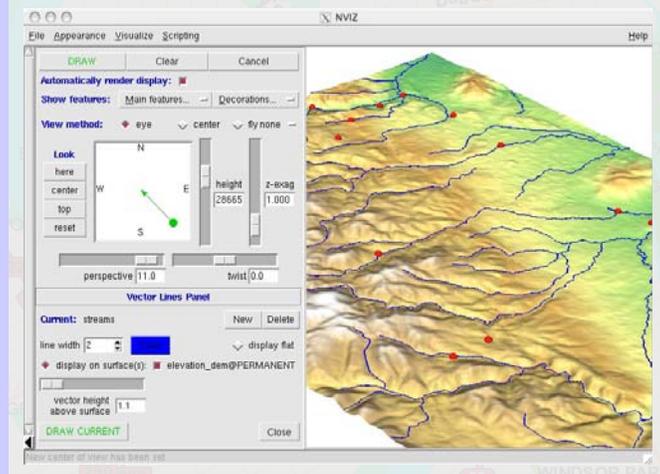
Image Processing Software

- GRASS & JGRASS (Geographic Resources Analysis Support System)
 - A popular and widely used image analysis system
 - has vector processing capabilities, including building topology
 - has interfaces to other FOSS GIS software such as QGIS, uDig and MapServer
 - in 2006 a Java version (JGRASS) with a modern GUI interface went into development

I have no experience with this software other than talking to users of it, experimenting with JGRASS a little and perusing the user manual. This seems to be one of the few open source applications with topological processing

A Survey of Open Source Geospatial Software An (incomplete) List of Open Source Geospatial Software (cont.)

GRASS & JGRASS (Geographic Resources
Analysis Support System) <http://grass.itc.it/>



This project is a project member of OSGeo. This picture was taken from the GRASS web page on the OSGEO site.

A Survey of Open Source Geospatial Software An (incomplete) List of Open Source Geospatial Software (cont.)

Image Processing Software (cont.)

OSSIM - Project member of OSGeo - <http://www.ossim.org>

- Open Source Software Image Map (OSSIM) is a high performance engine for remote sensing, image processing, geographical information systems and photogrammetry. It has been actively developed since 1996.
- OSSIM has been funded by several US government agencies in the intelligence and defense community and the technology is currently deployed in research and operational sites.
- Designed as a series of high performance software libraries, it is written in C++ employing the latest techniques in object-oriented software design. Many command line utilities, GUI applications, and integrated systems have been implemented - several of which are included with the software distribution.

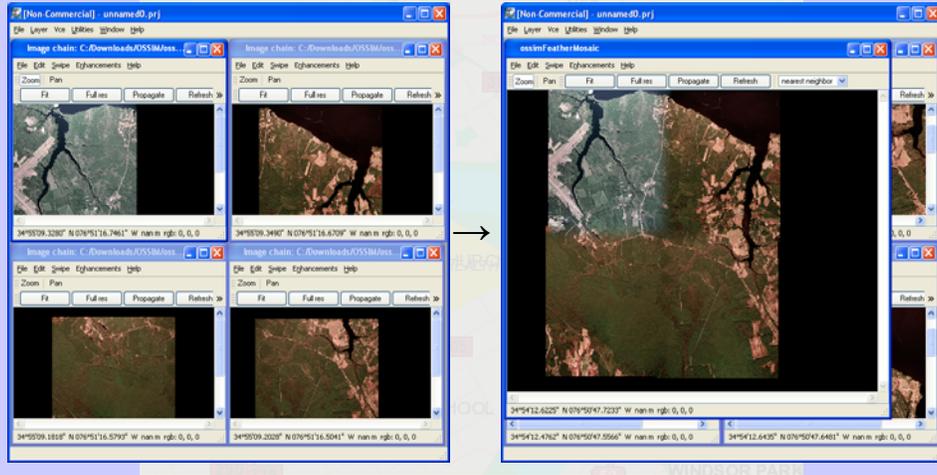
All of this text was taken from the OSSIM page on the OSGEO site.

A Survey of Open Source Geospatial Software

An (incomplete) List of Open Source Geospatial Software (cont.)

Image Processing Software (cont.)

OSSIM – Blending Images



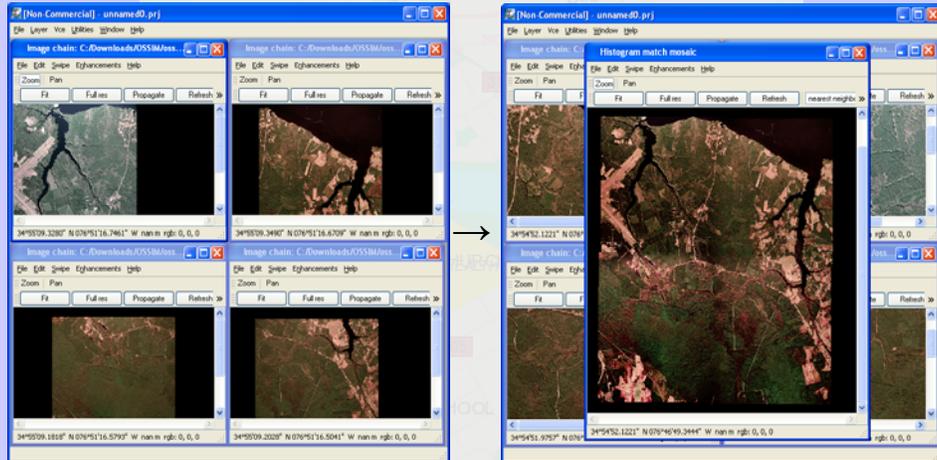
OSSIM provides three ways of combining images, mosaicing, blending and feathering which allows for a variety of effects when combining images. The image on the right has been feathered.

A Survey of Open Source Geospatial Software

An (incomplete) List of Open Source Geospatial Software (cont.)

Image Processing Software (cont.)

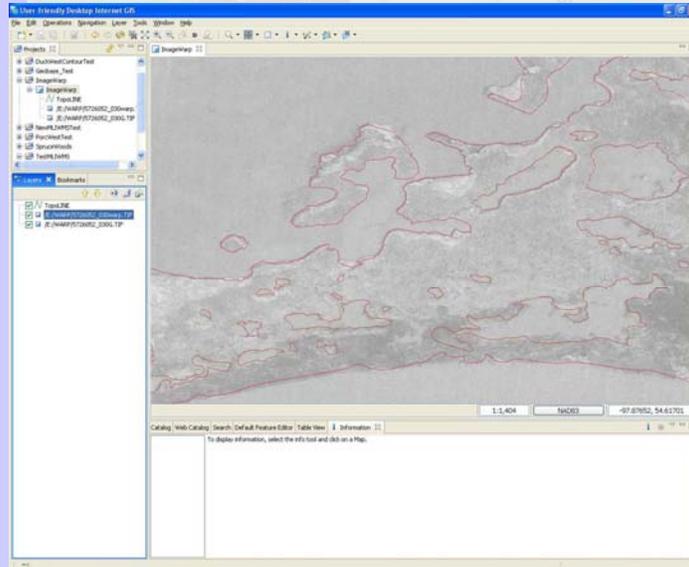
OSSIM – Histogram Match



Here OSSIM is matching the image colours of four images together. The first image opened is the one that others are matched to. There should be some overlap between the images in order for this matching to be performed well.

A Survey of Open Source Geospatial Software Image Processing Software (cont.)

OSSIM – Image Warping



OSSIM allows for the warping of imagery by selecting points in an image and by providing the ground control coordinates (Lat/Long) and then performing a fit of the image coordinates to the ground coordinates. This image was a TIF file from the Cross Lake area and it was fitted to topographical mapping of the area. The coordinates of the mapping were obtained by using the uDig open-source program. The two images superimposed upon each other in this slide illustrate the warping that was done within the image.

A Survey of Open Source Geospatial Software An (incomplete) List of Open Source Geospatial Software (cont.)

Desktop GIS Clients

- uDig – User-Friendly Internet GIS
 - Development led by Refrations Research, Victoria, B.C. (developers of PostGIS)
 - is a very active development project with independent international developers participating and developing extensions
 - has support for PostGIS, Geoserver, image and vector data
 - supports reprojection on-the-fly of vector data
 - supports editing and creating vector data

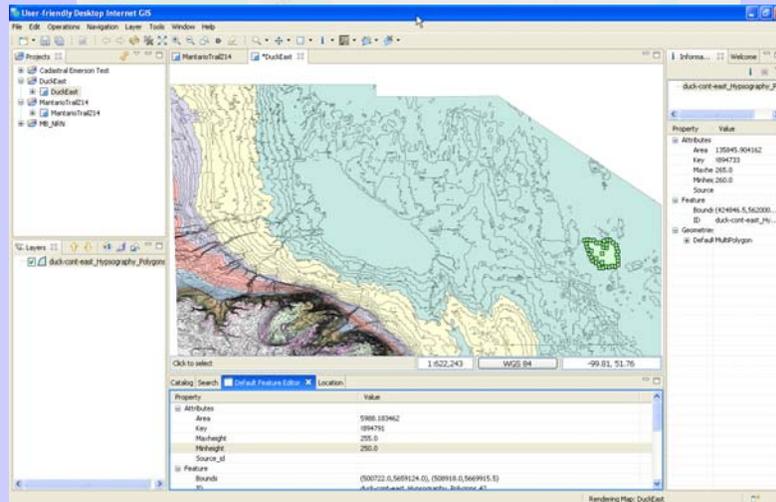
This desktop GIS supports connections to WMS and WFS servers, databases, and raster and vector files.

I have found that this program provides a great connection to our MLI WMS server.

A Survey of Open Source Geospatial Software

An (incomplete) List of Open Source Geospatial Software (cont.)

uDig – User-Friendly Internet GIS

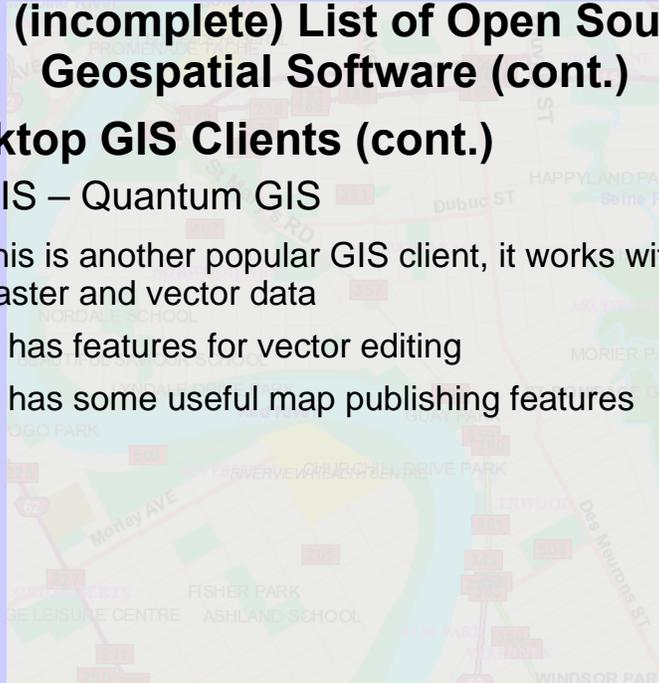


This shows uDig with the Duck Mountains East contour SHAPE file (from Manitoba) opened with one contour polygon selected for editing. The polygon attributes are shown on the right side of the window and the bottom of the window shows the attributes and the coordinates.

A Survey of Open Source Geospatial Software An (incomplete) List of Open Source Geospatial Software (cont.)

Desktop GIS Clients (cont.)

- QGIS – Quantum GIS
 - this is another popular GIS client, it works with both raster and vector data
 - it has features for vector editing
 - it has some useful map publishing features

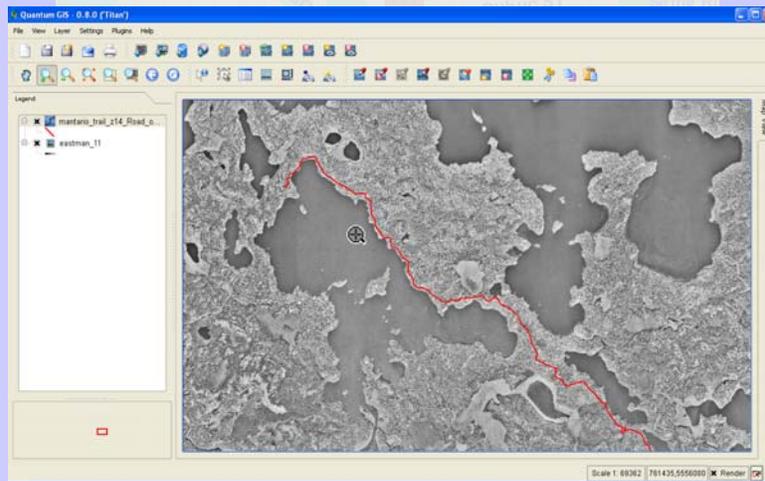


A Survey of Open Source Geospatial Software

An (incomplete) List of Open Source Geospatial Software (cont.)

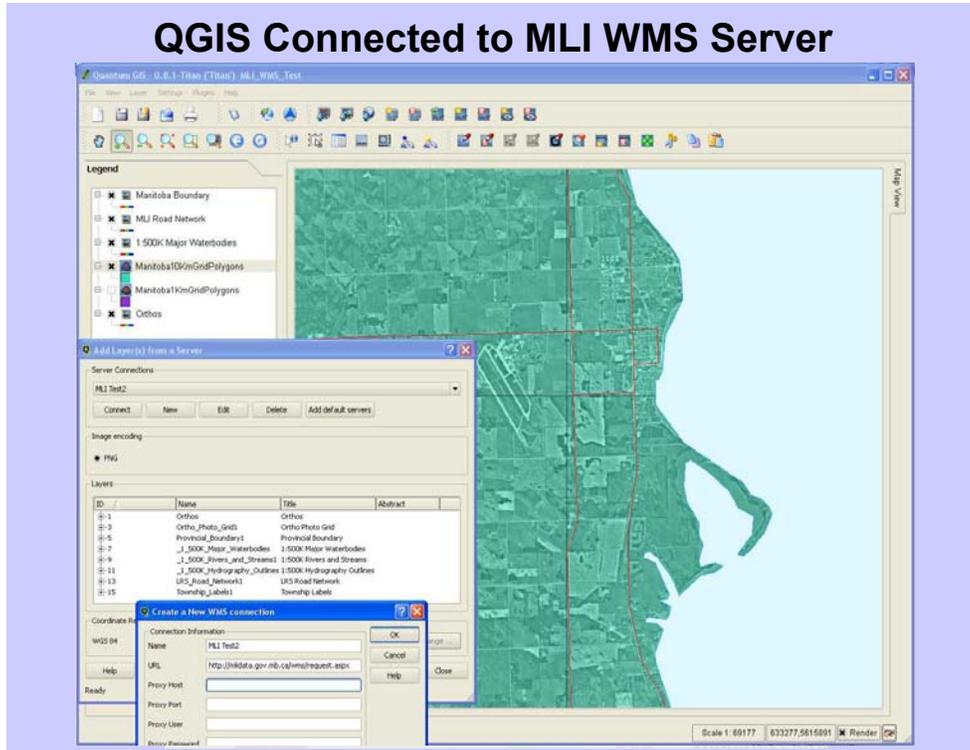
Desktop GIS Clients (cont.)

- QGIS – Quantum GIS



This graphic shows the GeoTIFF file that was created by GDAL with the vector SHAPE file of the Mantario trail superimposed upon it.

QGIS Connected to MLI WMS Server



The MLI WMS connection and layers are shown here. There are several MLI WMS layers displayed with the Orthophotography layer at the bottom and a 10Km grid with transparency set shown above it and the 1:500K water layer from the WMS server and the MLI road network shown above that. This is the same MLI WMS data that was shown earlier in the browser capture.

A Survey of Open Source Geospatial Software An (incomplete) List of Open Source Geospatial Software (cont.)

Desktop GIS Clients (cont.)

- gvSIG
 - this is an application being developed in Spain and that is licensed under the GPL
 - vector formats supported: SHAPE, DXF, DGN, DWG
 - raster formats supported: ECW, MrSID, JPEG, jp2, TIFF, GeoTIFF, PNG, GIF
 - <http://www.gvsig.gva.es/index.php?id=gvsid&L=2>
 - has vector editing commands and processes such as buffering, clipping, dissolving, merging, union, intersection, spatial join, difference

Development of this software began at about the same time as development of uDig.

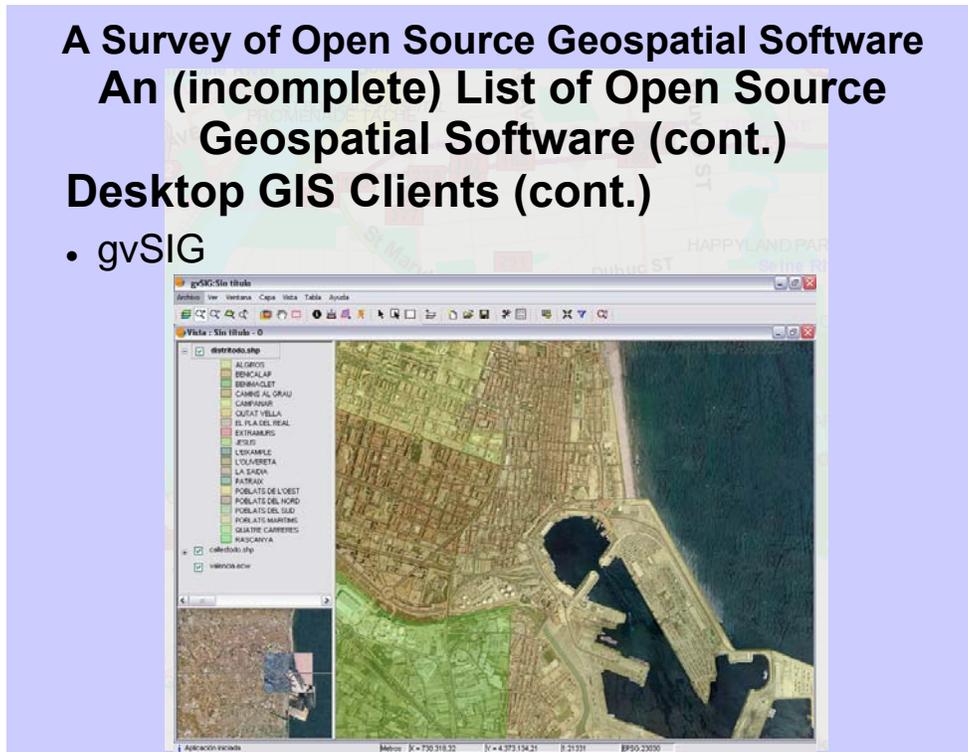
This software appears to have an excellent collection of spatial tools and supported raster and vector formats

A Survey of Open Source Geospatial Software

An (incomplete) List of Open Source Geospatial Software (cont.)

Desktop GIS Clients (cont.)

- gvSIG



This is a picture taken from the Wikipedia page on gvSIG, it shows vector polygon data symbolized with transparency superimposed on raster imagery.

A Survey of Open Source Geospatial Software An (incomplete) List of Open Source Geospatial Software (cont.)

Desktop GIS Clients (cont.)

- Kosmo
 - this is being developed in Spain by a company called SAIG
 - it is being advertised at the “first Corporate Free GIS Platform” and is licensed under the GPL
 - <http://www.saig.es/en/kosmo.php>
 - supports vector editing and topological control
 - currently supports DXF, SHAPE vector formats and Oracle, MySQL, PostGIS databases and ECW, MrSID, Tiff & GeoTIFF imagery
 - future support is planned for WMS, WFS and DWG

This is yet another GIS from Spain

Development seems to be controlled by a private company, not sure how this will affect its future

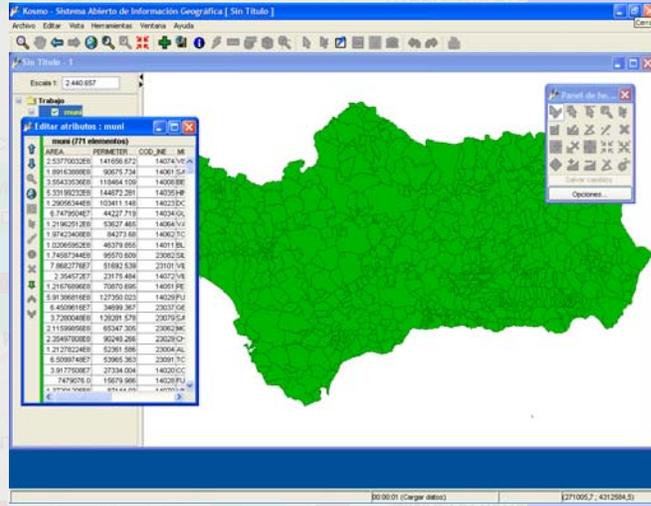
This is in the early stage of development, it is uncertain what the future of this will be

A Survey of Open Source Geospatial Software

An (incomplete) List of Open Source Geospatial Software (cont.)

Desktop GIS Clients (cont.)

- Kosmo



This picture was obtained from the Wikipedia entry for Kosmo.

A Survey of Open Source Geospatial Software

Kanton of Solothurn Spatial Data Architecture

KANTON solothurn
Amt für Geoinformation - Department of Geoinformation

Abteilung SOGIS Koordination - Bureau of SOGIS Coordination

The canton of Solothurn is a Swiss province located in the western part of the country. SOGIS is the synonym for the GIS-infrastructure of the Solothurn state government. More than 2000 people are working daily with these GIS infrastructure.

Since 2001 the whole governmental IT infrastructure will be migrated from MS Windows to RedHat Linux. As a result of this migration in autumn 2002 SOGIS began to migrate the GIS infrastructure from ESR software products to an open source GIS software strategy. Desktop GIS will be build by GRASS and QGIS, for the future these two systems will replace the UNIX ArcInfo workstations and ArcView 3.

More than 300 geographical themes are stored in a PostgreSQL/PostGIS DB. These informations are distributed mostly by LIN MapServer and are integrated in many governmental business processes. At the moment 50 projects are realized. The main approach of data modelling leads to the goal of data free of redundancy. This is achieved by a strong process of data normalisation and modelling. As the result we can achieve a significant enhancement of data and information quality.

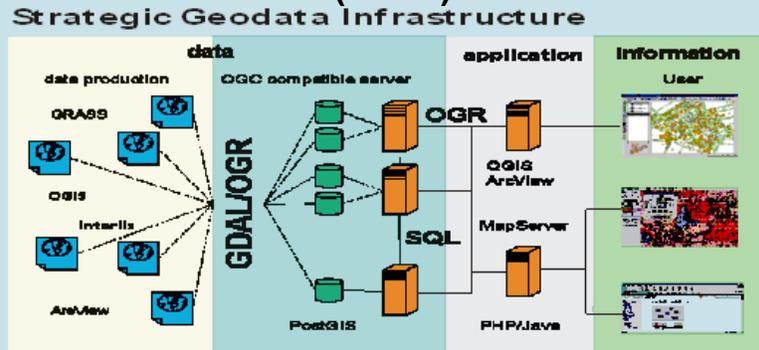
Since 2006 most of these data are free available for free use via SOIDATA (<http://www.sogisf1.so.ch/sogis/OnLineData.php/index.php>).

SOGIS works together with partners from local, state and national level with the intension to participate to the construction of the Swiss NSDI.

The kanton of Solothurn, located in the north west of Switzerland and has a mostly German speaking population of about 250,000 people.

They have built a spatial data infrastructure entirely using open source software. The next slides will show information about this

A Survey of Open Source Geospatial Software Kanton of Solothurn Spatial Data Architecture (cont.)



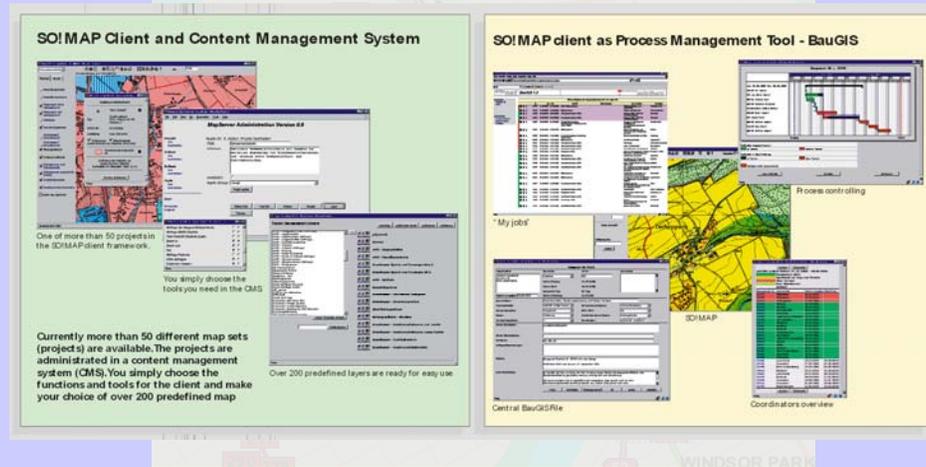
implemented components (Open Source)

- / PostgreSQL/PostGIS DB as Data Warehouse
- / OGR/GDAL for data Import/Export
- / Apache/PHP as application server
- / UMN MapServer for publishing data/applications

Here we see an architectural diagram showing the data residing in PostgreSQL/PostGIS databases being served by Apache and PHP and being transformed using GDAL/OGR

A Survey of Open Source Geospatial Software

Kanton of Solothurn Spatial Data Architecture (cont.)



This slide shows the various interfaces to the Solothurn spatial infrastructure. They have a variety of ways of accessing geodata, from download of files, to a map interface client (shown earlier), to WMS and WFS services.

A Survey of Open Source Geospatial Software

Attend: www.FOSS4G2007.org



This is THE forum for user and developers of open-source geospatial software to meet and get to know each other and educate each other and collaborate on future developments and have fun. The developers of GRASS, PostGIS, MapServer, uDig will most certainly be there along with the developers of many other applications. This community is worldwide and the attendance at this event will come from around the world. Many of the leaders in this field are Canadians and there is always a strong Canadian contingent at these events.

A Survey of Open Source Geospatial Software

