Existing Open Source Tools and Possibilities for Cadastre Systems

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What is FLOSS? What is open source?

What open source software tools are available? Which ones are useful in Cadastre Systems?

Are they any good?
What is FLOSS

FLOSS stands for Free / Libre and Open Source Software. FLOSS is a combination of two movements:

Free Software Foundation

Software that can be used, copied, studied, modified and redistributed without restriction

Open Source Initiative

Software in which the source code is available for modification and redistribution by the general public

What is source code

```java
for (int i = bitSet.nextSetBit(0); i >= 0; i = bitSet.nextSetBit(i+1))
    statusMessage = "Procesando registro " + i;
    Geometry g;
    g = inputLayer.getSource().getShape(i);
    Coordinate[] coords = g.getCoordinates();
    if (coords.isEmpty())
        continue;
    Coordinate[] linePts = CoordinateArrays.removeRepeatedPoints(coords);
    Coordinate startPt = linePts[0];
    Coordinate endPt = linePts[linePts.length - 1];
    NodeError nStart = (NodeError) nodeMap.find(startPt);
    NodeError nEnd = (NodeError) nodeMap.find(endPt);
    if (nStart == null)
        nStart = new NodeError(startPt);
        nodeMap.add(nStart);
    else
        nStart.setOccurrences(nStart.getOccurrences() + 1);
    if (nEnd == null)
        nEnd = new NodeError(endPt);
        nodeMap.add(nEnd);
    else
        nEnd.setOccurrences(nEnd.getOccurrences() + 1);
```

Source code

COMPILE

Binaries (machine code)
The FLOSS world

- OSS repositories: Sourceforge.net, Freshmeat, Savannah and many others
- 52º North Initiative hosts geospatial open source projects
- OSGEO supports and promotes the development of open source geospatial technology and organizes FOSS4G conferences
- OGC is setting standards for interoperability of geospatial information
OGC interoperability standards

• Web Map Service (WMS)
• Web Feature Service (WFS)
• Transactional Web Feature Service (WFS-T)

Digital Land Administration Systems

There are many variations resulting from different laws and practices in land administration.

Most land administration systems use relational database software with spatial data engines to store the data; GIS software; and cadastral and surveying applications.

All software components must be customized and adapted to fit legal requirements, there are no out of the box solutions.
Software components in cadastre systems

• Database technology is used to store, maintain and control access to large amounts of data
• Large differences in table design, queries, reporting functions and system architecture, but the underlying technology is the same
• Oracle with Oracle Spatial is the most common repository for digital cadastral systems
• FLOSS alternatives exist: PostgreSQL / PostGIS, MySQL, SQLite / SpatiaLite

FLOSS database alternatives
PostgreSQL

Mature and reliable open source database software

PostgreSQL has become the standard spatial database for open source GIS tools

PostgreSQL is not more difficult to install and use than proprietary database software

PostGIS

PostGIS adds spatial functions to PostgreSQL such as Intersects(), Overlaps(), Within()

With PostGIS, you can store and manage geographic datasets in PostgreSQL

FIG Congress 2010
Facing the Challenges – Building the Capacity
Sydney, Australia, 11-16 April 2010
An easy way to convert your GIS data to PostGIS format is by converting it first to Shapefile, and then to PostGIS.

Most open source desktop GIS can connect directly to PostGIS...
... and edit geographic data that is stored in PostgreSQL

Open source desktop GIS

Recent developments have lead to a number of free open source desktop GIS
All are user-friendly and easy to download and install, and come with raster and vector support, direct connection to PostgreSQL, topology validation tools.

Interface translations are available in a number of languages, and if your language isn't there, you can always start a new translation
GRASS

First open source GIS; development started in 1982
From command-driven, UNIX based raster GIS to a comprehensive, flexible and user-friendly GIS
Latest version (6.4) runs also on Windows

Quantum GIS

Quantum GIS was initially developed as a light-weight front end to GRASS, but is now a very functional desktop GIS on its own with connections to PostGIS, MySQL and SpatiaLite. The latest version 1.4 (Enceladus) has 30 (!) new functionalities
uDIG

Development started by Refractions Research in 2004

Advanced editing and spatial analysis tools through the Axios plugin

Complete integration with OGC Web services; supports editing of WFS layers from GeoServer through WFS-T

gvSIG

Comprehensive raster and vector support

Easy to configure "locator map" to see where you are in your dataset

Very active user and developer community

Mobile version available: gvSIG Mobile
OpenJUMP and Kosmo

Same code base: Kosmo was forked from OpenJUMP in 2005
Both have many editing functions; good topology tools

Mobile GIS – gvSIG Mobile

gvSIG Mobile is a smaller version of gvSIG that can be installed on mobile devices.
Supports raster (TIFF, JPEG, PNG etc.) and vector (Shapefile) formats
Access remote WMS layers
Connect to GPS, measure areas and distances
Create points, lines and polygons
Mobile GIS - BeeGIS

BeeGIS is developed as an extension to uDIG
Designed for tablet PCs and mobile PCs
Connect to GPS; data logging
Create points, lines and polygons
Store Geonotes and pictures
Internet mapping tools

GeoServer, MapServer and Deegree are open source map server products focusing on internet mapping applications using OGC webGIS standards.

The role that FLOSS can play

Data storage

Internet

e-Governance

Creating and editing

Field data collection
But...

- Introduction of IT systems must be carefully planned and budgeted
- IT expertise is needed to set up and maintain systems
- Cost of maintenance must be taken into account

The use of FLOSS can be successful in places where:

- The government adopts a pro-FLOSS policy and include FLOSS as part of the national IT strategy
- The use of FLOSS in schools and universities is supported by the government
- Local IT companies are using FLOSS to implement IT systems
Thank you!