Lecture 10:
Open Source Computer Cartography
Open Source Computer Cartography

- Why bother?
- OSF vs. FSF
- The Cathedral and the Bazaar
- Open Source GIS
- Some examples
- What the bazaar offers
- The future
Software vs. data
Mother of All Freeware
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   (g) restrict or inhibit any other user from using and enjoying the Products or Google services;
   (h) interfere with or disrupt Google services or servers or networks connected to Google services, or disobey any requirements, procedures, policies or regulations of networks connected to Google services;
   (i) use any robot, spider, site search/retrieval application, or other device to retrieve or index any portion of the Google services or Content, or collect information about users for any unauthorized purpose;
   (k) submit content that falsely expresses or implies that such content is sponsored or endorsed by Google;
   (l) create user accounts by automated means or under false or fraudulent pretenses;
Software as a spectrum

Proprietary
Freeware
Open source
What is Open Source?

Open Source Initiative

1. Free Redistribution
2. Source Code
3. Derived Works
4. Integrity of The Author's Source Code
5. No Discrimination Against Persons or Groups
6. No Discrimination Against Fields of Endeavor
7. Distribution of License
8. License Must Not Be Specific to a Product
9. License Must Not Restrict Other Software
10. License Must Be Technology-Neutral
OSI vs. FSF

The term “open source” software is used by some people to mean more or less the same category as free software. It is not exactly the same class of software: they accept some licenses that we consider too restrictive, and there are free software licenses they have not accepted. However, the differences in extension of the category are small: nearly all free software is open source, and nearly all open source software is free.

The nice thing about standards

39 Open Source License types

40 Types in Free Software Community

Examples: Academic Free License, Common Public License, GNU General Public License, Zope Public License

Other standards: e.g. Copyleft, Media Commons, Wiki, creative commons
First edition 1999
Web essays included the “Cathedral and the Bazaar” and “Revenge of the Hackers” dating back to 80s
Compares 'cathedral' top-down model of software development to 'bazaar' model represented by Linux
The Cathedral

- Central planning and design
- Takes years to build
- Divide and conquer approach
- Code for wages
- “Customer driven”
- Feature and version approach
- Teams and internal competition
The Bazaar

- Little planning at all
- Change is instantaneous
- Competition and cooperation
- Code for bragging rights
- Customers and shopkeepers
- Whatever works best
“Given enough eyeballs, all bugs are shallow.”

Linus’ Law
Open Source GIS

- Basis in standards: OGC critical, but others e.g. GeoVRML, X11
- Includes code level tools, scripts, libraries, and utilities
- Clearinghouses for information: e.g. opensource.org
- Support fora, wikis, lists, etc
- Whole GIS systems e.g. GRASS, QGIS
- Whole web-based support systems e.g. MapServer
Geospatial and location standards for:

- Aviation
- Built Environment & 3D
- Business Intelligence
- Defense & Intelligence
- Emergency Response & Disaster Management
- Geosciences & Environment
- Government & Spatial Data Infrastructure
- Spatial Policy
- Interoperability
- Share
- Open
- Points of Interest
- Geoweb
- Open Data
- Information Integration
- Geosynchronization
- Situational Awareness
- Earth Observation
- Analysis
- Crowdsourcing
- CAD
- Monitoring
- Location
- BIM
- Open Source
- Navigation
- Hydrology
- GIS
- Sensor Web
- Map
- Where
- Linked Data
- Geosensorics
- Places
- Linked Data
- Climate
- Time
- Shared Understanding
- SDI
- GPS
- Indoor/Outdoor
- Metadata
- Data Quality
Sample code libraries

cgal.org: CGAL Open Source Project to provide easy access to efficient and reliable geometric algorithms in the form of a C++ library

OGR: Simple features library, C++ open source library (and commandline tools) providing R/W access to vector file formats

GEOS: Geometry Engine - Open Source, C++ port of the Java Topology Suite (JTS)

GTK: graphics Toolkit, with UI, libraries etc

OpenGL, OpenCV: C and C++ libraries
CGAL: Mesh_3 tet_mesh = CGAL::make_mesh_3();
Shapelib: C library

Shapefile C Library

Purpose
The Shapefile C Library provides the ability to write simple C programs for reading, writing and updating (to a limited extent) ESRI Shapefiles, and the associated attribute file (.dbf).

Supporting Information
- Shapefile API Docs
- DBFiBase API Docs
- Shapefile Tools Docs
- Release Notes
- Shapelib File Manifest
- Shapelib Licensing Terms

What is a Shapefile?
If you don’t know, you probably don’t need this library. The Shapefile format is a working and interchange format promulgated by ESRI for simple vector data with attributes.

An excellent white paper on the shapefile format is available from ESRI, but it is PDF format, so you will need Adobe Acrobat to browse it.

The file format actually consists of three files:
- XXX.shp - holds the actual vertices.
- XXX.shx - holds index data pointing to the structures in the .shp file.
- XXX.dbf - holds the attributes in dBase (dBase) format.

Download
Source code, and some other odds and ends can be downloaded from http://download.esri.com/shapelib.

Shapelib is available for anonymous CVS access:

cvs -d:pserver:anonymous@esri.maptools.org:/cvs/maptools/cvsroot login
Password: (hit enter)
cvs -d:pserver:anonymous@esri.maptools.org:/cvs/maptools/cvsroot co shapelib
Sample software tools

TARDEM, A suite of programs for the Analysis of Digital Elevation Data

Merkaartor is an OpenStreetMap editor distributed under the GNU General Public License

Worldwind: browser tool for geospatial data
Sample freeware

FlexProjector: Java
MapShaper: Java tools using shapelib
LandSerf: Java
MicroCAM
MicroDEM

Many open versions of common packages, e.g. ArcGISOnline, LAStools, etc: Payment unlocks parts of code unavailable to simple download

Often make student version free
Open Source Tools Clearinghouses

http://opensourcegis.org/
http://freegis.org/
http://www.geotools.org/ (Java libraries)
http://mapnik.org/
http://mapguide.osgeo.org/
Welcome to MapServer

MapServer is an Open Source platform for publishing spatial data and interactive mapping applications to the web. Originally developed in the mid-1990's at the University of Minnesota, MapServer is released under an MIT-style license, and runs on all major platforms (Windows, Linux, Mac OS-X). MapServer is not a full-featured GIS system, nor does it aspire to be.

The MapServer Project Steering Committee (PSC), sanctioned by OSGeo, manages and administers the project which is maintained, improved, and supported by developers and users from around the world. See the community activities page for mailing lists, etc.

More about MapServer

MapServer Suite Home

MapServer, MapCache, TinyOWS home

Download the MapServer Suite

Download the suite

Recent Announcements

2017-01-16 - MapServer 7.0.4, 6.4.5, 6.2.4, and 6.0.6 are released
# Open Source GIS

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Website</th>
</tr>
</thead>
<tbody>
<tr>
<td>QGIS</td>
<td>Quantum GIS—QGIS is a user friendly Open Source GIS that runs on Linux, Unix, Mac OS X, and Windows.</td>
<td><a href="http://www.qgis.org/">http://www.qgis.org/</a></td>
</tr>
<tr>
<td>uDig</td>
<td>uDig is an open source desktop application framework, built with Eclipse Rich Client technology.</td>
<td><a href="http://udig.refractions.net/">http://udig.refractions.net/</a></td>
</tr>
<tr>
<td>Capaware rc 1.0.1</td>
<td>General purpose virtual worlds 3D viewer. A free software project started in 2007 to promote the development of free software.</td>
<td><a href="http://www.capaware.org/">http://www.capaware.org/</a></td>
</tr>
<tr>
<td>Kalypsos</td>
<td>An Open Source GIS (Java, GML3) that focuses on water management. Supports modeling and simulation.</td>
<td><a href="http://www.ohloh.net/p/kalypsos">http://www.ohloh.net/p/kalypsos</a></td>
</tr>
<tr>
<td>TerraView</td>
<td>Desktop GIS that handles vector and raster data stored in a relational or geo-relational database, a frontend for TerraLib.</td>
<td><a href="http://www.dpi.inpe.br/terraview/index.php">http://www.dpi.inpe.br/terraview/index.php</a></td>
</tr>
<tr>
<td>GeoServer</td>
<td>GeoServer is an open source software server written in Java that allows users to share and edit geospatial data. Design: GeoServer.org.</td>
<td><a href="http://geoserver.org/display/GEOS/Welcome">http://geoserver.org/display/GEOS/Welcome</a></td>
</tr>
<tr>
<td>MapGuide Open Source</td>
<td>Web-based platform that enables users to quickly develop and deploy web mapping applications and geospatial web services.</td>
<td><a href="http://mapguide.osgeo.org/">http://mapguide.osgeo.org/</a></td>
</tr>
<tr>
<td>MapServer</td>
<td>Web-based mapping server, developed by the University of Minnesota.</td>
<td><a href="http://mapserver.org/">http://mapserver.org/</a></td>
</tr>
<tr>
<td>Spatialite for SQLite</td>
<td>Spatialite extension enables SQLite to support spatial data in a way conformant to OpenGis specifications.</td>
<td><a href="http://www.gaia-gis.it/spatialite-2.0/index.html">http://www.gaia-gis.it/spatialite-2.0/index.html</a></td>
</tr>
</tbody>
</table>
For example: uDig
For example: Quantum GIS
Graphics editors

GIMP2.0: Raster editor, filters etc. Versatile read/write capability

InkScape: vectors tools with support for SVG

SVG: Scalable Vector Graphics

XML standard to allow multiscale feature redraw

Simple specification, but large files
A square in Inkscape
square.svg: Open file in Firefox
<rect
    style="fill:none;stroke:#808080;stroke-width:3;stroke-miterlimit:4;stroke-dasharray:none;stroke-dashoffset:0"
    id="rect2985"
    width="217.64763"
    height="199.04527"
    x="189.74409"
    y="471.34842" />
</g>
</svg>
Cathedral & the Bazaar: Why?

- Release early and often vs. Versioning
- Delegate everything vs. Control everything
- Restrict nothing vs. License everything
- Copy and reuse vs. Stovepipe
- Interest rises and falls vs. Discontinued products
- Open algorithms vs. Proprietary solutions
- Toolboxes, libraries, code vs. Object modules and documentation
- Bug-free vs. Buggy
The Future

- Large software companies relying more on Open Source, microprojects abound!
- Price will converge on zero, Quality/Quantity should increase
- No more dongles or license servers
- Cyberinfrastructure, geoservices, mashups
- New social infrastructure and reward model
- Client server model to cloud and web model
- Geography can move on to spatial knowledge and learning
- Programming (and scripting) will be much more central
Summary

• Defined open source, freeware, etc
• Software as a spectrum
• The cathedral and the bazaar
• GIS, mapping software
• GIS, mapping toolkits and resources
• Advantages of OS
• Examples of Inkscape, GIMP, SVG
• The future of OS