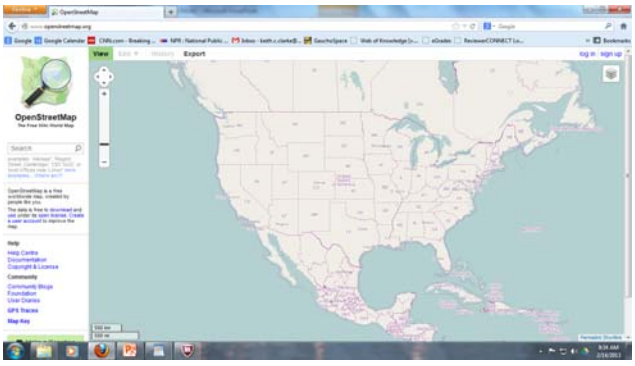
Analytical and Computer Cartography

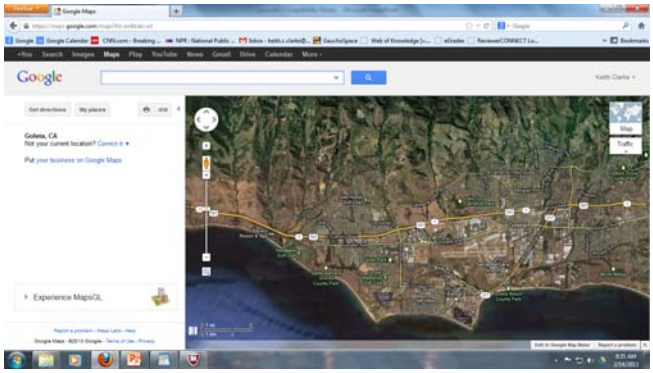
Lecture 10: Open Source Computer Cartography

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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(d) upload, post, email, transmit or otherwise make available messages that promote pyramid schemes, chain letters, or disruptive commercial messages or advertisements;
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(h) restrict or inhibit any other user from using and enjoying the Products or Google services;
(i) 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;
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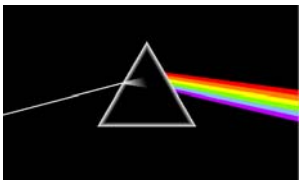
Software as a spectrum



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.

– Free Software Foundation, http://www.gnu.org/philosophy/categories.html

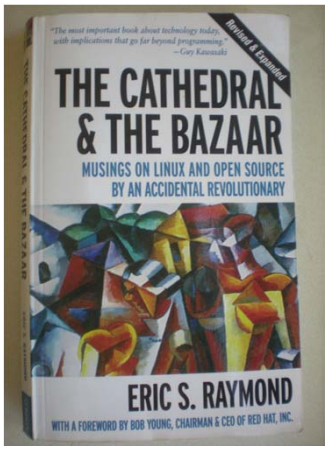
The nice thing about standards

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

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

Shapelib: C library

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

Open Source Tools Clearinghouses

http://opensourcegis.org/

http://freegis.org/

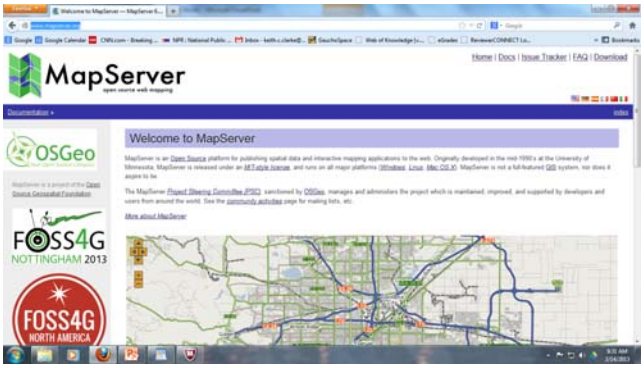
http://en.wikipedia.org/wiki/List_of_geographic_information_systems_software

http://www.geotools.org/ (Java libraries)

http://mapnik.org/

http://mapguide.osgeo.org/

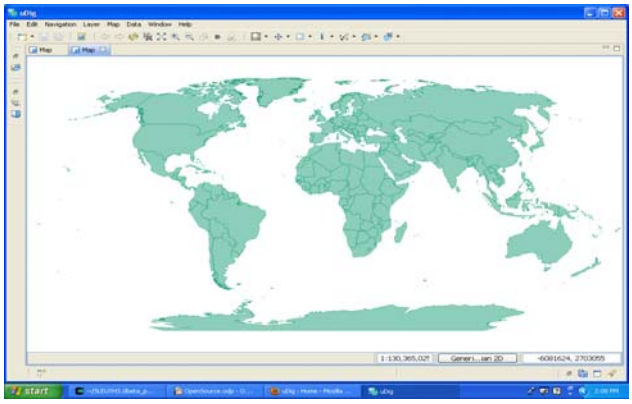
www.mapserver.org



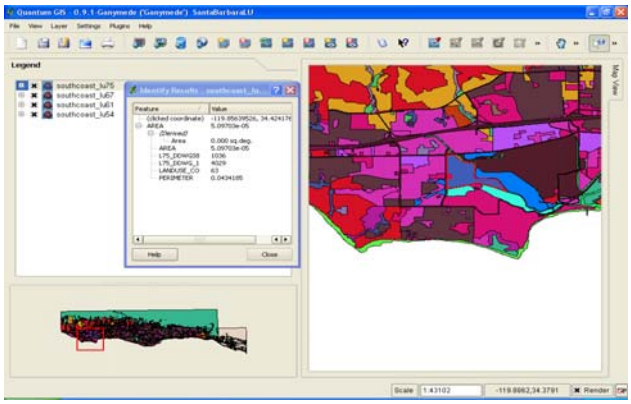
Open Source GIS

QGIS	Quantum GIS-QGIS is a user friendly Open Source GIS that runs on Linux, Unix, Mac OS X, and Windows.	http://www.qgis.org/
MapWindow GIS	Free, open source GIS desktop application and programming component.	http://www.mapwindow.org/
ILWIS	Integrated Land and Water Information System. Integrates image, vector and thematic data.	http://www.itc.nl/ilwis/
uDig	uDig is an open source desktop application framework, built with Eclipse Rich Client technology.	http://udig.refractions.net/
JUMP GIS / OpenJUMP–(O	Java Unified Mapping Platform. OpenJUMP, SkyJUMP, deeJUMP, and Kosmo emerged from JUMP.	http://www.jump-project.org/
Capaware rc1 0.1	General purpose virtual worlds 3D viewer. A free software project started in 2007 to promote the development of free sc	http://www.capaware.org/
Kalypso	An Open Source GIS (Java, GML3) that focuses on water management. Supports modeling and simulation.	http://www.ohloh.net/p/kalypso
TerraView	Desktop GIS that handles vector and raster data stored in a relational or geo-relational database, a frontend for TerraLib.	http://www.dpi.inpe.br/terraview/index.php
GeoServer	GeoServer is an open source software server written in Java that allows users to share and edit geospatial data. Design	http://geoserver.org/display/GEOS/Welcome
WebMap Server	Open source protocol and tools for serving GIS data over the Internet.	http://terraserver-usa.com/ogcwms.aspx
MapGuide Open Source	Web-based platform that enables users to quickly develop and deploy web mapping applications and geospatial web se	http://mapguide.osgeo.org/
MapServer	Web-based mapping server, developed by the University of Minnesota.	http://mapserver.org/
PostGIS	Spatial extensions for the open source PostgreSQL database, allowing geospatial queries.	http://postgis.refractions.net/
H2Spatial for	Spatial extension for an open source DBMS H2_(DBMS).	http://geosy.sin.ict.ch/rstv-trac/wiki/H2spatial/Download
SpatiaLite for SQLite	SpatiaLite extension enables SQLite to support spatial data in a way conformant to OpenGis specifications.	http://www.gaia-gis.it/spatialite-2.0/index.html
MySQL Spatial	MySQL spatial extensions following the specifcation of the Open Geospatial Consortium.	http://dev.mysql.com/doc/refman/5.0/en/spatial-extensions.html

For example: uDig



For example: Quantum GIS



Graphics editors

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

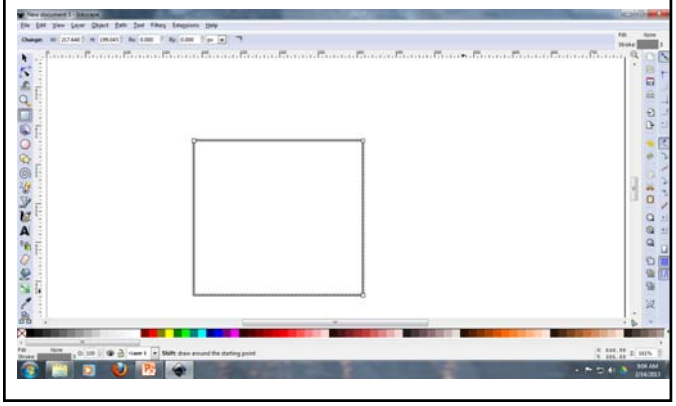
InkScape: vectors tools with support for SVG

SVG: Scalable Vector Graphics

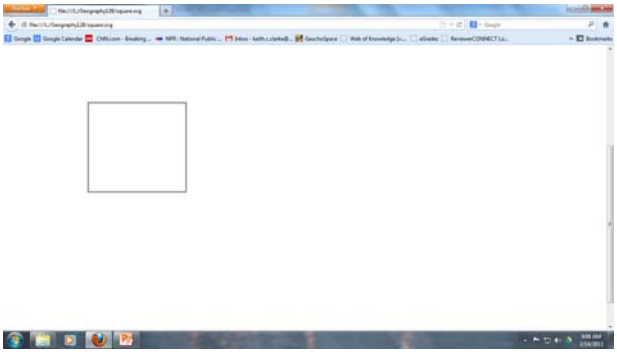
XML standard to allow multiscale feature redraw

Simple specification, but large files

A square in Inkscape



square.svg: Open file in Firefox



File header metadata

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<?xml version="1.0" encoding="UTF-8" standalone="no"?>
<!-- Created with Inkscape (http://www.inkscape.org/) -->
<svg
  xmlns:dc="http://purl.org/dc/elements/1.1/"
  xmlns:cc="http://creativecommons.org/ns#"
  xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:svg="http://www.w3.org/2000/svg"
  xmlns="http://www.w3.org/2000/svg"
```

Page and document description

```
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xmlns:inkscape="http://www.inkscape.org/namespaces/inkscape"
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  height="1052.3622047"
  id="svg2"
  version="1.1"
  inkscape:version="0.48.4 r9939"
  sodipodi:docname="New document 1">
```

Draw description

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    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