Annual Report for 2010

OSGeo Journal Volume 9 - January 2012

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Editorial

By Landon Blake

What's In This Issue

It's a year late, but the OSGeo Annual Report for 2010 has finally arrived. You have no one to blame for the delay but me. After a great deal of procrastinating and foot dragging, I finally managed to get the articles written, edited, and published. You don't want to hear excuses from me about the delay. I'll give you a brief overview of the contents of this issue instead.

Inside you'll find 2010 Annual Report items from two (2) of our software projects. The first is from the GeoTools Project, and the second is from the GRASS Project. Several of our chapters submitted 2010 Annual Report items, and they are also included. I hope you will enjoy reading about the busy activities of the software projects and chapters as I did. The annual report items help you get a clear view of how much OSGeo related activity is taking place around the globe.

We've included two (2) articles on technology related topics and an interview in this issue in addition to the annual report items. The interview is with the former executive director of OSGeo, Tyler Mitchell. In the interview we ask Tyler for his thoughts about OSGeo as an organization. We will also find out what he's been working on since he left his formal position as executive director. I was surprised by Tyler's departure, as I know many of you were, and I feel like this was a good opportunity to get some input from an "OSGeo insider". I'd like to do more interviews in future issues. An interview with each of our current OSGeo board members seems like a good place to start.

The first topical article we included in this issue discusses recent changes to the United States patent system that were created with the America Invests Act. The end of the article talks about patents and open source geospatial software specifically. I believe the topic of software patents is an important issue that all open source advocates should pay attention to. I hope this article will help. I commend the Economist Magazine, from which most of the material for the patent article was drawn, for their coverage of patents.

The second topical article discusses some utility code I developed for the JTS Topology Suite. The

utility code allows programmers to integrate bearings, distances, and angles into the JTS world. The code is released under the GPL through the SurveyOS Project on Sourceforge, and certainly reflects my professional background as a land surveyor. I welcome suggestions for improvements to the code, as well as contributions to the code base. Ragi Burhum encourages me to use more Python, so perhaps we will take a look at some Python code in the next issue.

What's Coming Up Next

Now that work on the 2010 Annual Report is complete, I'll immediately start collection items for the 2011 Annual Report. This is a consequence of my waiting so long to finish this current issue. Still, my goal is to have the 2011 Annual Report available by the end of the first quarter of this year.

I strongly encourage all OSGeo software projects, chapters, and sponsors to submit annual report items for 2011. I'd really like to see more participation. I will make the process of submitting the report items for inclusion in the report as painless as possible.

If you have an article on a technology related topic that you want to contribute to the next issue, please let me know.

You can send a message to the OSGeo Journal mailing list:
http://lists.osgeo.org/mailman/listinfo/newsletter

You can also contact me personally. My current contact information is always listed in the footer on my home page:
http://www.redefinedhorizons.com

Changes to the Journal

There have been some major changes to the Journal and the Journal team. Some of these changes will be visible in the appearance of this issue.

I put together this issue of the Journal using Inkscape and Scribus, both open source tools. The Journal team had used LaTex for post-production in previous issues. I'm not a LaTex expert, and didn't have time to learn it. I'm comfortable using Scribus, and will continue to use it for production of the OSGeo Journal PDF files until a willing and enthusiastic LaTex expert joins the Journal team. I hope the change in appearance resulting from the move to Scribus will be pleasing and not an irritation.

I've stepped into the main editing role, with assistance from Tyler Mitchell. This is a bit of a reversal that will continue for the foreseeable future. I was hesitant to take on more responsibility, but didn't want to see the Journal languish. I feel it is an important marketing tool for OSGeo as an organization. After a great deal

of indecision about my role in producing the Journal and the role of the publication itself, I believe I've found a plan for producing future issues of the Journal that will fit my schedule. (Thanks to Tyler Mitchell for helping me sort all this out.) I've made a tentative commitment to the Journal team to serve as editor and handle post production for two (2) issues a year. The first will be the annual report, which I'll try to have published by the end of the first quarter each year. The second will be an issue focused on peer-reviewed content. I'll try to have this published by the end of the third quarter each year.

I won't even tentatively commit to anything more. I'll just say we might squeeze out a third issue in the year if we have enough volunteer support and contributed articles. Please consider joining the Journal team or submitting an article to us in 2011. If you have any questions about getting involved in either way, just let me know. I'll be happy to talk with you and walk you through the process. If English isn't your first language, don't hesitate to contribute. OSGeo is a global organization. We can polish up your articles for our English speaking audience.

Thanks

I want to extend my thanks, first and foremost, to all the people who took the time to submit annual report items for this issue. I know you guys are busy, and many of you would rather be writing code then writing report items. I appreciate your effort and hope you will do me the same favor again soon for the 2011 Annual Report.

I also want to thank all the volunteers who have helped produce previous versions of the OSGeo Journal. It has been a pleasure to work with you, and I hope you will stay involved, even in a small way.

Finally, I want to thank Tyler. His leadership at the OSGeo Journal, and at OSGeo itself, will be missed. I appreciate his patient assistance as I do a very bad job of filling his shoes as the editor of the OSGeo Journal for the short term.

Volunteer Recognition

The OSGeo Journal is created by a volunteer team of open source geospatial technology enthusiasts. Without their help and support, the OSGeo would have no media mouth piece. We'd like to thank the following OSGeo members for their continuing involvement with the OSGeo Journal Team:

Eli Adam
Daniel Ames
Helena Mitasova
Scott Mitchell
Tyler Mitchell
Jorge Sanz
Micha Silver
Barry Rowlingson
Rafal Wawer
Zachary Woolard

We'd like to give special thanks and recognition to the following members of the OSGeo Journal Team that contributed to Volume 9:

Eli Adam

Eli Adam has been using open source geospatial software for eight years, currently as a GIS Analyst for Lincoln County, Oregon and previously in the private sector as an archaeologist. He is active in the local PDX OSGeo chapter, GeoMoose project, and enjoys copyediting for the OSGeo Journal.

Tyler Mitchell

Tyler is Engineering Director at Actian (Actian.com, formerly Ingres Corp) focused on implementing geospatial technologies for their enterprise supported open source Ingres database and other leading edge products.
Tyler also owns and runs Locate Press (locatepress.com), a startup publishing company focused on open source geospatial books and training support material.

He is also a Charter Member of OSGeo and served for 5 years as Executive Director.
He is seasoned speaker and regularly invited to speak at various conferences around the world on the topic of geospatial technologies.

Scott Mitchell

Scott is co-director of Carleton University's Geomatics and Landscape Ecology Research Laboratory in Ottawa, Canada. He is an Assistant Professor in Carleton's Department of Geography and Environmental Studies. His research is directed at spatial analysis

in support of environmental decision making, especially in agricultural and protected landscapes. Open source geospatial software and open standards provide valuable tools to enable his group's work, as well as transparent and accessible means to develop and share new algorithms and datasets. The lab's web site is http://www.glel.carleton.ca , and Scott can be reached at scott.mitchell at glel.carleton.ca.

Brief News and Event Announcements from the OSGeo Community

Compiled and Written by Scott Mitchell

To keep abreast of OSGeo news, watch http://www.osgeo.org/news , or subscribe to its RSS feed. This report includes highlights from recent months, plus items specifically sent to the News Editor.

OSGeo Governance Charter Member Elections

On November 30, 2011, the results of the 2011 Charter Member election were announced. 21 new members were elected, further diversifying the body that votes, and is drawn from, for the OSGeo board of directors. The complete list of new members can be found at http://www.osgeo.org/node/1251

Conferences and Meetings

FOSS4G Denver 2011 and Beijing 2012

Another great FOSS4G meeting has come and gone. Many of the conference's talks are recorded and available at the FOSS Learning Commons: http://www.fosslc.org/drupal/category/event/foss4g2011

The next FOSS4G will be in Beijing, September 10-15, 2012.

FOSS4G Regional Events - North America and Europe

The first ever North American FOSS4G regional meeting (FOSS4G-NA) will take place from the 10th to the 12th of April, 2012, at the Walter E. Washington Convention Center in Washington, DC. Registration has begun - see details at http://foss4g-na.org/

This will be followed up by FOSS4G-CEE & Geoinformatics, in Prague, 21-23 May, 2012. It is paired with the Geoinformatics FCE CTU conference, and more details can be found at http://foss4g-cee.org/

Bolsena Hacking Event 2012

The fifth OSGeo hacking event in a monastery in Bolsena, Italy will occur from 10 to 16 June, 2012. The venue is beautiful, has great facilities, and all meals for the week are provided. There is limited space (25 beds), however, so if you are interested in joining, you are encouraged to sign up soon at the event's wiki page. See http://www.osgeo.org/node/1221

GeoTools Software Project Annual Report

Key Accomplishments

The GeoTools Project had four (4) stable releases and six developer releases of the software project in 2010. A lot of new features were included in the new releases of the project. These include the following:

Georeferencing

- Support for Mollweide, EckertIV, Winkel Tripel, Policonic projections.

- Better generation of ESRI PRJ files.

- Integration of EPSG database updates.

- Concurrent execution improvements.

Rendering

- Symbology encoding 1.1 data structure now supported.

- Dash array support for graphic strokes and stability improvements over simple lines.

- Fast polygon clipping.

- Transforming data on the fly during rendering.

- Injecting environment variables in style sheets.

- New options and assorted improvements for the labeling engine.

- Light multithreading in rendering and a set of other rendering speed improvements.

Datastore

- Support for SQL driven views.

- Support for terradata store, SpatiaLite store, and updates to support recent versions of PostGIS.

Raster Rendering

- Mosaic improvements to support heterogeneous mosaics.

- Time and elevation support.

- Raster reprojection speed improvements.

- External overviews for GeoTIFF data.

- Performance improvements.

- Added the ability to extract very large portions of a mosaic at native resolution without memory penalties.

Application Schema

- Complex features graduated to supported status along with a number of fixes and improvements in both functionality and performance.

Documentation

-A large effort was made in 2010 on improving documentation and introductory tutorials.

Areas for Improvement

There are a number of opportunities to improve the documentation for GeoTools. The use of the CodeHaus wiki for user docs has tapered off due to restrictive controls designed to combat spam. This has left the project in a no-mans-land where current documentation is not available.

The project has also done a poor job of involving "downstream" projects dependent on GeoTools. Noticeable is the delay in 52N upgrading to a modern version of the library, and in the balance of active developers drawing from early adopters.

Events

The project had a great showing at FOSS4G with many presentations based on GeoTools powered software and a "Geospatial for Java" workshop.

Opportunities to Help

The GeoTools community would like to thank contributors that provided patches, our users for their feedback and the companies providing sponsorship to fix bugs and add new features. Thanks to our development team for making this a great year. If you would like to join any of the above activities, send a message to our email list. You are welcome to take part.

- Does your project use GeoTools? Please get involved, we would like to get your voice involved in the future direction of the library.

- This year we are looking for editors, sensible questions and ideas for the GeoTools user guide.

- As always patches make open source great, please contribute in code!

Outlook for 2011

GeoTools is shaping up for an excellent year in 2011, you can get a sneak peak by viewing the change proposals already underway.

- The GeoTools 2.7 release mentioned above has now been released.

- Thanks to AuScope, the app-schema work is scheduled to be completed.

- The project has a couple of great ideas scheduled to land this year.

- The project is "re-versioning" so the next major release of GeoTools will be 8.0 (and based on Java 6).

- The project also has a lot of work going into Web Feature Service 2.0 support with all the new capabilities that implies for Filter, Data Access, Joins, Temporal support and more!

- Access to the latest GDAL (without patches) thanks to ImageIO-Ext progress.

- The big news is the porting of our user guide to Sphinx. The user guide is weighing in at over 100,000 words with diagrams and "live" code examples.

GRASS GIS Software Project Annual Report

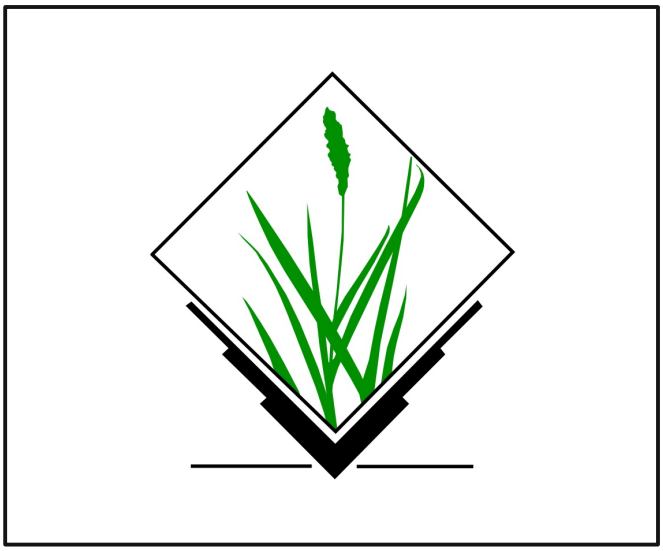
Key Accomplishments

In 2010 the project released version 6.4.1RC of GRASS. There was also a new winGRASS 6.4.1RC stand-alone package, MacOSX installer and Linux package released in 2010. The project participated in the Google Summer of Code 2010 participation with two projects. The first Google Summer of Code was by Martin Landa. Martin worked on wxNviz development for enhanced 3/4D visualization and analysis in Grass. In the second Google Summer of Code Seth Price worked on GPU accelerated imagery resampling and reprojection in Grass.

The project also focused on getting GRASS 7 into a usable state and able to offer many new features.

Events

On November 17, the project participated in GIS Day 2010 at Warszawa, Poland. There was a GRASS lecture and GRASS workshop at this event.



On October 31, presentations were made at the Geological Society of America Annual Meeting. This included the Pardee keynote and poster.

On October 15-17, several GRASS presentations and a winning poster were presented at the 41st International Binghamton Geomorphology Symposium (BGS) on Geospatial Technologies & Geomorphological Mapping.

On September 13-16, the 12th Annual Scientific GRASS Workshop entitled “Spatial Analysis with GRASS" was held in Wroclaw, Poland.

On September 11, Helena Mitasova received the Sol Katz Award.

On September 6-9, various

presentations were made at the FOSS4G conference in Barcelona, Spain.

On April 14 to 16, presentations were made in a symposium at the American Association of Geographers meeting in Washington, DC, USA.

Areas for Improvement

The project would like to develop a migration guide for public administrations and wants to improve the existing sponsorship program.

Opportunities to Help

The project could use help in translating GRASS GIS messages. The project also needs assistance in preparing more marketing material. This would include updating flyers and posters in different languages, and the preparation of a new website.

Education

The project has an inventory of university courses based on GRASS posted at its website.

11-12 Feb: FOSS4G-IT 2010, Lugano - XI Meeting degli utenti di lingua Italiana di GRASS e FOSS4G, Lugano, Switzerland

1-2 May: Geoinformatics FCE CTU 2010 - Free and Open Source Software in Geoinformatics, Prague, Czech Republic

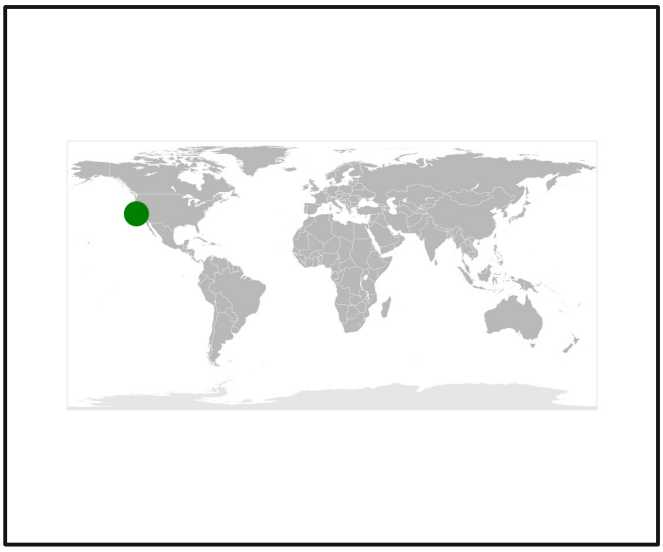
California Chapter Report

Chapter Events

The chapter maintained a presence at 5 events during 2010. These events included the annual meeting of the California Geographical Society, the annual meeting of the Association of American Geographers, and the 2011 Southern California Linux Expo. California Chapter member Ragi Burhum also presented a talk at the PGWest 2010 Conference.

Member Activities

Landon Blake continued his work on the unsupported GPX2 Module. This module allows Java programs to parse GPS files. (GPX files are XML files used to store points, routes, and tracks from recreational grade GPS receivers.) It also allows Java programs to manipulate entities from GPX files as simple feature objects. This work on the next release of the module focuses on the removal of the JDOM for XML parsing. It is being replaced with a hybrid DOM-on-Demand XML parsing library from the SurveyOS Project. Work on the next release of the module will also include implementation of a set of



objects to provide a GPX file DOM to Java Programs.

Landon also continued his work as an assistant editor of the OSGeo Journal. This included work on Volume 9 of the Journal, the 2010 Annual Report and exploring ways to make OSGeo Journal Content available in formats other than PDF.

Alex Mandel continued his work to host and build the OSGeo Live Version 3 and Version 4. A presentation on OSGeo Live was given to the California Geographical Society. Alex also helped convert a university course on GIS from Visual Basic for Applications to the Python Programming Language, and assisted with teaching the modified course to students. At the United States Forest Service International Seminar on Climate Change, Alex provided a 2 hour

workshop in QGIS using OSGeo Live.

Ragi Burhum started the San Francisco, California Geomeetup. This group has grown into a highly focused geo developer bi-monthly event with more than 450 members from big and small companies across the California Bay Area. The San Francisco Geomeetup sponsors have included O'Reilly, SimpleGeo, CBS Interactive, xCubeLabs, TRulia, Eventbrite and others. Both Ragi Burhum and Josh Livni have given talks at Geomeetup events that heavily promoted OSGeo. Brian Hamlin distributes OSGeo Live DVD's as prizes during the trivia sections of the Geomeetup events. Ragi wrote and committed two (2) drivers for GDAL. The first was for ArcObjects. The second was a FileGDB driver.

Ragi Burhum and Brian Hamlin have continued their work with California companies to solve complex problems for California on top of Open Source GIS stacks.

Francophone Chapter Report

Key Accomplishments

The chapter elected a new board in June 2010.

Areas for Improvement

The chapter would like to improve in a number of areas. These include the following:

1) Encouraging more contributions to translation projects.
2) The creation of a marketing package for the chapter.
3) More assistance for chapter members in organizing event booths.
4) Attracting additional contributors and project managers.
5) Improving communication in the Francophone geospatial community.

Opportunities to Help

The chapter is looking for help in the following areas.

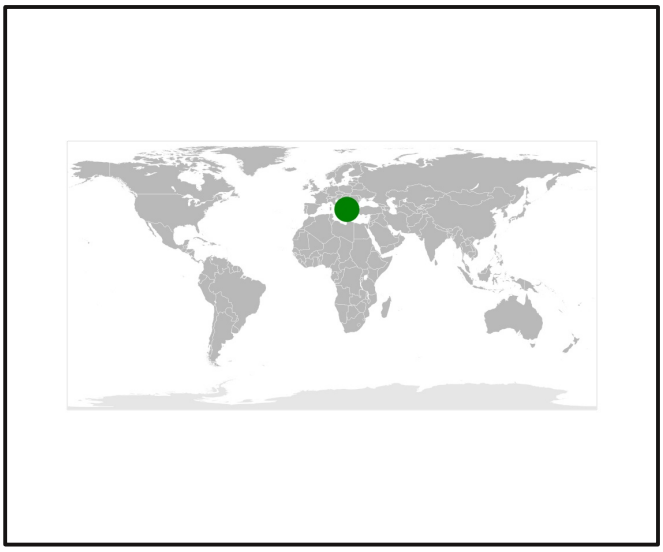
1) Translation and proof reading of the MapServer manual.
2) Help in organizing Francophone QGIS events. This would include booths at OGRS and at several conferences.
3) Help in marketing duties. This would include design of a flyer, booth materials and improvement of the OSGeo-fr website.

Outlook for 2011

The chapter has several goals for the 2011 year. This includes setting up a legal association for the French Chapter, improving the document translation process, and organizing QGIS French day!

Greek Language Chapter

The OSGeo Greek Local Chapter was initiated in November 2007. During 2010 membership grew, but there is still a need more chapter members.



Key Accomplishments

Chapter members participated in two (2) events during 2010.

The first was the National ISPIRE SDI Infrastructure Event. This event took place on October 1st, 2010 at the University of Thessaly, Volos, Greece. It was jointly organized by the chapter with HellasGI (http://www.hellasgi.gr). The event was very successful with over 90 participants who stayed for the duration of the event. Many Greek and international experts presented issues related to the event's main theme.

Participants in this first event were very supportive of holding a second event. This second event was the National Greek GI Conference. This event took place between December 2nd and 3rd, 2009 at NTUA, in Athens, Greece. It was organized by HellasGI (www.hellasgi.gr). During the conference many papers on or involving open source technology were presented.

Areas for Improvement

The chapter still does not have the participation that was expected. It needs to intensify efforts to increase the membership and the overall awareness of the organization. A big challenge faced by the chapter is securing funding for organizing further events.

Opportunities to Help

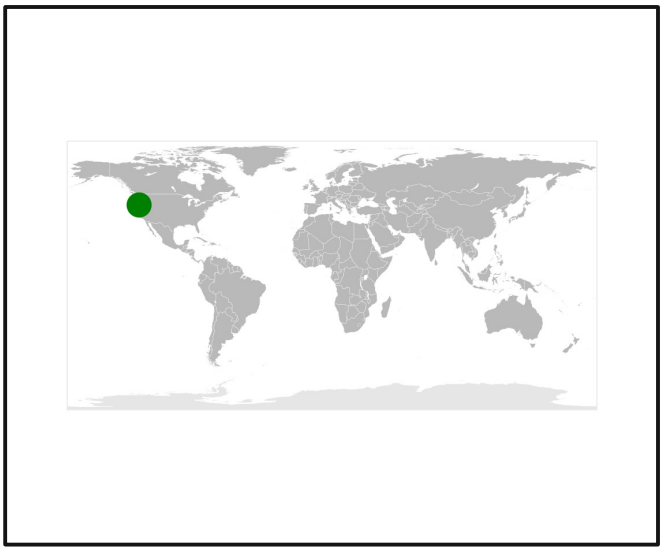
In the future the chapter will definitely need some speakers for national FOSS or other simple GIS events. It would also like to demonstrate some cases of successful use of FOSS GIS by the public sector to local government officials.

The chapter would like to plan some demo classes on FOSS GIS for students in universities. This would include determining how these classes can be integrated in their curricula, and showing that these classes can achieve the exact same educational result as a program focused on proprietary GIS software.

Outlook for 2011

The chapter is interested in determining how to raise funds for a chapter presence at future events. They also plan on working to attract additional membership.

PDX OSGeo Chapter Report for 2010



Key Accomplishments:

We had monthly meetings with numerous presentations covering a variety of topics. Our mailing list remained strong and active list membership increased. We put on a well attended unconference, http://pdxosgis2010.eventbrite.com/. We presented several sessions at a Regional GIS conference (GIS In Action), including an Open Source Desktop Smackdown, OSGeo LiveDVD use and presentation. We became an ORURISA Special Interest Group, http://orurisa.org/PDXOSGISConference

Areas for Improvement:

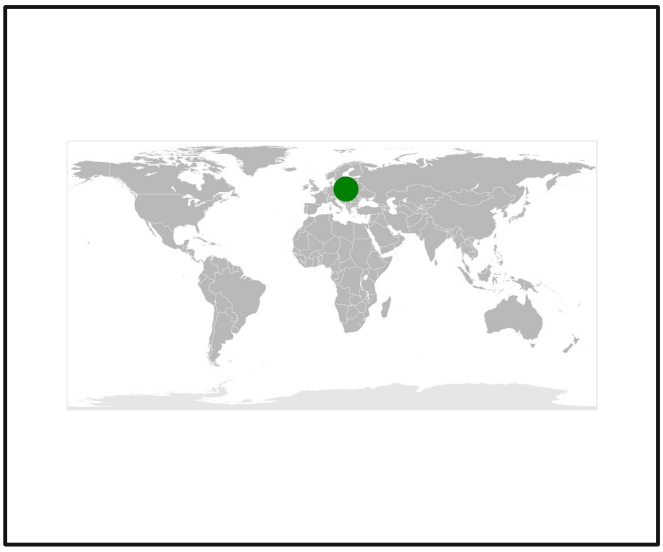
Organization could be slightly more formal. Planning meetings and activities further in advance could make events run slightly smoother. Increasing coordination with other regional OSGeo groups (CUGOS) could broaden horizons.

Opportunities to Help:

Visit our wiki, http://wiki.osgeo.org/wiki/PDX, or mailing list to see current activities or find out how to help.

Poland Chapter Report

Chapter Events



The Poland Chapter organized or had a presence at three (3) events in 2010. In May the first event was the second Open Software for Geodesy and Geoinformation Science Conference held at the Wroclaw University of Environmental and Life Sciences, in Wroclaw, Poland. The conference had a Polish audience but an international scope. Foreign guests, including the representatives of national mapping agencies of the European Union member states, were invited to deliver plenary lectures. The conference was also an used to hold the OSGeo Chapter Poland annual meeting.

In September the Chapter held a four day workshop at the Department of Climatology and Atmosphere Protection, University of Wroclaw, in Wroclaw, Poland. The workshop was organized by the Laboratory for Geographic Environment Spatial Modeling Methods, University of Wroclaw, and Wroclaw's GRASS Users Group (WGUG). The workshop was also backed by ENRIS of the Royal University of Stockholm. It was split into three parts: lectures (with some presentations of submitted works), practical classes and individual consultations (where participants could develop their own ideas and work on their own projects). During four days of the workshop there were four lectures and ten shorter presentations. There were also introductory courses for new GRASS users in the first day of workshop.

Other activities

The chapter actively promoted OSGeo projects at Poland GIS events, including conferences and GIS Day. This supplemented promotion of OSGeo projects in blogs and other media. The chapter also actively participated in the localization (translation) of FOSS4G packages into Polish.

Areas for Improvement

The Poland Chapter has identified two (2) areas for improvement moving forward. These are:

1)Having a broader impact on the open source software community.
2)Encouraging greater membership in the chapter.

Opportunities to Help

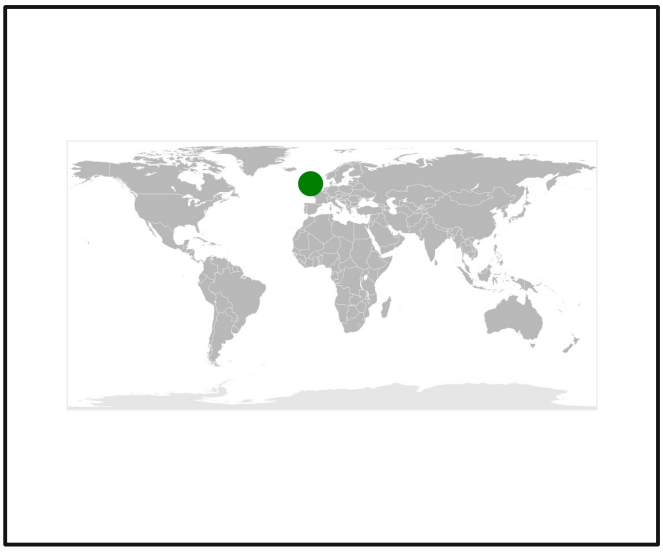
The chapter would like assistance with the promotion of FOSS4G at the universities by the definition of diploma subjects for master and engineering degrees. The chapter would also like to establish repositories for geospatial deliverables.

OSGeo UK Chapter Report for 2010

Key Accomplishments:

2010 has been a defining year for the chapter. The chapter passed the 100 member mark, up from 80 last year. We helped to co-host the OSGIS 2010 Conference in Nottingham http://cgs.nottingham.ac.uk/~osgis10/os_home.html, and chapter members presented at a number of other open source and geospatial events and workshops. We have also been lucky enough to receive some sponsorship from the following organisations and individuals:
Astun Technology (http://www.isharemaps.com), Saber Razmjooei of Faunalia (http://www.faunalia.it/en/home), and Suchith Anand of the Centre for Geospatial Sciences (http://cgs.nottingham.ac.uk).

The chapter has been improving the communication with chapter members and other interested parties through monthly IRC meetings and an official OSGeo:UK twitter account (@osgeouk). Members have also been busy promoting open source GIS through



local Linux User Groups and other places.

The chapter has members on the board of the new Open Source Geospatial Lab at the Centre for Geospatial Sciences in Nottingham, and a chapter member has also been elected to OSGeo Charter Membership.

Areas for Improvement:

The chapter could improve our collaboration with other GI organisations in the UK such as the Association for Geographic Information. This would help to promote open source GIS products as mainstream choices rather than niche or specialist options.

Opportunities to Help:

The chapter is always on the lookout for new members, and new events at

which to promote OSGeo. Interested individuals can join the chapter mailing list and get involved!
(http://www.osgeo.org/uk/mailing_list)

Outlook for 2011:

The outlook for 2011 is sunny. The current focus of the chapter is on gathering case studies showcasing the use of open source GIS in many different environments
(http://www.osgeo.org/uk/case_studies). The chapter has tried to make the process of submitting a case study as easy as possible by providing a template and set of guidance notes. The chapter will be helping with OSGIS 2011 (http://cgs.nottingham.ac.uk/~osgis11/os_home.html), where various chapter members will be speaking, and running workshops.

The sponsorship the chapter has received is allowing the chapter to start amassing a collection of marketing materials and to help the chapter sponsor some small GI events itself.

In the wake of the recent UK Public Sector Mapping Agreement http://www.ordnancesurvey.co.uk/oswebsite/media/news/2010/aug/psma.html, the chapter will be helping chapter sponsors hold a number of free workshops introducing ways that government organizations can use Ordnance Survey data using open source software. Chapter sponsor Astun Technology is also developing a suite of open source tools for working with Ordnance Survey data, either Open Data
(http://www.ordnancesurvey.co.uk/oswebsite/products/os-opendata.html) or data released under the PSMA.

The Potential Impact of Recent Changes to the United States Patent System On Open Source Software Projects

By Landon Blake

Introduction

In this article we'll examine recent changes to the United States Patent System created by the legislation known as the "America Invests Act". After a brief discussion of how patents work we'll look at the problems with the previous United States patent system. We will then discuss how the America Invests Act attempted to solve these problems, and where it fell short. We will conclude with a brief discussion of how the changes to the patent system discussed in this article could potentially impact open source software projects. Most of the material researched and analyzed during the preparation of this article is from a series of articles on patents in the Economist Magazine. References to these articles are included at the end of this article.

What Are Patents?

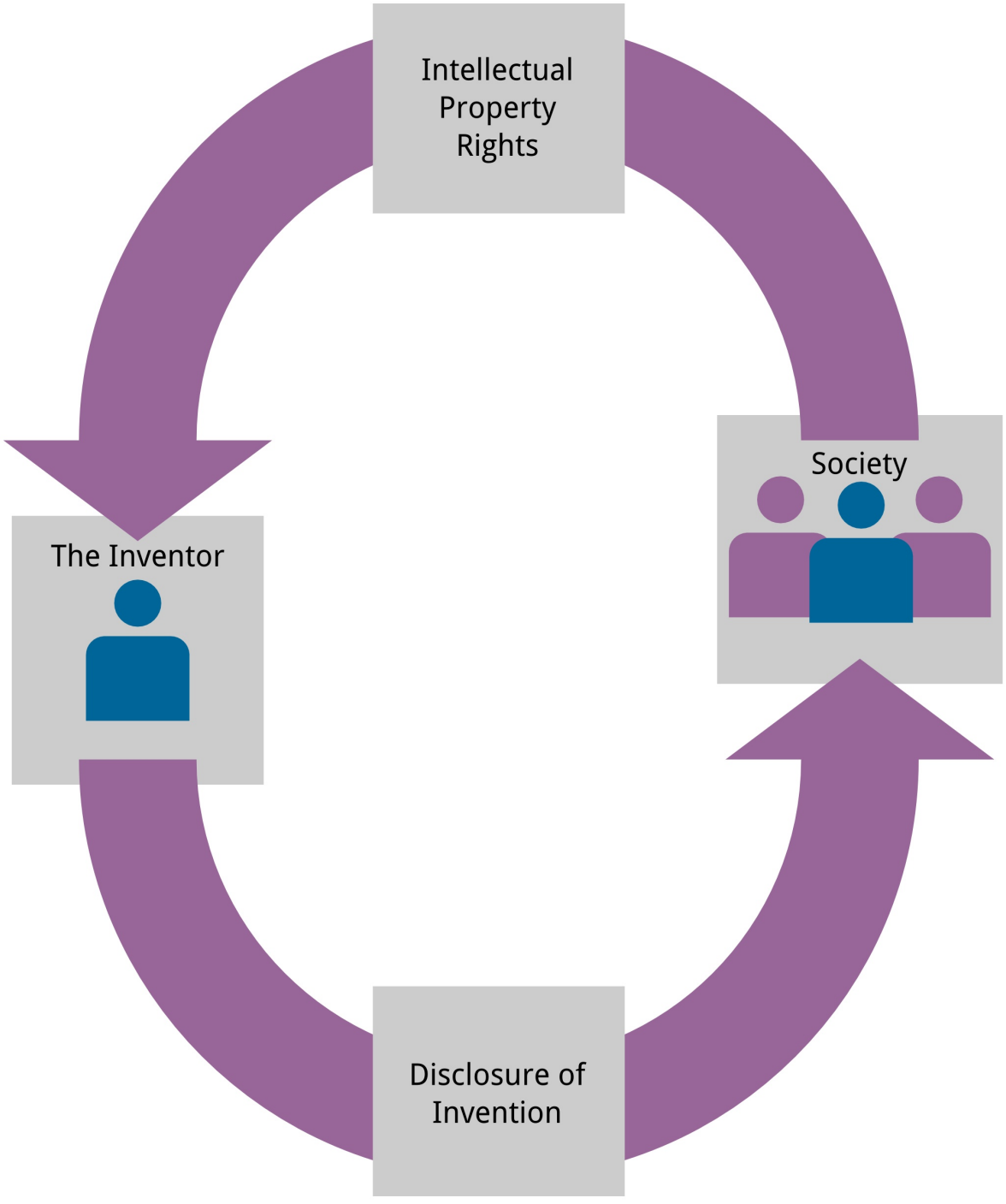
We will begin our article with a simple definition of patents. [URL1]

A patent is provided by a government entity to an inventor. This patent is a form of intellectual property that typically allows the inventor to have the exclusive right to use, or license to others the right to use, their invention. Most patents are granted for a limited amount of time, after which others are allowed to freely use or build upon the invention.

Patents are essentially a tradeoff between the inventor and society.

Why are patents important?

Patents are essentially a tradeoff between the inventor and society. Most patent systems attempt to balance the rights of the inventor to benefit financially from their invention with the



The Patent Tradeoff

benefits to society that come from disclosure of an invention. In a society without patents, inventors may have an incentive to keep their innovations a secret. Proponents of patents argue this slows down the pace of innovation as a whole. Proponents of patents also claim that investment in research and development by private companies would slow dramatically without a vigorous patent system which protects their investment and allows them to profit from the results of their research and development efforts. [URL2] [URL 3][URL4]

The Previous United States Patent System

For several years there has been strong debate about the effectiveness of the United States patent system. In the ideal situation, companies are granted patents with a narrow scope for truly genuine and unique inventions. (The Economist Magazine pointed to patents in the semiconductor and pharmaceutical industries as an example of this ideal situation. [URL 5]) Opponents of the previous United States patent system argue many patents were issued to companies for inventions that were neither unique nor genuine. These bad patents allow companies to disrupt the business operations of others in their industry. They can do this by threatening patent litigation or by squeezing them for licensing fees. Many agree that bad patents were frequently granted in the United States for business and software ideas that did not really represent true innovation. If these “bad patents” are broad in scope they can cost businesses billions of dollars. Ultimately these costs are passed onto the consumer. For example, a 2008 study revealed that public companies in America earned 4 billion dollars from patents in 1999, but spent 14 billion dollars on patent litigation costs.

The legal costs of patent disputes have ballooned.

The problems with the previous United States patent system resulted in a number of disturbing trends. Over time the number of disputed patents, average monetary awards in patent disputes, and legal costs of patent disputes have ballooned. [URL 6] The current patent system has also allowed the rise of patent trolls. Patent trolls are companies that buy patents from others, but who don’t typically invest in research and development to create their own. They then profit from licensing the use of the technology

covered by their patents to other companies. If other companies are unwilling to pay these fees, the patent trolls will sue others for patent infringement to compel payment. This results in legitimate companies being shut down or being forced to pay license fees for a bogus patent that shouldn't have been issued in the first place. The problem with patent trolls is so bad it has generated wide media coverage. This American Life did an excellent story about patent trolls that included shadow offices in a small Texas town. [URL 7] The Amazon CEO also talked about the problem with software patents in a recent Wired Magazine interview. [URL 12] In the interview Jeff Bezos says he'd be willing to give up Amazon's 1-click patent for true software patent reform. (PacketVideo's claim against Spotify for a patent infringement for streaming music over the internet is one example of a patent troll shakedown. [URL 8])

Many technology companies now value quantity of patents over quality of patents.

These patent law suits result in patent wars, in which competing companies each try to acquire broad patents they can use to sue and counter sue. This sets up a scenario in which the only way to avoid patent litigation is a to become a player in the "mutually assured patent destruction" game. Google's recent purchase of Motorola Mobility for 12.5 billion dollars may be one example of a purchase made for defensive patents. Microsoft and Apple have recently sued smart phone makers using Google's Android Operating System. (This is a clear demonstration that legitimate businesses, not just patent trolls, are using patents to go after other businesses.) The purchase of Motorola Mobility would give Google and its business partners an armada of potentially 24,000 patents with which to fight these claims.

Many technology companies now value quantity of patents over quality of patents. They measure the effectiveness of a company's patent portfolio by determining how high the stack of printed patent documents is.

Of particular interest to the open source geospatial software community are the problems with software patents.

Of particular interest to the open source geospatial software community are the problems with software patents. Software patents are singled out as a prime example of the patent system gone wrong. [URL9] Opponents of the patent system argue that new discoveries and true innovation are not required to write most software. In addition, the complexity of software, in which thousands of independent sub-routines or functions are used by a single program, can make software patent review a real challenge.

The America Invents Act [URL10] was meant to fix these problems with the United States patent system.

The America Invents Act

The act was signed into law by Barack Obama on September 16, 2011. The lead sponsors of the act were Patrick Leahy and Lamar Smith.

The act made three important changes.

The act made three important changes. The most significant change was a move from a first-to-invent patent system to a first-to-file system. In the previous patent system you couldn't be granted a patent if someone else invented it first. Now the patent is issued to the first person to file a patent application for the particular invention. This relieves the United States Patent Office from the burden of determining innovation timelines when evaluating a patent application. Instead, the patent office can focus on the merit of the actual patent application. It also means inventors no longer have the burden of proving they were the first to implement an idea. Critics of the new law also point out the first-to-file system favors large companies, with their army of patent lawyers. The new law included a "micro-entity" provision to address this criticism, but opponents say this provision was not sufficient. Critics also point out, under a first-to-file system, that companies may rush to file an invention before it is truly ready and merits protection. This could result in more bad patents being issued.

The law fell far short of what many patent reformers were hoping for.

A second change was the ability to challenge an existing patent at the United States Patent Office, instead of in the judicial system. The goal of this change was to provide an alternative,

and less expensive, method to challenge bogus or overly broad patents. A related change allows third parties to submit evidence of “prior art” when a patent is being challenged. Both of these changes were implemented to reduce the number of bad patents in the technology ecosystem.
The law fell far short of what many patent reformers were hoping for. The law doesn’t limit the damages that can be sought in patent infringement suits. It does not restrict the suit to the district where the alleged patent infringement occurred. (This allows patent trolls to shop for the judicial systems in which juries are known to be more sympathetic to companies making a claim of patent infringement.) Working demonstrations or actual prototypes of inventions are not required as part of the patent application.

Funding is another problem of the new law. It doesn’t provide more funding to the United States Patent Office, although the duties of the office have now been expanded to include dispute resolution. (This may actually leave less time to review patent applications, the source of most of the problems with the previous patent system.) Business Insider reports the new law even “allows Congress to continue to treat the patent office as a petty cash drawer and divert applicant fees to other purposes”. The law also did not limit the term of business and software patents.

The Potential Impacts on Open Source Software Projects

There is good news and bad news for open source software projects in these changes to the United States patent system. The new opportunity to challenge bogus patents at the United States Patent Office, with the ability for third parties to contribute to the challenge, is certainly good news. It is plausible that open source software projects will provide examples of prior art when a company challenges a bad patent in this way. (In fact, open source software projects could be a treasure trove of this prior art.) The move to a first-to-file system could prove to be bad news. There are many small companies who have embraced the use and development of open source software. In addition, the companies offering services around an open source software product are often small

businesses. A system that makes it harder for smaller organizations and companies to apply for patents would have a disproportionate impact on the open source community. If the first-to-file system does result in premature patent applications, that will also make the problem with patents worse, not better.

The worst news is the law's failure to address the biggest problems with the United States patent system. With the passage of the America Invents Act, it is not likely the patent system will be examined again by United States legislators for some time. The opportunity for real substantial reform of the patent system has been missed for the foreseeable future. Open source

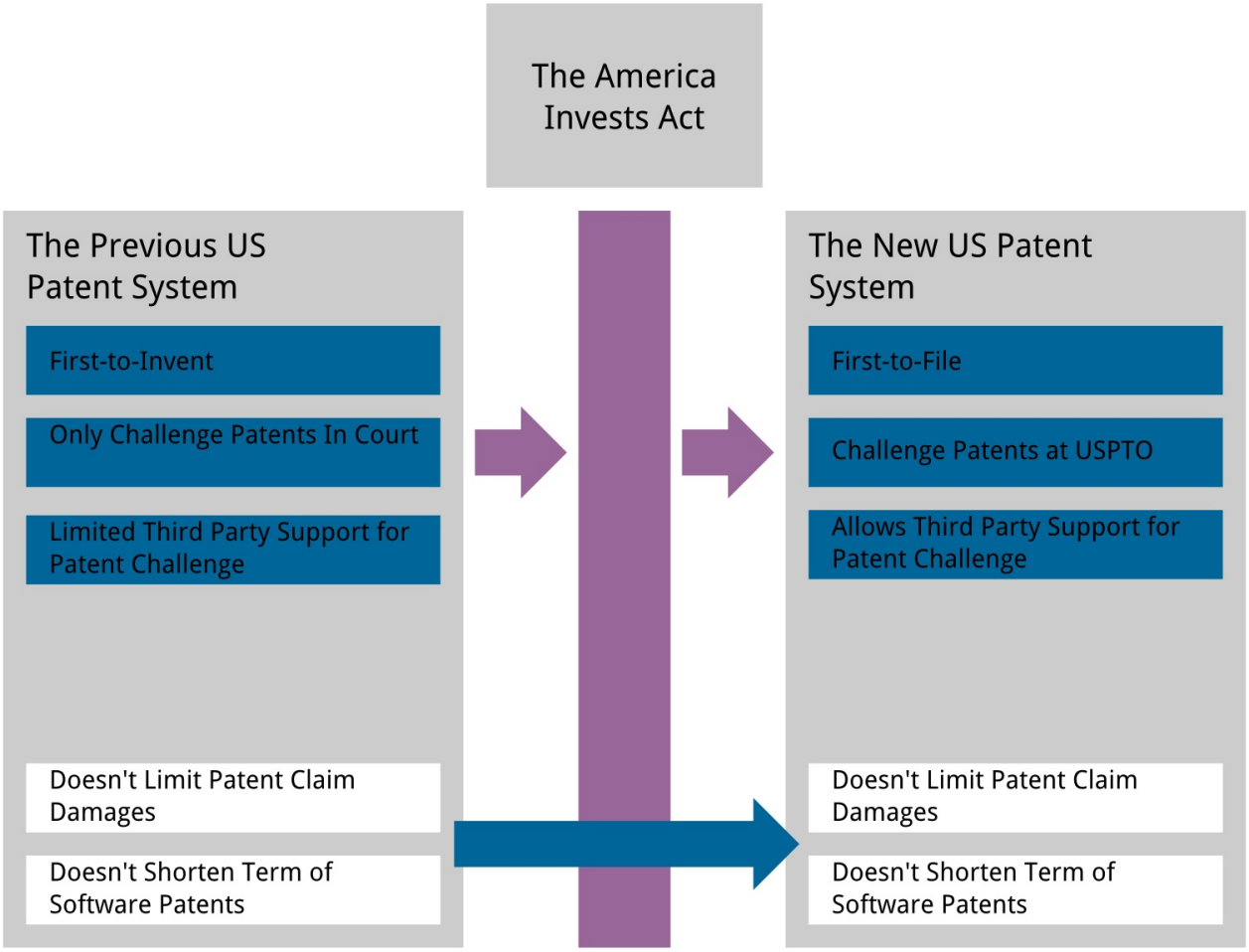


Diagram of "America Invests Act" Changes to the US Patent System

software projects are not immune to patent disputes. The example of claims over Android mentioned earlier in the article is proof of that. How long until a patent troll sues an open source project or companies related to it, for patent infringement? What effect would a patent claim against companies using popular open source software have? The recent changes to the patent system will not prevent this.

The topic of patent reform should be of special interest to programmers involved with open source geospatial software.

The topic of patent reform should be of special interest to programmers involved with open source geospatial software. Location related technology has been making huge leaps in the last couple of decades. This technology is creeping into many nooks and crannies of the average person's life.

The likelihood of including an algorithm, program feature, or technology in the geospatial arena into your open source software that is the subject of some ambiguous patent is higher than in many other technology fields. Because geospatial software is undergoing rapid change, it is more likely to be the victim of patent disputes. It will be interesting to see how the recent changes to the United States patent system will impact future patent disputes over geospatial technology, and if these disputes suck open source software projects into their vortex.

Conclusion

The system used to issue and resolve disputes related to patents in the United States is clearly broken. The America Invests Act was an attempt to fix this broken system. This legislation made major changes to the patent system in the United States, including a move to a first-to-file system of issuing patents. However, the America Invests Act fell fall short of the comprehensive patent reform needed to improve innovation in America and remove bad patents as an expensive financial burden on American consumers and businesses. The shortcomings that remain in the United States patent system are especially apparent in the proliferation of bad software patents. In the future we should expect to see more patents, and patent-related disputes that impact open source software projects, including those related to geospatial technology.

Changes in the United States patent system made by the America Invests Act will not prevent these patent disputes.

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

URL 2: “Patents Against Prosperity”, The Economist, August 1, 2011
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URL 9: Dan Lynch Blog Post “Why Software Patents Suck”
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URL10: Wikipedia Article on the America Invests Act
http://en.wikipedia.org/wiki/Leahy-Smith_America_Invents_Act

URL 11: Business Insider Article “3 Ways the New Patent Law Destroys Jobs”
http://articles.businessinsider.com/2011-09-21/strategy/30183613_1_patent-system-independent-inventors-patent-cases

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Angles and Directions: An Introduction to JTS Warped

By Landon Blake

Introduction

This article provides an introduction to the JTS Warped software library. It begins with a brief discussion of the JTS Topology Suite (JTS) and explains what functionality JTS Warped adds to the JTS Topology Suite. It then provides an overview of the code in JTS Warped that allows programmers to easily work with angles and bearings in JTS. It concludes with some code examples.

What Is JTS?

JTS is a software library and set of tools that support geometry calculations on the 2D Cartesian plane. JTS conforms to the Simple Features Specification for SQL published by the OGC. JTS strives to be (1) fast, (2) robust, and (3) implemented in pure Java. JTS was originally written by Martin Davis while at Vivid Solutions. He still maintains the library although he is no longer working for the company. JTS is used by popular geospatial software written in Java, and is the geometry library used by the open source desktop GIS OpenJUMP.

What is JTS Warped?

JTS Warped is a library of utility code related to JTS. It adds to the functionality of JTS but is not included in the main JTS distribution. JTS Warped is written by Landon Blake. The code for JTS is released under the GPL and is managed by the SurveyOS Project, a member of the Free Software Conservancy. JTS Warped is currently in Alpha status. You can download the source code, via SVN, for JTS Warped from here:

https://surveyos.svn.sourceforge.net/svnroot/surveyos

In this article we are going to focus our discussion on the code in JTS Warped that allows programmers to work with angles and bearings in JTS.

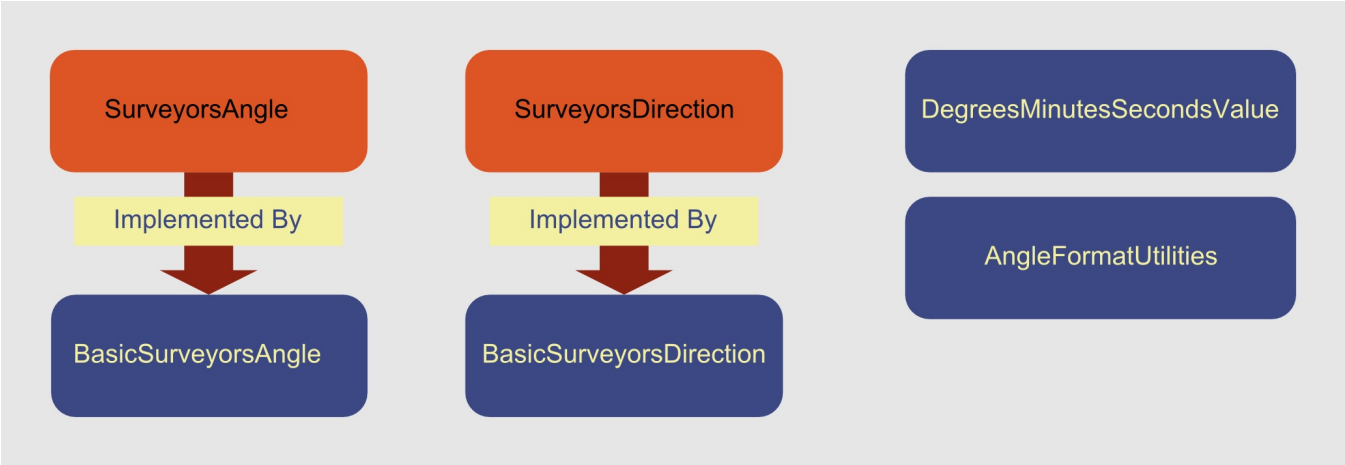
Overview of Angles and Directions Code in JTS Warped

Land surveyors frequently work with

angles and directions when moving data between 2D grid (also known as 2D Cartesian or rectangular coordinate systems) and polar coordinate systems.

Here is one example: Optical instruments used in terrestrial surveying employ polar coordinate systems to collect their measurements. In a polar coordinate system points are located in relation to the instrument point. This involves two measurements. The first is the measurement of the angle between the instrument point, a backsight point and the point being located (foresight point). The second is the distance between the instrument point and the point being located. Software is then used to transform the collected measurements in to point coordinates on the project grid coordinate system.

Here is another example: Descriptions for land parcel boundaries often use bearings and distances to describe the parcel geometry. It is often useful to convert this bearing and distance information into 2D vector geometry in a 2D grid coordinate system.
The angles and directions code in JTS Warped was designed to make it easier to perform the transformations between polar coordinate systems and 2D grid coordinate systems. The angles and directions code has only two (2) key classes used to implement this design. The BasicSurveyorsAngle class represents angular measurements in a polar coordinate system, and the BasicSurveyorsDirection class represents direction measurements in



Class Diagram

a polar coordinate system. Both classes provide basic implementations of corresponding Java interfaces, which allow the library to support alternate implementations of the interfaces if desired.

The Basic Surveyors Angle Class

The BasicSurveyorsAngle is essentially a value class. It represents an angle measurement by storing the value of the angle in degrees, minutes, and seconds. The degrees value, minutes value, and seconds value are passed in and out of the class as ints. The fractional seconds value is passed in and out of the class as a double. As an alternative, you can wrap these values in a DegreesMinutesSecondsValue object for passage in and out of the BasicSurveyorsAngle methods.

There are four (4) ways to create a BasicSurveyorsAngle class. The default, no-argument constructor will create an BasicSurveyorsAngle class with a degree value of 0, a minutes value of 0, a whole seconds value of zero, and a fractional seconds value of 0. A second constructor allows you to pass these values as three ints and a single double. A third constructor sets the value during construction using an instance of the DegreesMinutesSecondsValue passed as an argument. The final constructor is a “copy constructor” which accepts another instance of SurveyorsAngle as an argument. The value of this argument is used to set the value of the new angle. (This constructor is a tool for cloning angle values.)

Code Listing #1 shows examples of how to create instances of the BasicSurveyorsAngle class.

The BasicSurveyorsAngle class is immutable. You can obtain its degree, minute, second, and fractional second components using traditional getter methods of the class. The decrease and increase methods allow you to increase or decrease the value of an angle by applying other angles as a rotation. These methods do not modify the subject angle, but create a clone, modify and return it. The value of the angle object can also be obtained in radians or decimal degrees through convenience methods. Convenience methods are also included to return the trigonometric ratios for the sins, cosins, and tangent of the angle. These methods handle the internal conversions of the angle values to and from radians so the trigonometric ratios can be calculated. Three (3) additional

methods provide information about the type of angle. These are the isAcute method, isObtuse method and isRightAngle method.

A few standard utility methods are also included in the class. There are three methods to compare angle values for equality and a toString method. The toString method returns the angle value in the following format: degrees-minutes-seconds. For example: 282-12-11.12

The last method of the BasicSurveyorsAngle class allows you to rotate a JTS geometry. You provide the geometry, center of rotation coordinate, and a boolean flag that indicates the direction of the method. Note that this method modifies the JTS geometry it is passed in-place. It does not create and modify a copy of the geometry.

The Basic Surveyors Direction Class

The BasicSurveyorsDirection class is also essentially a value class. It represents the direction of a line segment or line in reference to a system for angle measurement. In JTS Warped, the direction of a line is measured as an azimuth in degrees, minutes, seconds, and fractional seconds. A direction of 0-0-0.0 corresponds to cardinal north or the Y axis of the 2D coordinate grid. The degrees value, minutes value, and seconds value are passed in and out of the class as ints. The fractional seconds value is passed in and out of the class as a double.

There are five (5) ways to create a BasicSurveyorsDirection object. The default constructor creates a direction with a value that corresponds to 0, or true north. Two additional constructors allow you to create a BasicSurveyorsDirection object from an angle object. You can also create a BasicSurveyorsDirection by passing two JTS coordinate objects or a string representing the azimuth. The format for the string argument passed to this last constructor is the same as output by the toString method of the BasicSurveyorsAngle class.

You can obtain the value of the BasicSurveyorsDirection object as an Angle object, as a string formatted as a bearing, or as an angle value in degrees, minutes, seconds, and fractional seconds stored in a string. The format for the returned string is the same as output by the toString method of the BasicSurveyorsAngle class. Another method returns the quadrant of

the direction.

The BasicSurveyorsDirection class is not immutable. (It will be made immutable in the next release.) It can be modified by four (4) methods. Three (3) of these are convenience methods that allow the BasicSurveyorsDirection to be flopped 180 degrees or rotated forward and backward 90 degrees. The last method allows you to rotate the BasicSurveyorsDirection by passing in a rotation angle.

There are two (2) methods of the BasicSurveyorsDirection that create JTS geometry objects. The getLineStringAlongDirection method accepts a JTS Coordinate object and a double as arguments. It then creates a JTS LineString along the direction, using the Coordinate object as a start point and the double as the length of the LineString. The getCoordinateAtEndOfVector object accepts a JTS Coordinate object and a double as arguments. It returns a Coordinate object at the end of the vector represented by the direction stored internally in the class and the length passed in to the method as a double.

Code Listing #2 shows how to use the BasicSurveyorsDirection class to create a new line segment offset 50 units in a perpendicular direction from an existing line segment.

Converting Between Angular Unit Systems

A number of different units systems are used to measure angles. Surveyors typically measure angles in values recorded as degrees, minutes, and seconds. Mathematicians record angles as radians. Military surveyors record angles as Grads. You may measure angles in revolutions. Latitude and longitude values are often stored in decimal degrees. JTS Warped provides a utility class that allows for the easy conversion between these different angle formats. This utility class is named AngleFormatUtilties.

The class also contains three (3) convenience methods. Two of these provide BasicSurveyorsAngle objects for a given value in radians or revolutions. The third returns a DegreesMinutesSecondsValue from a string in the appropriate format.

Conclusion

JTS Warped contains code that enables programmers to integrate angles and directions into their creation and

manipulation of JTS geometries. In this article we looked at the two (2) most important classes of this code, the BasicSurveyorsAngle and the BasicSurveyorsDirection. JTS Warped includes other code to enhance JTS. This includes classes to support common coordinate geometry operations, additional coordinate filter implementations, and utility methods for manipulation of LineStrings and Coordinate objects.

JTS Warped is an open source library released under the GPL. It is maintained by the SurveyOS Project, a member of the Free Software Conservancy. Contributions of code or documentation for the library are welcome.

Code Listing #1

```
1)   // Use the default, no argument constructor.
2)   BasicSurveyorsAngle angle1 = new BasicSurveyorsAngle();

3)   // Create a BasicSurveyorsAngle with a specific value.
4)   BasicSurveyorsAngle angle2 = new BasicSurveyorsAngle(35, 22, 11,
0.2116);

5)   // Create a BasicSurveyorsAngle with using a
DegreesMinutesSecondsValue.
6)   DegreesMinutesSecondsValue dmsvalue = new
DegreesMinutesSeconsValue()
7)   BasicSurveyorsAngle angle3 = new BasicSurveyorsAngle(dmsValue);

8)   // Clone a BasicSurveyorsAngle using the copy constructor.
9)   // The value of clone will be the same as the value of angle2.
10) BasicSurveyorsAngle clone = new BasicSurveyorsAngle(angle2);
```

Code Listing #2

```
1) // Rotate the target LineString 90 degrees.
2) // Create the angle needed to perform the rotation.
3) BasicSurveyorsAngle rotationAngle = new BasicSurveyorsAngle(90, 0, 0, 0.0);

4) // Apply the rotation. “target” holds the JTS LineString to be
rotated. “rotationBase” holds
5) // a JTS Coordinate object that is the basis of the rotation.
6) rotationAngle.rotateGeometry(target, baseCoordinate, true);
```

Code Listing #3

```
1) // Get the end coordinates of the existing LineString.
2) // “targetLine” holds copy of existing LineString to offset 50
units.
```

```
3) Coordinate coord1 = targetLine.getCoordinateN(0);
4) Coordinate coord2 = targetLine.getCoordinateN(1);

5) // Create a BasicSurveyorsDirection from the two (2) coordinates.
6) BasicSurveyorsDirection dir = new BasicSurveyorsDirection(coord1, coord2);

7)  // Rotate the direction 90 degrees so we can create a point on a
line perpendicular to the existing
8)  // LineString.
9)  dir.rotateForward90Degrees();

10) // Create a point 50 units away on the perpendicular line.
11) Coordinate newStartPoint  = dir.getCoordinateAtEndOfVector(coord1, 50.0);

12) // Create a parallel LineString that is 200 units long and offset
50 unites from the existing LineString.
13) LineString parallelLine = dir.getLineStringAlongDirection(newStartPoint, 200.0);
```

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