Scaling up globally: 30 years of FOSS4G development

Keynote

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THE 80's ... the beginning

*Img. courtesy: J Westervelt 2006: Early GRASS Community Views on FOSS*
THE 80's ...

1980 – LAGRID – J. Westervelt master's thesis: GIS software, developed on a mainframe computer, then ported to Cromemco Z-80. FORTRAN

1982 – FHIS (Fort Hood Information System)
Vax 11/780 minicomputer, UNIX, C language.
Programmer: L. Van Warren

by J. Westervelt and M. O'Shea, 29 July 1983

Included GIS programs:

| arctogrip | griptocell |
| area_stats | layer_info (r.info) |
| cell_stats | list (g.list) |
| cellmod (grid editor) | over (d.rast, but for b/w monitor) |
| coin (r.coin) | reclass (r.reclass) |
| combine (boolean combination) | sho_over (display images created by over) |
| distance (r.buffer) | table (stats associated with over) |
| dotmap (graphics on a dot-matrix printer) | whats_here (r.info with a mask) |
| erase (d.erase) | window (g.region) |

1983 – PROJ4 library development started by Gerald I. Evenden
THE 80's ...

August, 1983 – U. S. Army Corps of Engineers' Construction Engineering Research Laboratory (USA/CERL) in Champaign, Illinois

Purchase of first Sun-150 computers (2) – specs:
- $8.900 16 bit, 10Mhz, 256Kb memory, 10Mbps Ethernet, 17" b/w monitor (100*800)
- $3.400 1Mbyte extra memory
- $2.000 3/4M Fast Sun Memory
- $1.590 Barko color monitor
- $6.540 80Mbyte hard disk
- $1.900 Disk controller board
- $5.500 Dot Matrix printer
- $1.500 Vanilla UNIX software -or-
- $2.000 4.2BSD plus library of graphics software

1983/1984 New analysis capabilities added in GRASS GIS:

Boolean combination - gridcell and polygon
Weighted overlay - gridcell and polygon (reworked later into r.mapcalc)
Distance-from (now r.buffer)
Isoline generation (grid to poly - now r.contour)
Coincident tabulation (now r.coin)
Mathematical combination (reworked later into r.mapcalc)

Source: http://lists.osgeo.org/pipermail/grass-psc/2012-December/000985.html
THE 80's ...

1984 – GRASS running on SUN-1 and Masscomp

1985 – GRASS 1.0, GRASSnet established (pre-mailing list)

15 March 1985: **first** commercial Internet domain name registered

1985 – Richard Stallman publishes the **GNU Manifesto**

1987 – GRASS 2.0; first issue of *GRASSClippings* Newsletter
  GRASS video narrated by William Shatner (Captain Kirk of Star Trek)

1988 – GRASS 3.0; Army R&D Achievement Award (Webster, Goran, Shapiro, Westervelt)
THE 80's ...

1989 – GRASS 3.1
First release available on Internet
(uxc.cso.uiuc.edu)

But how was software developed? Locally!

While Revision Control System (RCS) was available and sometimes used, yet no server based system like “CVS” (CVS 1.0 in 1990 – today: SVN, git, …)


However:
By 1992, still less than 15,000 .com domains registered...

See also:
- http://grass.osgeo.org/home/history/
THE 90's ... visualization and analysis

Source: Helena Mitasova
http://skagit.meas.ncsu.edu/~helena/gmslab/gsoils/vizrep2.html
THE 90's ...

1990 – GRASS 4.0
Letter-dot format adopted for commands (e.g. d.rast and g.region)

1991 – First mailing lists

Opening night

Rob Knauernhase  robyzorro.decarr.army.mil
Mon Dec 16 19:10:33 EST 1991

• Next message: Opening night
• Messages sorted by: [ date ] [ thread ] [ subject ] [ author ]

To everyone who has beta-tested the list:
This is the last dry-run before releasing it to the world. There are no
more bugs, right? :-)

Rob

More information about the grass-user mailing list
THE 90's ...

1992 – New graphics technology became available: OpenGL

Software distribution:
“Moon“ FTP server of CERL

(note: still 2 years to wait for WWW!)
THE 90's ...

ORGANIZATIONS

**1992**
GRASS Inter-Agency Coordinating Committee
→ Open GRASS Foundation (OGF)
→ OpenGIS Consortium (OGC)

**1994** – Tim Berners-Lee decided to constitute the
**World Wide Web Consortium (W3C)**

**1994** – **Open Geospatial Consortium (OGC)** founded
THE 90's ...
THE 90's ...
Internet growth as a crucial precursor to FOSS4G development

In 1998, just a few countries - Iceland, Sweden and New Zealand - had extensive internet usage. In Africa, the Democratic Republic of Congo, a country of 68 million, had just 200 registered internet users.

Source:
http://news.bbc.co.uk/2/hi/technology/8552410.stm
THE 90's ...

First Web Applications come up, finally!

1993 – Xerox PARC Map Viewer

1994 – GNU/Linux 1.0 released

1995 – First GRASS 4.1.5 port to Linux (Andreas Holz, Greifswald, Germany)

1995 – UMN MapServer project started

1995 – Well, and also the first spam email in the GRASS mailing list

Do you remember:
30 slackware disks downloaded, but unfortunately in FTP ASCII mode (7 bit, not 8)??

http://wiki.osgeo.org/wiki/Open_Source_GIS_History
THE 90's ...
An interactive GIS via WWW, perhaps the first “Web Processing” service...


REGIS GRASSLinks 3.0: Public Access GIS

GRASSLinks is a World Wide Web interface to a geographic information system (GIS), offering public access to mapped information. GRASSLinks provides GIS display and analysis tools to facilitate data sharing and cooperation between environmental planning agencies, public action groups, citizens, and private entities.

Select one of the REGIS GRASSLinks databases listed below:

REGIS San Francisco Bay/Delta Geodatabase
This comprises our complete on-line archive of geographic information for the Bay region. REGIS has prepared a number of data layers for the California Department of Water Resources, the State Lands Commission, The San Francisco Estuary Project, the Bay Conservation and Development Commission, the Regional Water Quality Control Board, the Delta Protection Commission, and others.

North Bay Wetlands Protection Plan (NBWPP)

Appendix B

GRASSLinks Code

The source code for GRASSLinks is public domain and provided on a DOS-formatted 1.44 Megabyte disk included with this dissertation. A second copy of the disk is filed with the Graduate Assistant in the Department of Landscape Architecture, University of California at Berkeley, (510) 642-2965. To use the disk copy the file, glintar.Z, to a Unix file system. Use the uncompress command to uncompress the file, followed by tar to unpack the component files. The files will be automatically placed in a grasslinks directory which will include a README file with complete instructions for installation.

DataCenter: These maps may be accessed directly from this DPC-Sponsored Delta-specific GRASSLinks site, or via the
THE 90's ...

GRASSLinks

GRASSLinks 3.0 at REGIS
Maps of the San Francisco Bay and Delta Regions

Analysis and Display Options:

- **Display**: Interactively create an image using available maps, colors and regions.
- **Oblique Aerial Photography**: View oblique photos of various locations in the Bay and Delta area.
- **Area tabulation**: Calculate area totals of categories in a map, or overlay two maps and find the extent of intersection.
- **Metadata**: View descriptive text about the maps including source, scale, date, etc.
- **Reclass**: View a new map by aggregating the information of an existing map.
- **Combine**: Create a new map that highlights the coincidence (overlap) of information in two existing maps.
- **Buffer**: Create a new map by adding concentric rings (buffers) around information in an existing map.
- **Ftp**: Compile the composite GRASS files of a map and ftp it.

Start Grasslinks

- **A Tour Guide to GRASSLinks now available!**
  [Please note: you must have a Frames-compliant Net Browser]

Return to the GRASSLinks Homepage
THE 90's ...
Internet, its tools and geeks spreading!

1996 – GeoTools project started

1998 – deegree (originally JaGo) development started with an OGC Simple Features implementation

1998 – GDAL/OGR development started

1998 – First European GRASS GIS server at ILN, Uni Hannover, Germany

1999 – GRASS GIS source code moved from manual management to CVS, precisely on 29 Dec. 1999 :-)

The BIG Spring '98 functionality check of GRASS 4.2.1

Markus Neteler neteler at geog.uni-hannover.de
Wed Apr 8 09:36:19 EDT 1998

- Previous message: ERDAS to GRASS
- Next message: ERDAS to GRASS
- Messages sorted by: [ date | [ thread ] | [ subject ] | [ author ] ]

Dear GRASS community,
spring time is cleaning time!
So I invite you to the

The BIG Spring '98 functionality check of GRASS 4.2.1
---------------------------------------------------------------------------------

This is the invitation to YOU to make a better GRASS! Due to some
Since 2000...
May the FOSS be with you

Free/Libre and Open Source Software (FOSS)
Copyleft Mayuri 2004
Since 2000... growing communities

2001 – OSSIM initial revision in CVS
  PostGIS started
  GeoNetwork opensource started
  GeoServer started

2002 – Quantum GIS initial revision in CVS
  GEOS initial revision in CVS

  Release of Mapbender under the GNU GPL license
  gvSIG was started

2004 – uDig was started

2005 – MapGuide Open Source

2006 – Mapbender gets first bits in CVS
  OpenLayers Started

2007 – GeoMoose was open sourced (started 2005)

2009 – rasdaman was open sourced (started 1995)

http://wiki.osgeo.org/wiki/Open_Source_GIS_History
Since 2000...growing communities

Chulalongkorn University, Bangkok 2004:

FOSS4G is born!

Special thanks to Venkatesh Raghavan, Osaka City University
Since 2000...growing communities

Mapbender
code sprint 2007

FOSS4G Conferences:
Lausanne, Denver,
Victoria, Cape Town, Sydney,
Barcelona, Denver, ...

QGIS Hackfest Pisa 2010
Community sprints, even more...

GRASS-GIS Community Sprint 2012, Prague, Czech Republic
Communication
Flow of bug reporting and solution:

1. User sends bug report
2. Developer detects bug
3. New feature

(Percentages are estimated)
Organization of distributed source code management: “Code habitats”

Two main types of developers may be identified:

- generalist
- specialist (the majority)

It appears that many developer assign themselves to “code habitats”, i.e. their area of expertise (e.g., in GRASS GIS a selection of libraries or topics which they maintain)

These “code habitats” remain often stable over years

There are also partially abandoned code areas (~ 10% of the code?) which are functional but aren't really getting improved

A few “garbage collectors” (generalists) fix lots of odds 'n ends
Organization of distributed source code management: “Code habitats”

http://www.youtube.com/watch?v=suyDqmGXoWk

Intense maintenance in GRASS 6.4 release branch (GRASS 7 development not shown here)...

GRASS GIS 6.4 development visualization from 1999 to 2011 with Gource
Code vetting

Legal aspects

License compliance (e.g., GPL)
No code copying from books like “Numerical Receiptes in C”
Ensure that 3rd party contributions are clean
Employers must agree that work time is spent

Full transparency and peer review help to minimize the risk.

Apache or OSGeo Foundation

Incubation phase
Graduation

http://incubator.apache.org/
http://www.osgeo.org/incubator
Since 2010...

Source: Blog of Arnulf Christl
Open Data: OpenStreetMap.org

Emergency support

Haiti, January 2010:
7.0 magnitude earthquake

Available Geodata:
almost absent

See also:
http://hot.openstreetmap.org/projects/haiti-2
A few days later ... international crowd mapping

See also:
http://hot.openstreetmap.org/projects/haiti-2
New: Crowdfunding of development

OpenLayers: Free Maps for the Web

Get OpenLayers Now!
- 2.12 (Stable): .tar.gz | .zip
- 2.12 Release Notes
- API Documentation, User documentation
- See examples of OpenLayers Usage: Release Examples (2.12), Development Examples

INVEST IN THE WEB MAPPING FUTURE

WHY OPENLAYERS 3?
While OpenLayers is the most complete and capable javascript web mapping library around, it has also started to show its age. While there is great benefit in maintaining full backwards compatibility, the current code base is not designed to take full advantage of a number of the best features of the web, like WebGL, CSS3 and other HTML5 advances.
The OpenLayers team has already started work on a 3.0 version with a number of goals:
- Cleaner, friendly API that is more intuitive for modern web developers
- Small size (20kb in tests), for faster loading, leveraging Google's Closure Compiler
- Nicer default design, and easy designer customizability with CSS3
- WebGL fully integrated, for 3D maps and faster 2D performance on the latest browsers
- Great documentation and examples, making the library easier for all to approach and use

OpenLayers 3 Funding
New cool stuff: plotting GIS data

3D Volume: Mars North Polar Cap

- Research topics:
  - Buried valleys beneath the polar cap,
  - radar signal attenuation.
- Need: „Handpiece“ for communication among scientists and data quality assessment.
- 3D Print is currently used by INAF for data quality assessment.

From Radar to voxels to 3D plots
New cool stuff: massive data processing

- Since 2005 GRASS GIS is running natively on 64bit CPUs
- GRASS GIS 7 also offers Large File Support on 32bit Windows
- Installed on Grids and TOP500 supercomputers (AKKA Umeå, ENEA Frascati, Aurel Bratislava, ...)
- Runs on Linux, AIX, Solaris, freeBSD, netBSD, ...
- Various ways of parallelization
Massive data processing: also for you

Doug Newcomb
General · May 31, 2013

Finally finished recreating the the 20ft elevation grid for North Carolina from all of the bare earth points and verticies of break lines (about 8.5 billion points).

I had all of the points in a single text file, sorted them by X Coordinate, then split them into 30 files in which the coordinates overlapped by 1000 feet in the X direction.

Since the home computer only has 8 GB of RAM (and I wanted to keep doing things like reading email during processing) I limited the extent of processing to about 140,000 feet N-S by 110,000 feet E-W (about 30 million cells), which kept the memory requirements in the 4-6 GB range. I used v.surf.rst with a tension of 20 and npmin of 100 from the GRASS 7 svn pull from March 2013.

“8.5 billion points…”

“Since the home computer only has 8 GB of RAM…”

https://plus.google.com/u/0.communities/111147786674687562495
Concluding remark:

THANKS TO ALL CONTRIBUTORS!

And more to come...

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