SEG Technical Program

Number of Abstract Submissions

- 2007: 800
- 2011: 1100
- 2014: 1600
- 2017: 1700
SEG Bylaws

ARTICLE II
PURPOSES AND OBJECTIVES

The objectives of this Society shall be to promote the science of exploration geophysics and related fields, including applications and research, to foster the common scientific interests of geophysicists, and to maintain a high professional standing among its members.
Science or Black Magic?

Volume 1
JANUARY, 1936
Number 1

GEOPHYSICS
A Journal of General and Applied Geophysics

BLACK MAGIC IN GEOPHYSICAL PROSPECTING

L. W. BLAUS

EDITOR’S NOTE: The term “doodle-bug” is coming more and more to mean proposed
kinds of geophysical prospecting that are neither based upon scientific fact nor upon
known or proven properties of oil, minerals and geologic formations. The geophysicist
is often consulted concerning the reliability of such a proposed method, and his task then
is to explain scientifically just why the proposed method fails and is unsuitable for the in-
tended purpose.
Outline

- Software versus Science
- State of the Madagascar project: 2006-2017
- Madagascar philosophy
- Madagascar fundamentals
Abandoning the habit of secrecy in favor of process transparency and peer review was the crucial step by which alchemy became chemistry. In the same way, it is beginning to appear that open-source development may signal the long-awaited maturation of software development as a discipline.” Eric Raymond
What is Science?
“Science is the belief in the ignorance of experts.”
Richard Feynman
What is Science? (1966)
Science is the systematic enterprise of gathering knowledge about the universe and organizing and condensing that knowledge into testable laws and theories. The success and credibility of science are anchored in the willingness of scientists to expose their ideas and results to independent testing and replication by other scientists. This requires the complete and open exchange of data, procedures and materials.
REPRODUCIBLE RESEARCH

ADDRESSING THE NEED FOR DATA AND CODE SHARING IN COMPUTATIONAL SCIENCE

By the Yale Law School Roundtable on Data and Code Sharing
Reproducibility in Computational and Experimental Mathematics @ ICERM
“It is important to promote a culture change that will integrate computational reproducibility into the research process.”

“Journals, funding agencies, and employers should support this culture change.”

“Reproducible research practices and the use of appropriate tools should be taught as standard operating procedure in relation to computational aspects of research.”
“Communities need to examine how to build a culture that rewards researchers who put effort into verifying their own results rather than quickly rushing to publication.”

“Institutions need to make extra efforts to instill students with an ethos of care and reproducibility.”

Marcia McNutt
“Abandoning the habit of secrecy in favor of process transparency and peer review was the crucial step by which alchemy became chemistry. In the same way, it is beginning to appear that open-source development may signal the long-awaited maturation of software development as a discipline.” Eric Raymond
Usage share of web browsers

Source: StatCounter
Android and iOS Are the Last Two Standing

Worldwide smartphone operating system market share (based on unit sales)

- **Android**
- **iOS**
- **Others**

<table>
<thead>
<tr>
<th>Year</th>
<th>Android</th>
<th>iOS</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td></td>
<td></td>
<td>100%</td>
</tr>
<tr>
<td>2010</td>
<td>20%</td>
<td>40%</td>
<td>40%</td>
</tr>
<tr>
<td>2011</td>
<td>40%</td>
<td>40%</td>
<td>20%</td>
</tr>
<tr>
<td>2012</td>
<td>60%</td>
<td>20%</td>
<td>20%</td>
</tr>
<tr>
<td>2013</td>
<td>80%</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>2014</td>
<td>81.6%</td>
<td>4.3%</td>
<td>4.3%</td>
</tr>
<tr>
<td>2015</td>
<td>15.9%</td>
<td>81.6%</td>
<td>2.5%</td>
</tr>
</tbody>
</table>

Source: Gartner
Back in 1991

Linux

Pyhton

WWW
Reproducible Research

“It is a big chore for one researcher to reproduce the analysis and computational results of another [...] I discovered that this problem has a simple technological solution: illustrations (figures) in a technical document are made by programs and command scripts that along with required data should be linked to the document itself [...] This is hardly any extra work for the author, but it makes the document much more valuable to readers who possess the document in electronic form because they are able to track down the computations that lead to the illustrations.”

(Claerbout, 1991)
Reproducible Research in 1997

Short Note
Empowering SEP's documents

Sergey Fomel, Matthias Schubart, and Joel Schroeder
sergey@sep.stanford.edu, matt@sep.stanford.edu, schroeder@alumni.stanford.org

INTRODUCTION

DOCUMENT EXAMPLE

Document system
- Books and reports
- Installation of SEP's new LaTeX2e system

WITTY LaTeX2e?
- From one source to many documents
- Figure buttons in xtext and HTML documents
- Interaction under discussion

conclusion
- acknowledgments
- REFERENCES
- Introducing SEP2e class
- Available commands
- About this document...

Stanford Exploration Project
Mon Apr 14 08:31:18 PDT 1997

Figure 1: Marine data moved out with water velocity. Input on the left, output on the right.

(After Jon Claerbout, 1991)

If you have access to the electronic version of this article (online at SEP or on a SEP CD-ROM), we suggest you inspect the various output formats of this scientific mini article. Simply execute the commands described in the next section.

$\rho_2 = \frac{c_2 + \frac{h^2}{V^2}}{r}$

where $h$ is the offset and $V$ the subsurface velocity. We copied the underlying program and the following result from Jon Claerbout (1991).
Outline

☑ Software versus Science

◆ State of the Madagascar project: 2006-2017

◆ Madagascar philosophy

◆ Madagascar fundamentals
In a nutshell, Madagascar...

...has had 12,757 commits made by 97 contributors representing 1,118,533 lines of code

...is mostly written in C with an average number of source code comments

...has a well established, mature codebase maintained by a large development team

...took an estimated 328 years of effort starting with its first commit in May, 2003
Contributors
CircleCI Continuous Integration

Builds

By Repo  Mine  All

> ahay/src

- SUCCESS  ahay/src/master #123
  - Duplicated dependencies bug fix.
  - 3 days ago  22:40  1081501

- SUCCESS  ahay/src/master #122
  - selfdoc for data structure ->
  - 3 days ago  21:02  7f8b8da

- SUCCESS  ahay/src/master #121
  - add two programs: Mmpifwigrad1r.c and Mfwiqfw1.c
  - 3 days ago  31:59  0d8d8c8a

- SUCCESS  ahay/src/master #120
  - large figures
  - 3 days ago  32:04  1282269

- SUCCESS  ahay/src/master #119
  - cleanup
  - 4 days ago  21:17  7de6b8e

- FIXED    ahay/src/master #118
  - c99.h
  - 4 days ago  30:59  bde204c

- FAILED   ahay/src/master #117
  - dependency
  - 4 days ago  10:40  3207f5b

- FAILED   ahay/src/master #116
  - dependency
  - 4 days ago  5ec3ec0d
CircleCI Continuous Integration

Builds » ahay » src » master » build 123

Testing in bei_sg/toldi
-------------------------
  scons: Reading SConscript files ...
  scons: done reading SConscript files.
  scons: Building targets ...
  retrieve(['"dynamics.H", "/var/tmp/bei_sg/toldi/dynamics.H"], [])
  < dynamics.H /home/ubuntu/RSFROOT/bin/sfwindow n1=375 n2=1 f2=9 | /home/ubuntu/RSFROOT/bin/sfdd form=native type=Float | /home/ubuntu/RSFROOT/bin/sfgrey wanttitle=n allpos=y > Fig/toldi.vpl
  test(['"test_toldi1"'], ['"Fig/toldi.vpl"'])
Comparing /home/ubuntu/RSFROOT/figs/bei_sg/toldi/toldi.vpl and Fig/toldi.vpl
  < dynamics.H /home/ubuntu/RSFROOT/bin/sfwindow f3=5 n3=1 | /home/ubuntu/RSFROOT/bin/sfdd form=native type=Float | /home/ubuntu/RSFROOT/bin/sfwindow f2=9 n2=1 | /home/ubuntu/RSFROOT/bin/sfdd form=native type=Float | /home/ubuntu/RSFROOT/bin/sfnstretch v0=1.5 half=n inv=y > cmp.rsf

  sfnmostretch: CMP 1 of 1;
  < cmp.rsf /home/ubuntu/RSFROOT/bin/sfwindow f2=0 n2=1 > win0.rsf
  < cmp.rsf /home/ubuntu/RSFROOT/bin/sfwindow f2=5 n2=1 > win5.rsf
  < cmp.rsf /home/ubuntu/RSFROOT/bin/sfwindow f2=9 n2=1 > win9.rsf
  < win0.rsf /home/ubuntu/RSFROOT/bin/sfcat axis=2 win5.rsf win9.rsf | /home/ubuntu/RSFROOT/bin/sfwiggle wanttitle=n plotcol=6 zplot=4.4 wans
  < cmp.rsf /home/ubuntu/RSFROOT/bin/sfwindow f2=27 n2=1 > win27.rsf
  < cmp.rsf /home/ubuntu/RSFROOT/bin/sfwindow f2=22 n2=1 > win22.rsf
  < cmp.rsf /home/ubuntu/RSFROOT/bin/sfwindow f2=18 n2=1 > win18.rsf
  < win27.rsf /home/ubuntu/RSFROOT/bin/sfcat axis=2 win22.rsf win18.rsf | /home/ubuntu/RSFROOT/bin/sfwiggle wanttitle=n plotcol=5 zplot=4.4 wantaxis2=n xll=0 xur=13 yll=-5 yur=10 > casel.vpl
  /home/ubuntu/RSFROOT/bin/vpopen erase=v vstyle=n case0.vpl case1.vpl > Fig/reciptrace.vpl
  test(['"test_reciptrace"'], ['"Fig/reciptrace.vpl"'])
Comparing /home/ubuntu/RSFROOT/figs/bei_sg/toldi/reciptrace.vpl and Fig/reciptrace.vpl
  < dynamics.H /home/ubuntu/RSFROOT/bin/sfwindow min1=1 n1=1 | /home/ubuntu/RSFROOT/bin/sfdd form=native type=Float | /home/ubuntu/RSFROOT/
Madagascar Contributors
Madagascar Schools
Beijing-2011
Qingdao-2015
Development Activity

Contributors per Month

- MADAGASCAR

- BLACKDUCK | Open HUB

Austin-2013 Working Workshop
Migration Gallery
Incremental Baselines

Precision vs. % Answered

Graph showing incremental baselines over time from 12/2007 to 11/2010.
Madagascar Website Visits
Online Collaboration

- Blog [http://ahay.org/blog/](http://ahay.org/blog/)
- GitHub project (34 contributors) [https://github.org/ahay](https://github.org/ahay)
- Mailing lists (462 subscribers) [https://lists.sourceforge.net/lists/listinfo/rsf-user](https://lists.sourceforge.net/lists/listinfo/rsf-user)
- LinkedIn group (595 members) [https://www.linkedin.com/groups/1847746](https://www.linkedin.com/groups/1847746)
Outline

- Software versus Science
- State of the Madagascar project: 2006-2017
- Madagascar philosophy
- Madagascar fundamentals
Research Pyramid

- Implement
- Test
- Publish

Pyramid
Research Pyramid

- Programs
- Examples
- Workflows
- Papers
Research Pyramid

- 200 Papers
- 900 Workflows
- 1,700 Programs
- 8,000 Figures

Languages:
- LaTeX
- Python
- SCons
- Unix
- C
Outline

✓ Software versus Science
✓ State of the Madagascar project: 2006-2017
✓ Madagascar philosophy
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