Engaging Students in Real World HFOSS Projects

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Real World HFOSS Projects
In Engineering Students

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Outline

• The Humanitarian FOSS Project
• What is FOSS
• H-FOSS Projects
• H-FOSS Courses
• Observations/Pitfalls
• Discussion
The Humanitarian-FOSS Project
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• Motivation
  – Let’s help our neighbors!
  – Let’s join the open source movement!
  – Let’s help our neighbors!

• NSF Grant (2007-2009)

• Credit: David Patterson, former ACM President

• http://www.hfoss.org

Can these joint initiatives help revitalize undergraduate computing education?
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NSF/CPATH Grant

• Goal: Get undergraduates building H-FOSS.

• Chapters: Trinity College, Connecticut College, Wesleyan University.

• Projects:
  - New: GNOME, Mozilla (anticipating)
  - Local/Regional: Hartford Public Library, Ronald McDonald House
  - Global/International: Sahana, OpenMRS, POSIT, InSTEDD

• Courses:
  - FOSS Software Engineering
  - FOSS Independent Studies and Senior Thesis Projects
  - FOSS Application Programming
  - FOSS 101


• Community Building Annual Symposium (SIGCSE)
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Community Building Effort

Computing Departments
• Teach computing
• Build FOSS
• Gain skills and opportunities

FOSS & IT Communities
• Host interns
• Fund and advertise
• Volunteer expertise
• Recruit students

Humanitarian Communities
• Acquire software
• Host interns
• Teach volunteerism

Humanitarian Project

The Humanitarian FOSS Project

Community Building Effort
Projects anywhere.

Where students anywhere can join HFOSS
- A Google Summer-of-code like community
  - Grand vision (with corporate support):
    - Tied to school's curriculum.
    - Courses, independent studies, internships.
    - Lightweight FOSS curriculum.
    - Lightweight FOSS Certificate Program
  - Example: HFOSS@MTSU.org
  - Research universities, community colleges.
  - Women's colleges, traditionally black schools.
  - Create N new H-FOSS Chapters.

Goal #1: Grow and broaden the community

NSF/CPATH Part II (we hope)
What is FOSS?
Free software is freedom to...

- run the program.
- study how the program works.
- share copies with your neighbor.
- improve the program to benefit the community.

Defining, ~1983
(Richard Stallman, The Free Software Foundation)

Free software is a matter of liberty, not price. [It is] free as in free speech, not as in free beer.

(Richard Stallman, The Free Software Definition, ~1983)

www.fsf.org

Free software is freedom to...
Linux (Linus Torvalds, Usenet post, 1991)

... professional like GNU)
... just a hobby, won't be big and
... I'm doing a (free) operating system
... Hello everybody out there using minix

... generated a community of 1000s of developers.
... started as a hobby project in 1991.
... built on Stallman's GNU (GNU is Not UNIX) Project.
... is the kernel of GNU/Linux.

Linu
Cathedral and the Bazaar

(George W. S. Tavris, The Cathedral and the Bazaar)

Given enough eyeballs all bugs are shallow.

Given enough eyeballs all bugs are shallow.

Cathedral and the Bazaar

Given enough eyeballs all bugs are shallow.

Given enough eyeballs all bugs are shallow.

... closely tied to users ("release early and often").

... a meritocracy based on peer review.

... open and transparent.

... non-hierarchical.

... community based.

FLOSS development is...
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FOSS licenses

- are maintained by the Free Software Foundation and the Open Source Initiative.
- are maintained by the Free Software Foundation and the Open Source Initiative.
- number between 60-80.


Bruce Perens, OSI Co-Founder
How is FOSS Doing?
Source: Morelli unpublished, 2007

1.8 + Million Members
173,000 + Projects

Sourceforge.net -- the largest open source repository.

Growth of Open Source Projects
Free vs. Proprietary

Closed and Proprietary

Gates

Bill

Malware

Free and Open

Ross

Blake

Source: net applications (May, 2009)

Total Market Share

Microsoft Internet Explorer

50.26%

Firefox

22.51%

Safari

8.43%

NetScape

6.74%

Chrome

1.80%

Opera

0.72%

Other

0.28%
Many Large Successful Projects

Supporters

Apache Software Foundation

http://www.apache.org
Server Market Share All Domains

Source: news.netcraft.com (June 2009)
Market Share - Million Busiest Sites

Source: news.netcraft.com (June 2009)
FOSS in Government

Brazil adopts open source (BBC, June 2005).

French Gendarmerie moved from MS to Ubuntu saving an estimated 50 million Euros since 2004 (OSOR-EU, 2009).


Amsterdam: Govt makes OpenOffice and Firefox default. (OSOR-EU, April 2009).

UK: Govt backs FOSS to avoid “lock in” (BBC, Feb. 2009).


Vietnam: By July 2009 of clients of Govt IT must use FOSS, including OpenOffice and Mozilla (VietnamNet, Jan. 2009).


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Projects
Humanitarian FOSS
Sahana means relief in Sinhalese

- Web-based information system.
- Started by Sri Lankan volunteers in aftermath of Asian Tsunami.
- Deployments:
  - Sri Lanka Tsunami (2005)
  - Pakistan earthquake (2005)
  - Philippine mudslide (2006)
  - Indonesia earthquake (2006)
  - Peru earthquake (2007)
  - Myanmar cyclone (2008)
  - China earthquake (2008)

- 38,000+ SourceForge downloads since 2005.
- Free Software Award for Social Benefit (2007).

Sahana - Disaster Management

Sahana means relief in Sinhalese
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Missing Person Registry

This data is at least 20% correct based on the number of people touched. The system was designed to be used for the needs of the family. As we can see, the system is also captured which adds to the chances of people finding each other. For capture information about the people missing and found, the information of the person.

The Missing Person Registry is an online bulletin board of missing and found people. It not only
Our Contribution:

- Used as a teaching tool in undergraduate courses.
- WMOS (Stand-alone VM) over 600 downloads in 1 year.
- Galveston TX, disaster preparedness.
- NYC, Office of Emergency Management, disaster preparedness.

Deployments and Branches:

- Accepted into Sahana in 2007.
- Trinity, Wesleyan, and Connecticut College students.
- Manages volunteers during a recovery effort.
- Collaboration with Accenture volunteers.
- Volunteer Management (VM) module (2006-2009)

Sahana - Our Contribution
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Volunteer Management Module

- May 2008, China Deployment

- Chengdu, Colombo, NYC, Hartford

- May 2008, China Deployment

Blog: http://blog.hfoss.org/

Volunteer Management Module
NYC Office of Emergency Management

Summer 2009: OEM's Virtual Emergency Operation Center

Fall 2008, Galveston TX downloads system from NCY-OEM.

Summer 2008, OEM hires HFOSS students to customize.

Summer 2007, Respere modifies the VM Module.

IBM Subcontract with Respere, The Sahana Company

OEM Sahana System – evacuate 600,000 from coastal areas.
“The [HFOSS] team has been fantastic and I think this is as polished a product as you could ask for. It’s going to do a lot of good and help many, many people.”
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- Portable Open Search Identification Tool
- Mobile Tool: Victim Search and Rescue
- Mobile adhoc network (MANET)
- Linkoping University RTS lab (Sweden)
- Open Handset Alliance
- Google Android FOSS
- Google Android FOSS
- code.google.com/p/posit-android

Crisis Management Tool
A Design Session
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UI Design (CST 22)

Flag Input errors.
Confirm on exit.
A walk around campus
GPS fix accuracy
Open Medical Record System

Supporters: WHO, CDC, Rockefeller Foundation, Google

Implemented in: Rwanda, Kenya, South Africa, Lesotho,
Zimbabwe, Mozambique, Uganda, Tanzania, Haiti.

Goal: Self-sustaining health IT for developing world.

Developed by Partners in Health and Regenstrief Institute.

Electronic Medical Record System started in 2004.
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Open Medical Record System

Rwanda, Oct. '07
Hospital, Rwinkwavu

2008 Implementers Meeting

Open Medical Record System
OpenMRS – Our Contributions

- Remarks/Project
- Teaching/development platform in software engineering course.
- Non-numeric data representation (Vinit Agrawal, Trinity '10)
- Image capture and upload (Rachel Foecking, Trinity '11)
- Sourceforge: Autotouch, >70 downloads
- Touchscreen Toolkit (Giovanni Capalbo, Trinity '08)
- Fabbia-Kane, Wesleyan '11
Ronald McDonald House Project

projects

http://myopensoftware.org/content/software-

Spring 2008 Software Development Course

Allen Tucker, Bowdoin College, Emeritus

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Ronald McDonald House Project
Courses

Humanitarian FOSS
Examples: Software Engineering/Development

- Fall 2008 – Wesleyan University (TCW)
  - OpenMRS

- Spring 2008 – University of Hartford
  - Literacy Volunteers of Greater Hartford
  - Ronald McDonald House, Portland, ME

- Spring 2008 – Bowdoin College
  - Sahana, VMoss

- Spring 2007 – Trinity College (TCW)
  - Repository – http://teaching.hfoss.org
Examples: Independent Study

- Repository – http://teaching.hfoss.org
- AppTrac: Hartford Public Library Project
- Spring 2009 – Trinity College
- Giovanni Capalbo Senior Theses
- Spring 2008 – Trinity College
- Miscellaneous Projects
- Fall 2007 – Trinity College (TCC)
- Sahana Development
- Fall 2006 – Trinity College
Example: FOSS 101

- Spring 2007, Fall 2009, Spring 2010

Goals:
- CS0 general education course.
- No prerequisites.
- Math distribution credit.

Engage students in discussion of the FOSS impact on society.

Get students to see the relevance of CS to their lives.
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The 101 Pitch: We...

- We don't realize that all (a lot) of this stuff is based on something CS invented:
  • use good quality FOSS every day.
  • like the freedom and openness of the Internet.
  • think that Internet content should remain free.
  • share stuff with their friends for free.

BUT...

- we use good quality FOSS every day.
- like the freedom and openness of the Internet.
- think that Internet content should remain free.
- share stuff with their friends for free.

The 101 Pitch: We...
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Jimmy (Jimbo) Wales invented...
Ward Cunningham
Inventor of Wiki
Software

The Free Encyclopedia
WIKIPEDIA

Sharing what we know for free.

Jimmy (Jimbo) Wales Invented...
What do these programs do?

Blue Poison Dart Frog
(Dendrobates azureus)

Sourceforge
1.2 Billion Downloads!!

Emule

Ares Galaxy
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Example: FOSS 301

- Software engineering or development course.
- CS1 and/or CS2 prerequisites.
- Engage in a real FOSS project.
- Sahana
- OpenMRS
- Mozilla
- Needed: Mentors from the FOSS community.
- Sharing and collaborative in-class culture.
- Working in teams (communities).
- Working in teams (communities).

Example: FOSS 301
Classroom Culture: Sharing and Collaboration

• Classroom culture: Sharing and Collaboration

• Professors learn stuff from students.

• Students play a role in grading (peer-to-peer).

• Students are encouraged to help each other and

• Students work on teams on programming and

• Writing assignments (documentation, blogs, wikis).

• Students work in teams on programming and

• Share their solutions and insights.

• Students are encouraged to help each other and

• Discussed openly.

• Computational assignments are displayed,

• Discussion is open and encouraged.

• Classroom culture: Sharing and Collaboration
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Pitfalls

• Messy – this is the real world.
• What if …
  – Students don’t meet project goals?
  – Software bugs emerge next semester?
  – Organization doesn’t adopt the software?
• Need development time and support.
• Outside comfort zone – learning from students?
• Extra work and effort.

For Faculty

• Publish or perish.
• Extra work and effort.
• Outside comfort zone – learning from students?
• Need development time and support.

Messy – this is the real world.
Conclusions

• FOSS methodology is a significant development. It should be incorporated into undergraduate curricula.
  ● It can be incorporated at different levels.
  ● It helps to have a community.
  ● It can be incorporated into undergraduate curricula.

• FOSS movement has broad societal implications.
  • Freedom and Openness everywhere.
  • Interdisciplinary opportunities: Economics (Microfinance),
    Politics (grass roots movements), media ...
  • Humanitarian focus is attractive to students.
  • It’s fun!

• It’s fun!
Thank you!

(www.hfoss.org)