Open Source Software Development

OHJ-1860 Software Systems Seminar, 3 cr

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Course Information
Basic Information

- **Audience**
  - This course is primarily intended for Ph.D. students but participation is also open for others

- **Time and place**
  - Wednesdays (15:00-17:00) in room TC131

- Some of your presented material may be used in future instances of the course
Course Requirements

- Attending at least 50% of all the sessions (min of 6 sessions)
- One oral presentation
- Submission of a written report (about 7-10 pages)
- Active participation in the discussions is highly recommended, may compensate for absence
  - The presenter should conclude the presentation with “main lessons learned”, “future directions”, etc.
  - The audience should discuss the concluding points, or any other points related to the content of talk, by asking questions to the presenter
  - The presenter should also prepare at least three questions concerning the topic, the audience is expected to provide the answers 😊
Other Practical Information

- Presentation slides should be sent in advance
- The written report can be submitted later, but preferably in advance too
- Assessment scale: “Passed” or “Failed”
- Course webpage: http://www.cs.tut.fi/~imed/courses/OpenSource/
Available Topics

- T1. History of open source in the software engineering world
- T2. Popular open source projects (e.g. linux, apache, gnome, etc)
- T3. Management of open source projects (e.g. at http://sourceforge.net/)
- T4. The development organization and communication schemes
- T5. The production and release process in open source
- T6. Used tools and mechanisms in open source practices
- T7. The open source software repository
- T8. The use of high level specifications (req. specs., arch. and detailed designs, etc) in open source
- T9. Open source and quality attributes/concerns (e.g. reliability, safety, security, modifiability, etc)
- T10. Starting, contributing, adopting, and integrating to/from open source projects
- T11. Open source and empirical studies
- T12. Software documentation in open source projects
- T13. Evolution of open source projects
- T14. Potential benefits and risks of the open source movement
- T15. Open source and cost estimation models
- T16. Evaluating open source software
Introduction to Open Source Software Development
Free Software [http://www.gnu.org/]

“Free software” is a matter of liberty, not price. To understand the concept, you should think of “free” as in “free speech”, not as in “free beer”

Free software is a matter of the users’ freedom to run, copy, distribute, study, change and improve the software. More precisely, it refers to four kinds of freedom, for the users of the software:

- **Freedom 0**: The freedom to run the program, for any purpose.
- **Freedom 1**: The freedom to study how the program works, and adapt it to your needs. Access to the source code is a precondition for this.
- **Freedom 2**: The freedom to redistribute copies so you can help your neighbor.
- **Freedom 3**: The freedom to improve the program, and release your improvements to the public, so that the whole community benefits. Access to the source code is a precondition for this.
Open Source Software [http://www.opensource.org/]

- Basic idea: When programmers can read, redistribute, and modify the source code for a piece of software, the software evolves. People improve it, people adapt it, people fix bugs. And this can happen at a speed that, if one is used to the slow pace of conventional software development, seems astonishing.

- Open source doesn't just mean access to the source code. The distribution terms of open-source software must comply with the following criteria:
  - Free Redistribution
  - Source Code
  - Integrity of The Author's Source Code
  - No Discrimination Against Persons or Groups
  - No Discrimination Against Fields of Endeavor
  - Distribution of License
  - License Must Not Be Specific to a Product
  - License Must Not Restrict Other Software
  - License Must Be Technology-Neutral
Free and Open Source Software

- Free software (1983) is:
  - A philosophy
  - A social movement
  - Stallmanism

- Open source (1998) is:
  - A business model
  - A development methodology
  - Raymondism

- Both approaches share a **common vision** on access to **source code**
Dimensions of Open Source

- Organization
- Culture
- Economy
- Sociology
- Psychology
- Ethics

Course focus:

SW Engineering

Legality

Business

Open Source Software Development
The Sociological Dimension

- Distributed communities
- Working with unknown people
- Multi-cultural setting, cultural influences, cultural differences
- The role of welfare societies
- Gender and age studies
- Political motivation
- The formation of evolving communities
- The notion of trust, reputation, etc
- Consensus-based decisions
The Business Dimension

- Emergence of many successful commercial enterprises based on open source software licensing
- Open source as a business model
- Challenging competitors
- Adding value to products
- Companies and individuals can collaborate on a product that none of them could achieve alone
- Building a user/client community
The Economic Dimension

- Economic elements such as pricing, development cost, return on investment
- Increasing the competitiveness of the economy of less developed countries
- Job creation
- Strengthening the role (and the adoption) of Information Technology in rising and developing economies
- You are not a consumer only but a producer too
- Enforcing cross-border economy
The Cultural Dimension

- Geographic distribution of open source activities
- The importance of languages ("English")
- Ideological beliefs
- The notion of power, authority, and consensus
- Communication
- The history of open source in developer’s own environment
- Gender role
The Organizational Dimension

- Non-profit organizations
- Sponsors
- Commercial enterprises
- The Onion model of communities

![Image of people in a circle]

- Passive user
- Reader
- Bug reporter
- Bug fixer
- Peripheral developer
- Active developer
- Core member
- Project leader
The Legal Dimension

- There are important legal aspects involved in using open source software
- Different licensing models impose different restrictions

Classical licenses
- GPL: The GNU General Public license
- LGPL: GNU Lesser General Public license
- BSD: was first used for the Berkeley Software Distribution, a Unix-like operating system
- MIT: originated at the Massachusetts Institute of Technology

License database
- http://www.opensource.org/licenses/
- http://www.gnu.org/philosophy/license-list.html
The Ethical Dimension

- The role of ethics is to positively contribute to the community and to avoid all sorts of harm
- Personal commitment
- Responsibility
- Honesty
- Sense of public good
The Psychological Dimension

- Tolerance and patience
- Self-confidence and decision making
- Stress management
- Ambition to help
- Motivation and satisfaction
- Negative attitudes and prejudices
The Technical Dimension

- People in open source communities are people with (technical) quality
- Open source is a developer and code/configuration-centric development setting
- Tools: CVS; bug tacking systems; WIKI’s; build, integration and testing tools
- Communication: E-mails, instant messaging systems
- Open development plan
- Many of open source projects/software are of high quality
- The marriage of open source and proprietary software
Example Open Source Projects

- **Operating Systems**
  - Linux, FreeBSD, GNU/Hurd

- **General Utilities**
  - GNU Utilities

- **Languages**
  - GNU C/C++, Perl, Python, Tcl

- **Windowing Systems**
  - The X Window System, XFree86

- **Desktop Environments**
  - GNOME, KDE, GNUStep, XFce

- **Web Browsers**
  - Mozilla

- **Productivity Applications**
  - ABIWord, GNU Image Manipulation Program

- **Office Suites**
  - Open Office, KOffice

- **Server-type software**
  - Samba, Apache, PhP, Zope, MySQL, PostgreSQL

- **Games**
  - Freeciv, ZSNES, ScummVM
Example Personalities

- Richard Stallman: founder of the Free Software Foundation and the GNU Project
- Linus Torvalds: initial author and top maintainer of the Linux kernel
- Tim O'Reilly: an activist for internet standards and for open source software.
Example Organizations

- The Free Software Foundation
  - http://www.fsf.org/

- Free Software Foundation Europe
  - http://www.fsfeurope.org/

- The GNOME Foundation
  - http://foundation.gnome.org/

- Linux International
  - http://www.li.org/
Example Websites

- [http://www.opensource.org/](http://www.opensource.org/), a non-profit corporation dedicated to managing and promoting open source
- [http://www.gnu.org/](http://www.gnu.org/), a website promoting free software
- [http://sourceforge.net/](http://sourceforge.net/), a centralized location for managing open source projects, a source code repository
- [http://slashdot.org](http://slashdot.org), major community and news site with forum
- [http://freshmeat.net](http://freshmeat.net), major software release announcement site
- [http://advogato.org](http://advogato.org), the advocate site for free software developers
Literature

- Online digital libraries (IEEE, ACM, Springer, etc)
- MSR workshop series
- OSCON convention series
- OSS conference series
- Empirical software engineering literature
- Books:
- WWW:
  - http://www.isr.uci.edu/~wscacchi/
  - http://opensource.mit.edu/online_papers.php