Open Source Software Engineering: Research and Practice

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Successful Software Engineering Research

- Intellectual Accessible to SE Practitioners
- Collaborative: use “industry as laboratory” and society as well!
- Open and Transparent – Sharing process knowledge as well as research outputs
Software Reuse

- Software reuse has been inspired by Alexander's work on design patterns in architecture.
- By studying existing software systems within a particular domain, common design principles and software design concepts can be abstracted for reuse in the development of future systems.
- Software reuse is a metaphor for intellectual progress in Software Engineering.
- Publication of design patterns and frameworks.
Software Engineering Environments

• Linked to practitioner need and early Software Tools and PWB, APSE, IPSE developments

• IDEs
  • OSS Eclipse
  • SourceForge, Gforge, FusionForge
  • GitHub
ECMA Reference Model for Software Engineering Environments (ECMA 1993)
(taken from Sommerville’s slides)
My Work on SEEs

- UNIX ST and PWB
- IST IPSE with BT, ISTAR, mid 80s (Unix based)
- ESPRIT Practitioner Project, late 80s (Unix)
- ESPRIT AMES Project, mid 90s (early Web)
- [EPSRC CARD Project, late 90s (closed n/w)]
- Framework 5 GENESIS Project and EPSRC CoDEEDS project, 2000s (Web service based OS Systems)
- Current research on Eclipse based awareness support and OLPC - CODEX (OSS)
- **Base Case**: Models, Methods, Tools and Evaluation through usage
- **Inductive Step**: Theoretical Improvement based on feedback and advances in Technology allows progression from n to n+1
SEE of the future?!
Software Development Based Research

• Sharing of research software – growth of communities around UNIX, C, X-Windows, Java, the Web, GNU Software, the Free Software Foundation, Linux, SourceForge, KDE,...

• In OSS, the product, its source code and other SLC products, are exposed to public scrutiny as well as the process through change logs, versions, mailing lists, discussion forums, wikis, blogs...
New SE research possibilities

- OSS offers a wealth of data for mining by the SE research community, viz ICSE MSR.
- At CROSS, we have studied both software evolution and software reuse within OSS projects in terms of product and process.
- Recent studies in how developer and user communities affect the success of OSS projects.
- How do OSS projects grow and successfully evolve?
Overview

Software repositories such as source control systems, archived communications between project personnel, and defect tracking systems are used to help manage the progress of software projects. Software practitioners and researchers are recognizing the benefits of mining this information to support the maintenance of software systems, improve software design/reuse, and evaluate novel ideas and techniques. Research is now proceeding to uncover the ways in which mining these repositories can help understand software development and software evolution, to support predictions about software development, and to express and verify knowledge concretely in planning future development.

The goal of this two-day working conference is to advance the science and practice of software engineering via the analysis of data stored in software repositories. We solicit poster papers (max: 4 pages) and research papers (max: 10 pages) for the main conference. Additionally, we solicit submissions to the MSR Challenge 2009, described below. Poster papers should address controversial issues in the field, or describe interesting or thought-provoking ideas that are not yet fully developed. Authors of accepted poster papers will present their ideas in poster form during a dedicated session at the conference, and also in a lightning talk. Research papers are expected to describe new research results, and have a higher degree of technical rigor and maturity. Authors of accepted research papers will present their ideas in a research talk at the conference. Paper submitters...
Inspired by Classic SE Research

- Lehman’s 1st Law: Once created evolutionary software has the potential to change in its environment and it must be evolved in response to changes within its environment if it is to continue to be useful.
- A larger user community will demand changes and act as a key driver of evolution.
- In OSS, building both a developer community and a user community is important – they act in a symbiotic relationship.
The Role of Web-based Communities

• Accessibility offered by the web has been a key factor in OSS success, also cheap laptops and budget airfares!
• Web-based OSS SEEs such as SourceForge offer project hosting and the basis for community building.
• Other OSS projects are clustered around major Linux distributions, Desktop distributions.
• Wider distribution results in more users and potentially larger development communities.
TCPDF: 4.2.006 was released.
2008-11-07
TCPDF is a PHP class for generating PDF documents without requiring external extensions. TCPDF Supports UTF-8, Unicodes, RTL languages and HTML. TCPDF 4.2.006 was released. This version fixes a bug on HTML.

Project of the Month
November 2008
Shareaza

Every month the team at SourceForge.net picks one project, from among the tens of thousands hosted on SourceForge.net, to honor by naming it Project of the Month.

Past Projects

Community

2008-07-21
SourceForge.net staff have just updated the Site Status page which provides updates regarding our ongoing migration to Chicago, schedule unplanned outages, and new launches. See it at:
Be free

KDE is an international technology team that creates Free Software for desktop and portable computing. Among KDE's products are a modern desktop system for Linux and UNIX platforms, comprehensive office productivity and groupware suites and hundreds of software titles in many categories including Internet and web applications, multimedia, entertainment, educational, graphics and software development. KDE software is translated into more than 60 languages and is built with ease of use and modern accessibility principles in mind. KDE's full-featured applications run natively on Linux, BSD, Solaris, Windows and Mac OS X. More...

Latest Announcements

KDE 4.1.3 released.
On 5th November 2008, the KDE community released KDE 4.1.3.
OSS is Community based Development

- These are truly web-based communities.
- Software development projects require collaborative working; SD is a paradigm case of CSCW.
- OSS projects similarly offer exemplars of CSCW applied to SE.
- OSS projects must actively address community development!
Case Study OLPC

- “an education project” with a social context bringing together educationalists, software engineers, hardware engineers in one large community – reflected in the OLPC web presence.

- OLPC is based on “learning by making/doing” and its software base is OSS.
One Laptop per Child (OLPC), a low-cost, connected laptop for the world’s children’s education - Windows Internet Explorer

one laptop per child

give a laptop. get a laptop. change the world.
coming nov 17 at amazon.com/xo

sign up to receive updates: your email here subscribe
Welcome to the One Laptop per Child Wiki, a collaborative site about the OLPC project and related communities. We curate pages in over twenty languages.

Learn More  Get Involved  What's New  About this wiki

One Laptop per Child association is developing a low-cost laptop—the "XO Laptop"—to revolutionize how we educate the world's children. Our goal is to provide children around the world with new opportunities to explore, experiment, and express themselves.

Why children need laptops: laptops are a window and a tool: a window into the world and a tool with which to think. They are a wonderful way for children to learn learning through independent interaction and exploration.

What's new

Weekly current events  OLPC Planet  Current events archive

- The XO Software Release 8.2.0 is cut with a redesigned interface, software updater, and 13 languages. Read the release notes.

Mission Statement: One Laptop educational opportunities for the children by providing each child cost, low-power, connected laptop software designed for collaborative empowered learning.
Linking our CS students into OSS

- Using OSS in teaching CS e.g. Linux in OS module
- Student studies of OSS projects in SE module
- Student projects use OSS and contribute to OSS projects.
- Development of support for students to contribute to OLPC – CODEX project.
CODEX

- Supporting collaborative development for the XO laptop.
- UROS project in Summer 2008 and 2009
- Student researcher embedded in CROSS.
- CODEX LiveCD has been produced with wiki based tutorial support but major outcome has been confidence gained by student through interaction with wider OSS community and their encouragement and help – now USB and managed releases planned.
Centre for Educational Research and Development

UROS 2008

The UROS Research Event will take place on 12 November 2008 in the EMMTEC and MHT Buildings, 12.00 - 4.00. The event will start with a buffet lunch and poster display at 12.00 followed by short individual presentations on the different research projects. Further programme details will be posted nearer the time.

Visit http://www.lincoln.ac.uk/conferences to book your place.

- UROS 2008 blog pages
- Subscribe to the UROS 2008 blogs.
- UROS 2008 projects page
- UROS 2008 project booklet (pdf)

What is UROS?

The Undergraduate Research Opportunities Scheme (UROS) aims to enhance the links between teaching and research in the undergraduate curriculum. UROS provides students with the opportunity to engage in a small research project for which they are given a budget of up to...
Photos from CROSS Centre for Research in Open Source Software

Photo 1 of 7 | Back to Group | See All Photos

[Image of a person using a laptop and tablet]
Collaborative Development for the XO-1 laptop (CODEX)

Undergraduate Research Opportunity Scheme Project Proposal

Collaborative Development for the XO laptop (CODEX)

The primary objective of CODEX is to carry out research in support of the Level 2 Group Projects found on all courses for students in the Department of Computing and Informatics (DCI) so that all Level 2 student project groups can undertake projects developing applications suitable for the XO laptop - the principal system at the heart of the One Laptop Per Child (OLPC) project and to produce a tutorial for students on the XO software providing guidance for the development of XO applications by the various group projects which are related to student’s degree course within DCI.

The OLPC project is seeking to engage children globally in this enterprise of “learning to learn” by equipping them with networked laptops. The XO laptop has explicit support for collaboration and sharing of activities through its SUGAR user interface and mesh view which focuses on the activities of its networked users making real things directly supporting the evolution of knowledge as a collaborative enterprise. Education is necessarily a collaborative enterprise with a need for both repositories and also active support for the educational processes as learners engage with one another and their teachers. There is scope for our group project students to develop applications for the XO and make a significant contribution.

All the software associated with the XO is built upon Open Source Software (OSS) and there are already projects within the OSS community to develop further applications for the XO. So in the initial research, the student can survey these and evaluate the current tools being used in these projects as well as investigate the current application program interfaces (APIs) of the software currently available for the XO. The Centre for Research in Open Source Software (CROSS) directed by Professor Bodilyreff has already begun some preliminary research into the software potential of the XO and last summer an undergraduate student within CROSS involved in this project and was able to complete his first year of the code.
CODEX LiveCD Sampler Available
without comments

Good news! You can download a 'taster' of the CODEX LiveCD without the need for a BitTorrent client. There are some known issues with this CD but it is still a good way of testing the basics of the Sugar interface without having to install anything on your PC.

Known issues include:

- 'Browse' activity not working as intended.
- Multiple XFCE menu shortcuts not present.
- Untested on various hardware platforms (should work wherever Xubuntu Linux works!)
- Sugar packages need updating.

Unfortunately due to a busy schedule with the final year of my degree, I don't have the available time to devote more attention to this project. Perhaps someone might be able to continue the work in the future? I am not turning my back on the project, I just don't have much time to dedicate in recent weeks.

Apologies for the free hosting service, if you would like to help with hosting the CD please contact me.

Obligatory screenshot. (Running in VirtualBox)

Download HERE (Hosted by MEGAUPLOAD).
Here is the UROS 2008 poster. The dimensions of the poster are quite large (A1) and so you will need to zoom in to see the detail clearly.

**Introduction**

Here at the University of Lincoln we identified the OLPC project as a potentially excellent way of getting students involved in collaborative software development within the open-source community and as a way of allowing students to contribute to an ethical and worthwhile cause. We aimed to determine a suitable environment in which students can collaborate and develop software for the XO laptop. XO software applications are known as 'activities' for the laptop's Sugar interface. Like the XO hardware, Sugar is designed specifically for the children of developing countries.

**Research**

The key processes of CODEx involved:

- Identifying current Sugar development tools and techniques.
- Considering the efficiency and stability of existing tools.
- Choosing the most suitable option.
- Producing / adapting on the environment.
- Producing documentation and tutorial content.
- Sharing results with the open-source community.

**Results**

The result of the research is the **CODEx UNIUSP**:

- A self-contained development environment.
- Excellent hardware support (thanks to Ubuntu Linux)
- Integrated Sugar tools.
- Required Python bindings and libraries.
- Sugar emulator (can activities without XO hardware).
- Example Sugar activities.
- Useful menu shortcuts (reduces unnecessary typing).
- Tutorial content and resources.

See right-hand side of poster for screenshots.
Collaborative Development for the XO Laptop (CODEX)

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Abstract

The OLPC XO laptop is an interesting and simplistic system to develop applications for; however, there is a lack of information and resources from a university student's perspective. The CODEX project aims to research and produce a collaborative development environment for use by students wishing to create applications for the OLPC XO laptop system. Different platforms and environments were researched to determine the most suitable candidate. The end result of this project is the CODEX LiveCD, a usable self-contained development environment specifically catering for students developing software for the XO laptop. Students can now potentially use the LiveCD to collaboratively develop software for the XO laptop.

1 Introduction

The XO laptop is the unique system at the heart of the OLPC project. The laptop is specifically tailored and designed for use by children in developing countries. With its simplified Sugar interface the XO has stepped away from the traditional desktop computing metaphor that we've grown to rely on.

All of the software associated with the OLPC project is built upon Open Source Software (OSS) and is freely available to anyone in the world. Much of the development effort is undertaken by the open-source community entirely for free; and this
On-going Developments

- Current student projects developing “serious games” for the XO.
- Exploring a new forge with our 2nd year student group projects – github which has been described as FaceBook meets SourceForge!
- Further research on OSS communities and their development.
LimeChat is a slick IRC client for Mac OS X written with RubyCocoa. It features one window for multiple servers, keyboard shortcuts, speed, stability, and simple CSS THEM support.

Recently Updated Repositories
- elan / plex
- fesplugas / simplified_translation
- TheLuda / mangos2
- rlb3 / splitar
- marcusramberg / mojomojo

Top 5 Most Watched Projects
- rails / rails
- technoweenie / restful-authentication
- mislav / will_paginate
- wycats / merb-core
- dchelimsky / rspec

How does it work?
Concluding Remarks

- From Software Reuse to OSS Community Development via CSCW applied to SE and studies in Software Evolution
- OSS is a fantastic resource for SE researchers and also for SE educators and their students!
- Encouraging students as researchers and producers rather than consumers has benefits for both the student and the wider academic community as well as society at large.
Terima Kasih

• Exploring collaboration with the Universities of Malaya and Manchester to research global software development using SE student teams
Open Source Ecosystems: Diverse Communities Interacting

5th IFIP WG 2.13 International Conference on Open Source Systems, OSS 2009
Skovde, Sweden, June 2009
Proceedings