Open Source in Higher Education

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Copyright

Agenda

- Open Source and Universities
- Teaching using Open Source
  - Which courses?
- Teaching about Open Source
- Software
  - Using Linux instead of Windows
  - OpenOffice vs MS Office
  - Development tools
- Open Source & Research
  - Research using Open Source
  - Research about Open Source

Open Source and Universities

- Basic motives of OS and Universities are the same:
  - fostering knowledge & understanding
  - dissemination of knowledge & understanding
  - Better teaching tools
  - contribution to the greater community
  - fighting inequity (digital divide)
- Commercialization of Universities means:
  - move to closed, proprietary environments guarding intellectual property
  - funding by commercial companies to influence teaching and research (Microsoft in the US & Canada)

Open Source at UWA

- UWA developed a policy to promote the use of Open Source
  - defines Open Source
  - promotes the use of Open Source over proprietary software
  - allows academics and staff to contribute to Open Source software projects
  - promotes the use of Open Source in teaching and for Student use

Teaching and Open Source

- Two approaches
  - teaching using Open Source
  - teaching about Open Source
- Teaching using Open Source
  - finding suitable replacements for proprietary software
  - Aims:
    - Familiarizes/trains/skills students with Open Source rather than proprietary software
    - Demonstrates that Open Source is as good/better than proprietary software
    - Seeds the workplace with Open Source evangelists
  - Saves money!

Teaching using Open Source

- Finding suitable replacements for proprietary software
- Linux replaces Windows
  - RedHat probably the easiest distro in terms of desktop
- Office replacements for MS Office
  - Open Office
  - KDE Office
  - GNU Office

Teaching using Open Source

- Development environments
  - Emacs & Java SDK
  - Free closed software Sun ONE (Forte) Community Edition
  - Open Source IDEs
    - Eclipse
    - KDevelop
- Design tools
  - ArgoUML
- Server Software
  - Database software: MySQL, PostgreSQL
  - J2EE software: Apache, Tomcat, JBoss

Teaching using Open Source

- Course delivery software
  - Web server for presentation of content
  - lectures presented as pdf format and Open Office electronic slides
  - help/discussion forums
    - mailing list management software (mailman)
- Avoiding closed systems like WebCT, BlackBoard

Open Sourcing Education

- Releasing courseware using Free Documentation License
  - lecture material
  - laboratory material and code
  - assessments, questions, exams
- Open courseware initiative
  - UWA has many units online with presentations, labs, exams, etc.
  - Moving these over to FDL so they can be re-used
  - MIT has open courseware initiative
    - All unit material will eventually be offered free online

Teaching about Open Source

- History/Commercial/Social/Politics/Legal
  - Students understand the full context of free software and open source
  - Balance of principles vs pragmatism (how to avoid religious flame wars)
  - Understand the Open Source in the context of wider issues of personal freedoms, rights to privacy, etc.
  - Roles of commercial interests in the development, promotion and support of Open Source

Teaching about Open Source

- Software Engineering
  - Different process methodologies used in different projects (LK, Mozilla, OpenOffice, small sourceforge projects)
  - Differences/similarities between Open Source projects and corporate projects
  - Gathering requirements
  - Design (documentation/models?)
    - Source code as the design document
  - Development
  - Building
  - Testing

Teaching about Open Source

- Software Engineering (cont...)
  - Bug tracking
  - source code control
  - communication
  - team roles
  - milestones

Teaching about Open Source

- Operating Systems
  - Evolution of the Linux OS
  - Source code as a guide
  - Theory vs practice
- Security
  - Different aspects of system security
    - OS
    - Application level
    - User
- Networking
  - Linux as cheap and simple firewall/router/load balancer
  - Transparent stacks including Ipv6

Teaching about Open Source

- Advantages
  - Accessible technology
  - Easy to experiment with and introspect
  - Source code for detailed working knowledge
  - Best practice
- Disadvantages
  - Size and complexity of source makes introspection difficult
  - Constant change
  - One approach
  - Student perception of usefulness

Open Source and School of CS&SE

- Generally positive (although see issues)
- Likely to use for practical purposes rather than ideology (low awareness)
- No specific department policy
  - individual decision
- Absence of external influence
  - geographical isolation
  - small market
- Department belongs to MSDN Academic Alliance which gives us cheap MS software

Open Source and School of CS&SE

- Linux
  - all machines are dual boot Windows 2000 & Linux RedHat 8.0
  - Linux used in over 50% of 2nd, 3rd and 4th year units taught
- Development Tools
  - Sun ONE Community Edition (look to replace this with Open Source IDE)
  - HUGS (Haskell environment)
  - GNU compilers

Open Source and School of CS&SE

- Development Tools
  - Emacs, vi, pico
  - ArgoUML (Instead of Rational Rose)
  - MyProject (Instead of MS Project)
- Server
  - Apache, Tomcat, JBoss, MySQL, PostgreSQL
- Office tools
  - OpenOffice

Teaching about Open Source

- Linux OS fundamentals are taught in Operating Systems unit
- Linux security is taught in Computer Security
- Open Source
  - history
  - licensing
  - development process
- Bug Tracking
  - bugzilla
- Source code control
  - CVS

Teaching about Open Source

- Build process
  - make
  - ant
- Professional Computing
  - teams structured around open source style (tbd)

Issues

- Learning skills not relevant to employment
  - MS Office vs OpenOffice
  - generic skills being taught
- More complicated than windows
  - education
  - new versions of IDEs
    - user friendly
    - very familiar to windows users
- Lack of reliability
  - more stable older products
  - Opportunity to educate
  - “I tried to use the software and it crashed once”

Issues

- Compatibility issues
  - students working from home with Windows/MS Office
  - free software given to students to load at home
  - free support
- General apathy and resistance to change
- No one ever got fired for choosing Microsoft
- Sycophancy (fawning obsequiousness)

Research in Open Source

- Research in Open Source process methodology
  - not quite as simple as the cathedral & the bazaar
  - fluid structures reflecting different interests and motivations
  - traditional process methodologies - what have they got to learn from OS approach?
  - quality/reliability using OS approach
- Publishing software developed as Open Source
  - general principle (rather than looking for the commercial value)
  - CSSE: Linux Virtual Server

Research in Open Source

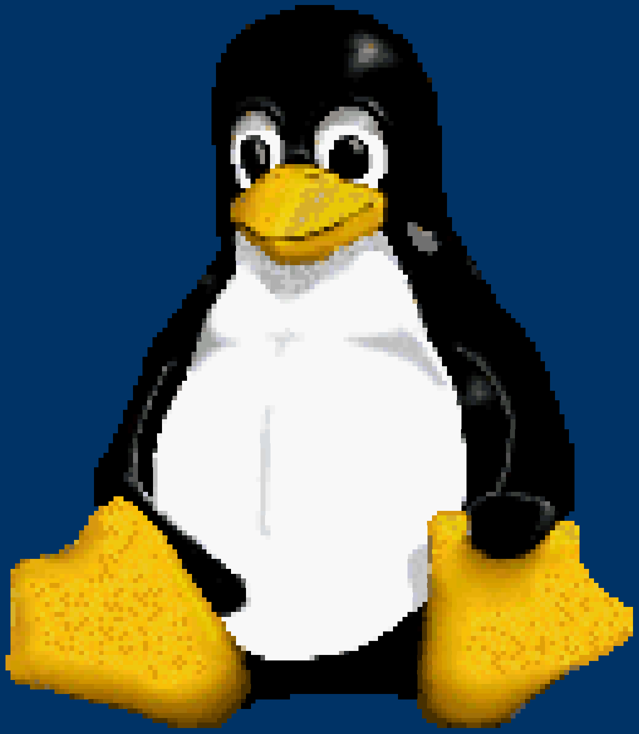
- Dynamic feedback for Linux Virtual Server
- Open source wireless sensors and weather stations
- Computer based training software
- Publishing research publications as Open Source
  - open peer review
  - CiteSeer or CiteBase index as examplars
  - largest obstacle: career oriented research
    - research not counted unless it is published in peer reviewed journals
    - requirement to change attitudes to open peer review schemes

Research in Open Source

- Why did Linus choose a penguin as the Linux mascot?

Linus Torvalds

Tux



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