An Investigation of the Open Source Ethos and the Linux Open Source Operating System

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The Open Source Ethos

"Free speech, not free beer."
— Richard Stallman

Deja GNU?

'Fifteen years ago people were saying "The free software people build some nice toys and demos, but they haven't got what it takes to build real tools." The FSF proved them wrong. Five years ago the same people said "OK, GNU is a nifty programmer's toolkit but they'll never build a viable operating system." Linux proved them wrong again. Now they're saying "OK, so Linux is a nice sandbox for hackers and it does Internet pretty well, but they'll never build decent end-user applications." If the naysayers are right this time, it will be a first.'

— Eric S. Raymond

History?

"In the ancient recesses of computer history, back in the 1950s, UNIX software was all open source."

— Caldera

History Of Open Source

- In the early '80s, Richard Stallman at MIT saw ethical problems with commercial, closed source software:
  - *"…the first step in using a computer was to promise not to help your neighbor. A cooperating community was forbidden. The rule made by the owners of proprietary software was, 'If you share with your neighbor, you are a pirate. If you want any changes, beg us to make them.'…a system based on dividing the public and keeping users helpless."*
- His belief is that it is *"antisocial, that is unethical, that is simply wrong"* to make software that cannot be shared or changed

Thus Was The GNU Project Born

- Turning the world of copyrights, etc. against itself to ensure that software remained free
  - "Copylefting"
    - Says that anyone who redistributes copylefted software, with or without changes, must pass along the freedom to further copy and change it. Guarantees that every user has freedom.
    - Also provides an incentive for other programmers to add to free software
- Supported by the Free Software Foundation
  - Not-for-profit charity that makes money distributing GNU-related software, tee-shirts, etc.

The Free Software Guidelines

- Promulgated in 1997 by Bruce Perens' (Debian) and a large 'net-based community
  - Allow the mixing of free and non-free software
    - Address the problems with the word "free" and how Stallman regards non-free software
      - Needed because the GNU/Linux efforts were beginning to attract "big business"
  - Perens and Raymond established OSI and applied for the trademark "Open Source"
    - Unsuccessfully…the term is too general
- Stallman regards all this as 'impure' and a bastardisation of his ideas
  - He has never accepted this vision

The Cathedral And The Bazaar

- Raymond in 1998
  - A paper about how the Free Software movement works and why people should use it
    - Crystallised the movement even more
      - Furious debate
        - Instant celebrity status for Raymond
      - More papers
    - Prompted Netscape to release the source for Navigator
      - (Navigator was failing against Internet Explorer anyway…)
  - Raymond has proven a powerful evangelist
    - More effective than Stallman
      - To Stallman's chagrin…

Work in Progress…

'In writers' workshops, in design charrettes, in code reviews and walkthroughs, and in artists' studios there is one common theme: By working within a community, a better result is achieved than working alone—even virtuosos learned by criticism and sharing. And if you talk to almost any artist or software developer, you will hear that what they are doing is a "work in progress."'

— Sun Microsystems

Competing Religions

- Open Source vs. Free Software
  - Argument has degenerated into camps
    - Stallman vs. Raymond
  - *"Poisoning the free-software well…"*
    - An arrow aimed by the Stallman camp at the likes of Caldera and Corel for daring to approach the Linux world with a commercial agenda
    - The Stallman camp does not acknowledge non-free (think free speech…) software and refuses to accept any mixing
      - GNU/Linux should not be used as a platform for any non-free software
        - Period.
        - There should be no non-free software

Open-Source Sound Bites

*"**Can you give me some open-source sound bites to use?***

The one-sentence version:

> *Open source promotes software reliability and quality by supporting independent peer review and rapid evolution of source code.*

The one-paragraph version:

> *Open source promotes software reliability and quality by supporting independent peer review and rapid evolution of source code. To be OSI certified, the software must be distributed under a license that guarantees the right to read, redistribute, modify, and use the software freely."*

— http://www.opensource.org/faq.html

Advice for Techies…

*"Mainstream corporate CEOs and CTOs will never buy "free software", manifestos and clenched fists and all. But if we take the very same tradition, the same people, and the **same free-software licenses** and change the label to "open source"- that, they'll buy.*

Some hackers find this hard to believe, but that's because they're techies who think in concrete, substantial terms and don't understand how important image is when you're selling something.

*In marketing **appearance is reality**. The **appearance** that we're willing to climb down off the barricades and work with the corporate world counts for as much as the **reality** of our behavior, our convictions, and our software."*

— http://www.opensource.org/for-hackers.html

Hmmm…

'Am I the only one to see that Torvalds and other open-source software revolutionaries are acting out the finale of George Orwell's Animal Farm? Orwell's farmhouse is full of open-source pigs, which are now almost indistinguishable from the proprietary humans they recently overthrew….with Torvalds saying some animals are more equal than others, why is the sanctimonious open-source press still cheering him on? Are the likes of Slashdot.org, just gobbled by VA Linux, also porking out in Orwell's farmhouse? So what I want to know is, if open-source software is so cool, and if Torvalds "gets it," why isn't Crusoe open source?…Where is the outrage?'

— Bob Metcalfe, LinuxWorld Expo., Jan. 2000

Open Source Defined

- Free Redistribution
  - The license may not restrict any party from selling or giving away the software
  - The license may not require a royalty or other fee
- Source Code
  - There must be a well-publicized means of obtaining the source code for no more than a reasonable reproduction cost—preferably, downloading via the Internet without charge
  - The source code must be the preferred form in which a programmer would modify the program
  - Obfuscated/preprocessed source code is not allowed

Definition (Cont'd)

- Derived Works
  - A developer must allow modifications and derived works, and must allow them to be distributed under the same terms as the license of the original software
- Integrity of The Author's Source Code
  - The license may restrict source-code from being distributed in modified form only if the license allows the distribution of "patch files" with the source code for the purpose of modifying the program at build time
  - The license used must explicitly permit distribution of software built from modified source code
  - The license may require derived works to carry a different name or version number from the original
- No Discrimination Against Persons or Groups

Definition (Cont'd)

- No Discrimination Against Fields of Endeavour
  - Anyone should be able to make use of open source code regardless of their field of endeavour
    - A developer cannot restrict the program from being used in a business, or from being used for genetic research, for example
- Distribution of License
  - The rights attached to the program must apply to all
- License Must Not Be Specific to a Product
  - Cannot be specific to a package or distribution
- License Must Not Contaminate Other Software
  - A developer cannot place restrictions on other software that is distributed along with the licensed software
    - For example, the license must not insist that all other programs distributed on the same medium must be open-source

Benefits Of Open Source

- Security
  - *"Mustering more brains"*
    - For every baddie, there are many goodies
- Faster fixes
  - A double-edged sword?
- Better quality in the first place
  - *"Enough eyes render all bugs trivial"*
- Low cost
- No licences to track
- Openness
  - *"Port once, run many"*
- Tweakability
  - Let the source be putty in your hands…

A Mismatch?

- The OS Community wants:
  - Operating Systems
  - A fun challenge
  - Hoopy new 'stuff'
  - To be at the bleeding edge
  - A caring, sharing community

We're currently at the "early adopter" part of the lifecycle

- Suits want:

  - Business solutions
  - Stability
  - Proven reliability
  - Controlled release cycles
  - Dependable support
  - A proven legal framework
  - Education and services
  - Harmony with existing infrastructure

The Open Source Marketplace

- Rapidly developing
  - A lot of good PR to be made
    - IBM, …
  - Heaven-sent for companies already moving to service, rather than production
    - IBM, …
  - Also for those frozen out of the Windows world
    - Corel, …
- Still some reluctance
  - Especially from hardware/peripheral vendors
    - May reflect (potentially fragile ☺) existing business relationships

Marketplace (Cont'd)

- The GNU/Linux phenomenon
  - Linux Distributors
    - Red Hat, Caldera, Corel, etc.
  - Inseparable from the Internet
    - And it's current low-barrier-to-entry cost structure
- Traditional application vendors jumping on the bandwagon
  - Oracle, IBM, Inprise/Borland, etc.
- Newbies

Several Open Source Projects

- Many of these are large, well-managed projects with sound software engineering foundations
  - Apache
  - SAMBA
  - GNU/C&C++, GNU/Emacs, PERL, Python, GNU/Ada
    - Lots of languages/tools
      - Reflects the hacker/nerd origins/drivers
  - Mozilla
  - WINE
  - RPM
  - KDE & Gnome
  - Zope; Enhydra

Zope's Story

'…the question was, "Can going open source increase the value of our company?" Here's what we saw:

- *Going open source will increase our user base by a factor of 100 within three months. Wider brand and stronger identity leads to more consulting and increased valuation on our company.*
- *Open source gives rock solid, battle-tested, bulletproof software on more platforms and with more capabilities than closed source, thus increasing the value of our consulting.*
- *Fostering a community creates an army of messengers, which is pretty effective marketing.*
- *This is not the last innovation we'll make.*
- *In the status quo, the value of packaging the software as a product would approach zero, as we had zero market penetration. What is the value of a killer product with few users? The cost to enter the established web application server market was going to be prohibitive.*
- *The investment grows us into a larger, more profitable company, one that can make a credible push to create a platform via open source. Since our consulting is only on the platform, a strong platform is imperative.*
- *Open source makes the value of our ideas more apparent, thus the perceived value of the company is apparent.*
- *Our architecture is "safer" for consulting customers. With thousands of people using it, the software is far less marginal. The customer is able to fix things themselves or reasonably find someone to do it for them. Finally, the software will "exist forever".*
- *Dramatically increasing the base of users and sites using it gives us a tremendous boost in "legitimacy".*
- *The exit plan isn't about the golden eggs (the intellectual property) laid last year. It is about the golden goose and tomorrow's golden eggs. The shelf life of eggs these days is shrinking dramatically, and the value of an egg that no one knows about is tiny. Give the eggs away as a testament to the value of the goose and a prediction of eggs to come.*
- *The community can work with us to dramatically increase the pace of innovation and responsiveness to new technical trends, such as XML and WebDAV.*
- *Ride the coattails of the nascent Open Source community and its established channels such as RedHat. OSS has a certain buzz that is greater than its real customer-closing value, but this buzz is getting hot. Moving aggressively towards Open Source can make us a category killer for the web application server market segment.*
- *We believe like hell in what we're doing. Others believe in us as well. We should follow our instincts.'*

— http://www.zope.org/Members/paul/BusinessDecision

Making Money With Open Source

- At least four known business models:
  - Support Sellers (Red Hat)
    - "Give Away the Recipe, Open A Restaurant"
    - Give away the software product, but sell distribution, branding and after-sale service
  - Loss Leader (Netscape)
    - A loss-leader and market positioner for closed software
  - Widget Frosting (Silicon Graphics/SAMBA)
    - A company for which software is a necessary adjunct but strictly a cost rather than profit centre, goes open-source to get better drivers and interface tools, etc. cheaper
  - Accessorizing (O'Reilly Associates)
    - Selling accessories
      - books, compatible hardware, complete systems with open-source software pre-installed
      - open-source T-shirts, coffee mugs, Linux penguin dolls
  - …Hijacking…
    - Get people cooperating on a project; when project nears end, set up company to pro$it…

Linux, Warts And All…

"You box of blacklegging binary bits!"
— Hitchhikers Guide to the Galaxy

Overview

"… Linux is a commercial operating system. It is just not one that restricts access to its source."

— Robert Hart, Red Hat

"Linux is only free if your time is worthless"

—Wisdom

"…infuriatingly complex to learn and use…"

— Australian PC World

"…Linux lets you live close to your system. you will encounter the bare bones of hardware and software…this may at times be confronting…"

— APC mag. pocketbook

Linux

- Properly: GNU/Linux
  - Must keep Richard Stallman happy, after all…
- August 1991: Linus Torvalds announces that he is working on a hobby OS for the Intel platform
  - *"Do you pine for the days…when men were men and wrote their own device drivers?"*
  - Unix-like with its heritage in Minix, BSD Unix, FSF GNU projects
- Open Source community development arose
  - There is no management infrastructure
    - Linus Torvalds retains control of the kernel but little else is fixed
- Now a sanctuary for those fleeing Microsoft's dominance?

Availability

- Runs on wide range of CPUs
  - Intel, 68k, PowerPC, PalmPilot even!
  - Support for new kit typically lags windows
    - Vendor reluctance to support open source: "giving away the family silver"
      - May/will(/*must*) change
- Growing madly
  - Last year, some 2.25 million commercial copies of the operating system were sold for desktop use alone…the universe of commercial and freeware Linux users could grow to 10 million by the end of this year

Availability (Cont'd)

- Linux distributions
  - Differ mainly in the software packages that accompany the core of the operating system, as well as in installation procedures
    - On one hand differences are trivial, on the other…
  - Red Hat (begat Mandrake), Caldera, Suse, Storm, VA Linux, etc.
  - Corel, Turbolinux
    - Viewed as 'traitors' by the Linux faithful
  - Non-english
    - Red Flag (adopted as China's "official Operating System"), Blue Point (Taiwan), etc.

Features In a Nutshell

- Multitasking; Multiuser

- Protected memory; Virtual memory using paging; Demand loaded executables; Shared copy-on-write pages among executables; Static and dynamically linked shared libraries

- Mostly compatible with POSIX, System V, and BSD (at the source level); with SCO, SVR3, and SVR4 at the binary level (through iBCS emulation)

- Supports many common filesystems, including FAT and SMB, NFS, cdrom, hfs, …

- Up to 16-way SMP support; support for NOWS

Features (Cont'd)

- POSIX job control; Pseudoterminals (pty's); Multiple virtual consoles
- TCP/IP networking, including web, ftp, telnet, ssh, NFS, etc.
- Mostly 'bundled' with X-window for GUI
- Source code is available, including the whole kernel and (most) drivers
  - A hacker's ideal playpen
- 32-bit code
  - BUT out-of-box version may be compiled for compatibility with '386's and so not give best performance
    - Enter Mandrake and others…

Strengths/Weaknesses

- (Ac)Claimed Strengths
  - Zero price tag
  - Do-it-yourself flexibility
  - Freedom from licensing headaches
  - Stability
  - Performance
  - Standards-compliance
  - Diverse hardware support
  - Native Internet support
  - Interoperability with existing systems
  - Inherent Y2K compliance
  - "Virus-proof" design

- Potential Weaknesses
  - User-unfriendliness
  - Installation problems
  - Scarcity of applications
  - Poor documentation
  - Lack of high-end features
  - Security concerns
  - Lack of support
  - Absence of legal recourse
  - Lack of ownership
  - Unviable business model
  - Uncertain roadmap

Position in the Enterprise

- Server end
  - Traditionally web/news/mail, etc.
    - Runs the majority of web servers on the net
    - A favoured tool of ISPs
- Network infrastructure
  - Routers/firewalls, etc.
  - Widely employed as file/print server
- Desktop
  - Not prime time yet
    - Gnome/KDE getting better
      - Lots of effort
    - Corel putting in lots of effort
      - Also experience, which is sometimes lacking…

Software/Applications

- Package managers
  - RPM; DEB
    - Go a long way to making Linux accessible
- Lots of stuff
  - Typically not general-purpose/business oriented apps
- Look and (mostly…) feel usually sucks
  - *"Mechanism, not policy."*
    - *"X is truly obese - whether it's mutilating your hard disk or actively infesting your system, you can be sure it's up to no good."*
    - *"X-Windows: ...The first fully modular software disaster…A mistake carried out to perfection…The defacto substandard...It could be worse, but it'll take time."*

Screenshot

Commercial-Grade Software

- Growing proof that Linux's time is coming
  - StarOffice, Applixware, WordPerfect & WP Office, Oracle, DB2, IBM VisualAge for Java, JBuilder, etc.
    - Less sophisticated as yet, some reliability / interoperability concerns
- Computer Associates, IBM, Informix, Oracle, and Sybase have all pledged to port server apps to Linux
- Emulators (dosemu, WINE, VMWare, etc.) help bridge the windows world

Documentation/Support

- Documentation remains pretty poor!
  - The Linux Documentation Project aims to improve things
    - So even if you are not a programmer, you can still help…
- Web/Community support
  - *Many* good web sites
    - Slashdot; Freshmeat, etc.
    - Also the various distributors own sites
  - Newsgroups are a rich source of experience
    - Potentially rapid response
      - In the U.S., anyway…
- Vendor support
  - Getting better (thar's $$$ in them thar problems…)
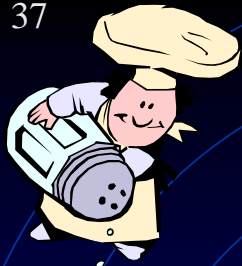
The Crystal Ball Part…

- The future is increasingly commercial
  - Red Hat, Corel, Turbo Linux, etc.
- IDC's projection [is] that Linux will grow faster than all other operating systems combined through 2003. Apache is at 61% market share and rising steadily.
- *"No more chasing taillights……"*
  - Things get more difficult when you aren't following
- What happens when it isn't 'fun' to the nerd community anymore?
  - Or the world doesn't match up to nerdish ideals…

Crystal Ball (Cont'd)

- Intelligent/embedded devices
  - Linux can be made to fit on a floppy
  - Going up against WindowsCE
    - Also against the PalmOS, another nerd fave…
- A more 'suited' (☺) development community
  - Certified engineer programmes
    - Red Hat RHCE, Caldera, etc.
- Commercial UNIX is expected to *"retire and die quietly in a corner"*
  - SGI has given up on IRIX, Compaq has given up on Tru64 Unix for IA-64, Sun has opened up Solaris 8
  - Remaining vendors are developing Monterey
    - IBM sees Linux as a low-end opener for Monterey

Crystal Ball (Cont'd)

- Linux Kernel 2.4
  - Better scalability; support for logical volumes; better support for USB/firewire/PCMCIA; DevFS; direct GUI rendering (bypass X for games); better networking; web server in kernel for efficiency; support for Intel IA-64 and Hitachi SuperH CPUs
- Kernel 3.0
  - Journalled filesystem; better multiprocessor support
  - Fewer taillights to chase
    - look to vendors to offer up new features

Avoiding Fragmentation

- Must avoid the division that happened in the Unix industry, which created multiple, incompatible versions of Unix
  - *"The applications have to run across everything, otherwise, you fragment the market like Unix [did]."*
    — Larry Augustin, VA Research
  - *"This is quite unlikely to happen to Linux, for the simple reason that all the distributors are constrained to operate from a common base of open source code. It's not really possible for any one of them to maintain differentiation, because the licenses under which Linux code are developed effectively require them to share code with all parties. The moment any distributor develops a feature, all competitors are free to clone it."*
    — Eric Raymond