

Free software and open resources: Opportunities for reducing the Digital Divide

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21st December 2002

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Definition

What is it?

Free software | libre software: An ethical view:
Freedom to copy, use, read, modify, give.

Open source software: A pragmatism view:
Better software, better marketing, easier acceptance by industry.

What it is not?

Gratis software: A gift (often related to monopolistic practices).

Shareware: A cheap distribution method.

Licences

- Software is mainly *protected* by copyright law.
- By default you can do almost nothing.
- Licences give you some rights (and restrictions):
 - Public domain: author renounce to all rights.
 - BSD type licence: you must give credit to authors:
 - Better to spread standards.
 - GPL type licence (copyleft): you must grant the same rights you received (if you redistribute derived work):
 - Better to produce more free software (viral licence?).

Advantages of free software

For any user

- Easy evaluation and adquisition.
- Customizability & easier integration.
- Easier inspection for code quality and security,
- Real competitive support.
- Independence of provider policies or survival.
- A learning tool.
- Good support in the net.
- A method to establish standards.
- **Cost?**

The cost of free software use

Must account the *total cost of ownership*.

- Cost of acquisition:
 - In some places *piracy* is cheaper.
- Cost of use:
 - Training.
 - Peer support.
 - Installation and administration.
 - Hardware & additional software needed.
 - Quality and fitness.

Example low cost system

- Many refurbished PC:
 - $\geq i386$.
 - $\geq 8Mb$.
 - Diskless.
 - With terminal software (LTSP, netstation, VNC).
- One GNU/Linux box:
 - Relatively recent (\geq Pentium II).
 - Enough memory (may be $40Mb$ per client for Openoffice).
 - Application server.
 - File server.
 - On demand dialup router.
 - The only administrable point.
 - The only point which needs hardware upgrades.
- Examples: Schoolnet Namibia (<http://www.schoolnet.na>), BorgouNet (<http://www.borgou.net>).

Advantages for any administration

- **Cost!** Even if some software is produced (can be shared).
- National security:
 - Recoverability of citizen data (open formats).
 - Safety of confidential information (no backdoors).
- Universal access to administration services (standards based, vendor neutral).

Advantages for third world countries

- Cost again.
- Customizability (local languages, customs, laws, ...).
- Development of local software industry.
- Better education in information technologies.
- High potential for less hardware costs.
- Technological independence.

But

- A lot of illegal copy: no need perceived for *gratis* software.
- Poisoned gifts.
- Free software is unknown or considered second class.
- No technical expertise.
- The proprietary formats barrier.

Political initiatives

UNDP Recommendations

UNDP Human development report 2001^a
Making new technologies work for human development

- Providing regional and global institutional support:
 - Protecting common resources:
 - * Biodiversity.
 - * Open source software.

*Open source software could
speed the information and communications technology revolution
if its use takes off on a sufficiently wide scale.*

^a<http://hdr.undp.org/reports/global/2001/en/pdf/completenew.pdf>

Legislative initiatives

Perú: LP 2485 (april 2002):

Ley de Uso de Software Libre en la Administración Pública.

- Exclusive of free software in all state institutions.
- Exceptions:
 - Unavailability.
 - Research.

Argentina: LP 904-D-02 (march 2002):

Política de utilización de software libre por el Estado Nacional.

Practical government initiatives

China: All Beijing government computers with Red Flag Linux.

Corea: 120.000 copies of HancommLinux/HancomOffice for administration computers.

Thailand: Linux Thai Extension and School internet server.

Philippines: Announced a Linux based distribution for de administration.

Spain: Extremadura's Linex distribution (<http://www.linex.org>) for administration and schools (¿Andalucía also?).

France, Germany, European Commission, ...

The production of free software

Who produces free software?

- First world countries: Europe, US, Japan, New Zealand, Australia, Israel, South Africa, Brazil, Argentina.
- Jounge educated people (average 27 years old, most 21–24), the majority unpaid.
- 80% produced by 20% of developers,

Why free software is produced?

- Learning, sharing, cooperation, fun (no money or reputation).
- Outcome of government funded research projects (mainly US, decreasing).
- Government funded deployment projects (few, increasing).
- As the only way to compete with *de-facto* monopolies (IBM, HP, Compaq, Sun, SGI, ..., mainly support, freeng code, and funding).
- Solution of need plus a **better development model**.
- As a **better business model**

Better development model?

- A way to attract codevelopers and bug trackers without cost.
- Parallel development, natural selection.
- Software reuse.
- Several cooperation models:
 - Bazaar (better for modular, standard software).
 - Cathedral (better for innovative, risky software).
- Distributed cooperation tools: CVS, bugzilla, sourceforge, ...

Better business model?

- Because a better development model.
- No distribution and packaging costs.
- ¿But where is the money?
 - Installation, configuration and support.
 - Education.
 - Customization and integration.
 - Paid new developments.
 - Selling other products (hardware, internet access, portals, ...).
- Marketing:
 - A good free product.
 - A good web site.
 - Presence in relevant mailing lists and meetings.
 - Attracting user and developer base.

Are losing something developing countries?

- Cheap labour (sometimes educated: India, Eastern Europe, Cuba, Costa Rica, Brazil, Chile, Argentina, ...).
- Cheap infrastructure: ubiquitous PC + internet.
- May they compete in packaged proprietary software?
 - Very difficult to enter.
 - Huge marketing costs.
 - Better to build good software factories (indian model).

Other free resources

with the exception of *free art*
they **do not work immediatly**
High cost off **effective replication**.

Free documentation, recopilations, courseware

- Essential for knowledge dissemination.
- GFDL licence:
 - Preserve author reputation and merit (modification history, invariant parts).
 - Universal access (transparent formats, like DocBook).
- Legal texts are free invariant documents.
- May use specialized development methods (wikis, etc).

Examples

- Free software documentation projects: <http://www.tldp.org> ...
- Collaborative encyclopaedias: <http://www.wikipedia.com>,
<http://mathworld.wolfram.com> ...
- Peer reviewed journals: <http://www.fisrtmonday.org>.
- Community created URL directories: <http://dmoz.org>.
- Open courseware: <http://web.mit.edu/ocw/>.

Free standards

- Essential for interoperability (and free software).
- Traditional in the internet world (IETF RFC, WWW Consortium).
- Free copying and implementation.
- Free of patents.
- Lack of free standards for office work.
- Open Standards Definition ^a

^a<http://perens.com/OpenStandards/Definition.html>

Free hardware

- Protected by patents and special copyrights for circuit layouts.
- Virtual machine specifications: needed for drivers, compilers, etc.
- Implementations:
 - Machine readable descriptions: VHDL, PCB layouts, ...
 - Test programs.
 - Human processable documentation and schematics.
 - Examples:
 - * Open cores:
www.opencores.org, ESA Leon-32, pico-JAVA, ...
 - * Universal access initiatives:
 - Brazil's People's PC.
 - Indian Simputer.

The Simputer

Community Digital Assistant^a



^awww.simputer.org

The Simputer

- Designed by Indian Institute of Science and Encore (Bangalore).
- Now in production (Encore and Pico Peta Simputers).
- Low cost community owned (\$190).
- Personalized by a Smartcard.
- No storage.
- Linux based GPL'ed software for the illiterate.
- Open hardware based on the Simputer GPL.
- Trademarks *Simputer* and *Simputerized*.
- One time fee for commercialization and trademark use.

Free software and ISF/UPM ITC projects

- Free software used when the better solution.
- Proprietary solutions when free solutions not available or accepted
→ multiplied development & maintenance costs.
- Free software development techniques barely used:
→ lack of experience.
→ lack of resources.
- Few contributions yet.

GNU/Linux

- Currently in standard and embedded servers (Debian).



- Planned in clients (maybe a metadistro).
- Planned in thin clients (embedded Linux).
- Planned in Wifi solar powered routers (embedded Linux).

VHF client/server networks

- Up to 50 Km.
- Standard voice FM radios.
- Intermiently used with data.
- Windows clients & Debian/GNU/Linux server.
- Soft soundmodem.
- Amateur semiduplex AX.25 transport, but
 - Linux code uses standard CS/CA access control:
 - taller masts
 - more power.
 - Implemented a round robin demand based access control, transparent to the clients.
 - Alternative: a standard DAMA facility.

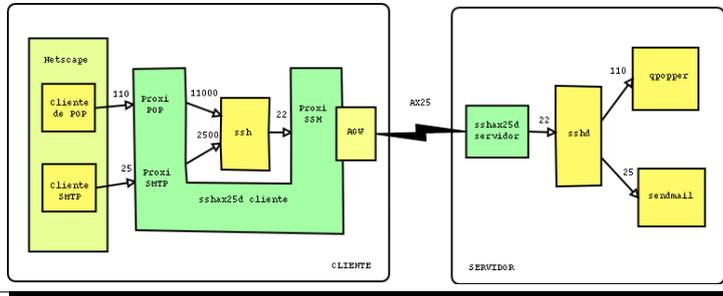
Micronet protocols

- UUCP between health centers and the mail hub:
 - Interruptible.
 - Can be compressed and batched with BSMTP.
 - Can use long distance calls if needed.
 - IP transport (i protocol).
- Windows makes necessary to support POP and SMTP.

IP over AX.25

- ¿Need to support TCP?
 - TCP/IP over half duplex AX.25: very inefficient.
 - Avoid it.
- Use of SSH:
 - POP and SMTP proxys.
 - Mutiplexing, compression and encryption → \approx 20.000 bps.

SSH-AX25 piping



HF networks

- Long distance.
- Expensive or slow modems (100 - 300 bps).
- Narrow band (3 KHz SSB).
- Fading.
- Heavy modifications to NEWQPSK sound modem (convolutional turbocodes) giving about 2000 bps.
- Round robin AX.25 with big windows.
- Home made selective reject.
- UUCP/BSMTP over AX.25 (y protocol).
- Only Linux.
 - Workstation and server.
 - Embedded HF mail gateway.

LEO Microsatellites

- Amateurs, commercial, cooperation (Healthsat).
- Short passes few times a day.
- PACSAT protocols over AX.25 (broadcast and file transfer).
- Developed a transport for *sendmail*.
- Developed a gateway ground micronetwork \Leftrightarrow satellite.
- Doppler correction.
- Special antenna (replacement for motorised antenna).

Applications

- XML based tools for teleeducation:
 - Currently built as HTML lessons and sent by e-mail.
 - DTD for abstract definition of courses.
 - An editor for abstract courses.
 - Automatic transformations for:
 - * Splitting in lessons and then sending by e-mail.
 - * Web site and CD-ROM publishing.
 - * Printable version.
- Epidemiological reporting, drugs handling, ...