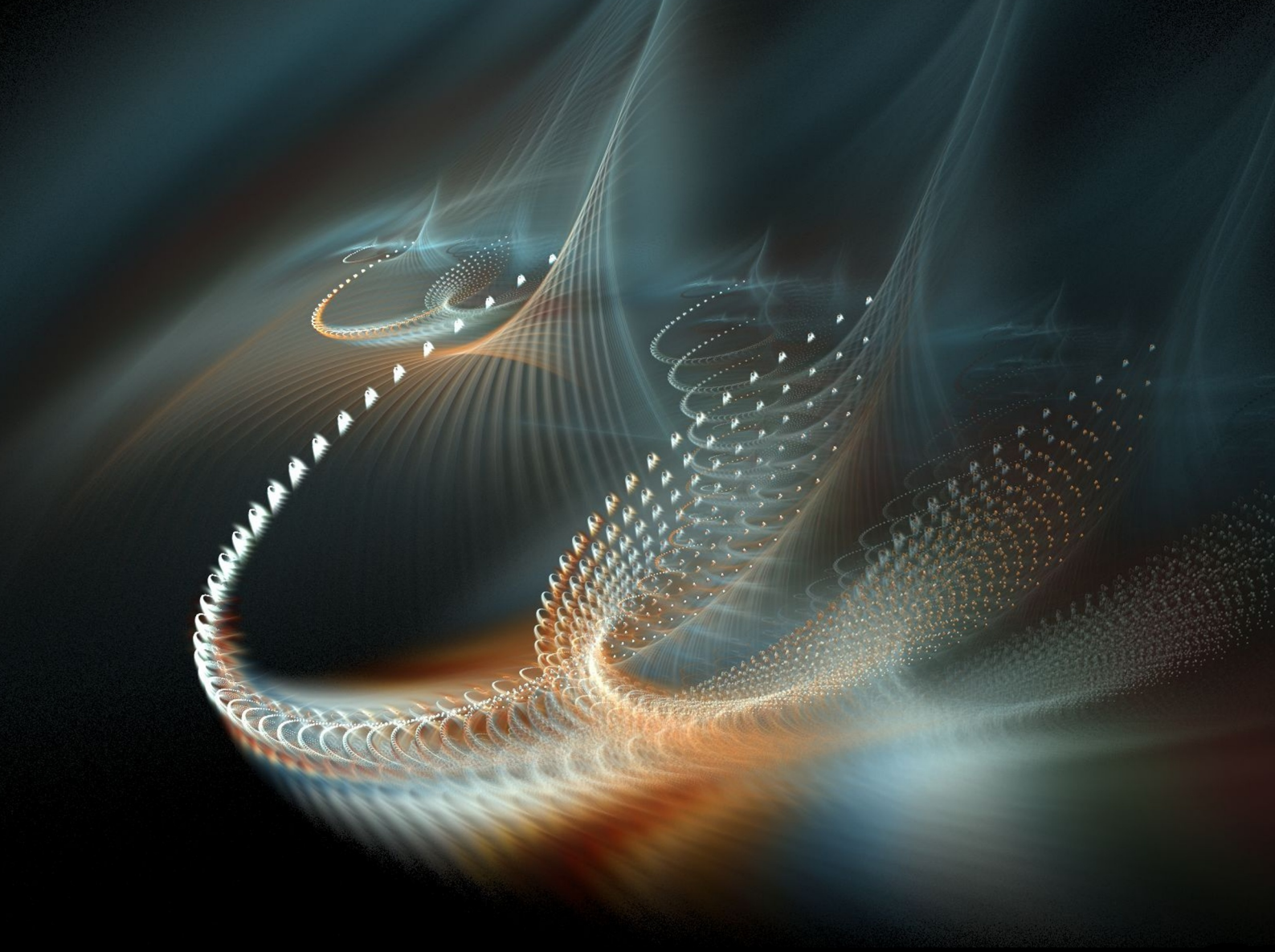


The SME guide to Open Source Software

Fourth edition

Report edition: 4, july 2009

Report edited by : Carlo Daffara, cdaffara@conecta.it
Created in the context of the FLOSSMETRICS EU project
website: guide.conecta.it and www.flossmetrics.eu

Free/Libre and Open Source Software Metrics

Information Society Technologies

European Commission

The Small/Medium Enterprise guide to Open Source Software

Carlo Daffara

This guide (developed in the context of the FLOSSMETRICS and OpenTTT projects) present a set of guidelines and suggestions for the adoption of open source software within SMEs, using a ladder model that will guide companies from the initial selection and adoption of FLOSS within the IT infrastructure up to the creation of suitable business models based on open source software.

The guide is split into an introduction to FLOSS and a catalog of open source applications, selected to fulfill the requests that were gathered in the interviews and audit in the OpenTTT project. The application areas are infrastructural software (ranging from network and system management to security), ERP and CRM applications, groupware, document management, content management systems (CMS), VoIP, graphics/CAD/GIS systems, desktop applications, engineering and manufacturing, vertical business applications and eLearning.

This is the final edition of the guide in the context of the FLOSSMETRICS project; the guide is distributed under a CC-attribution-sharealike 3.0 license. The author is Carlo Daffara (cdaffara@conecta.it). The wiki on which this guide is based is available at the address http://guide.conecta.it or through the main project website, http://www.flossmetrics.eu; ongoing research updates will be published at the author's website, (http://carlodaffara.conecta.it)

Table of Contents

1. What's Free/Libre/Open Source Software?

It may be a surprise to discover that the software market that we take for granted, based on the idea of "shrink-wrapped" packages that are easy to buy directly by the user is relatively recent. In the beginning, software was bundled with hardware by the manufacturer. Due to the complexity and cost of development (and the relatively limited power of those first computers), to the business models of the manufacturers (based on selling hardware), and to other factors, users freely shared source code and advice, in a collaborative way that led to the creation of user groups like SHARE (Society to Help Avoid Redundant Efforts, founded in 1955 and centered on IBM systems) and DECUS (for Digital Equipment computers and later for HP systems), both still alive. Code was also commonly shared in academic journals, like the famous "Algorithms" column of the "Communications of the ACM" journal.

With the "unbundling" process (the separation of hardware and software catalogs) the first "packaged" software products appeared on the market in the 1970s. With the advent of the first personal computers (the Apple II, the IBM PC and many others) the shrink-wrapped software market become the most familiar to users, being still today a significant part of the overall IT landscape. It is important however to notice that such market represents only around 25% of the total value of the software market, with the remaining composed of custom software developed under contract and software developed in-house [OECD 02].

The overall software landscape is mainly defined by three different, orthogonal aspects, like the three axes of the three-dimensional coordinate system. Their respective differentiators are control (software model), collaboration (development model), revenue (business model).

The **software model** axis is the one that is discussed most often. On the one hand there is proprietary software, for which the vendor retains full control over the software and the user receives limited usage permission through a license, which is granted according to certain conditions. On the other hand there is Free Software, which provides the user with unprecedented control over their software through an ex-ante grant of irrevocable and universal rights to use, study, modify and distribute the software.

The **development model** axis describes the barrier to collaboration, ranging from projects that are developed by a single person or vendor to projects that allow extensive global collaboration. This is independent from the software model. There is proprietary software that allows for far-reaching collaboration, e.g. SAP with it’s partnership program, and Free Software

projects that are developed by a single person or company with little or no outside input.

The **business model** axis describes what kind of revenue model was chosen for the software. Options on this axis include training, services, integration, custom development, subscription models, “Commercial Off The Shelve” (COTS), “Software as a Service” (SaaS) and more. This aspect will be the basis of chapter 6.

Building on a tradition laid by academic institutions like MIT, Richard Stallman[1] founded in 1983 the Free Software Foundation (FSF) to find a way to preserve the freedom of users to study, understand and modify software, in direct link with the hacker culture of openness and sharing of information. The objective of the FSF was to create a complete reimplementation of the Unix operating system, at that time an important reference for most large companies and research centers. With this purpose Stallman and many others created a complete development and execution environment, for which in the late 1980s the kernel (the underlying core of an operating system) was the only missing component. This gap was filled soon, in 1991, by two different teams: the effort lead by Linus Torvalds developed the Linux kernel, while William and Lynne Jolitz wrote a series in the Dr. Dobbs Journal on how to port BSD Unix to i386-based PCs, creating the basis for a complete, free operating system for modern personal computers [DB 00].

The Free Software Foundation places a strict emphasis on the underlying "four freedoms":

- The freedom to run the program, for any purpose (freedom 0)
- The freedom to study how the program works, and adapt it to your needs (freedom 1). Access to the source code is a precondition for this
- The freedom to redistribute copies so you can help your neighbor (freedom 2)
- The freedom to improve the program, and release your improvements to the public, so that the whole community benefits (freedom 3). Access to the source code is a precondition for this.

For this reason, the FSF created a set of "free software licenses", and among them the GPL (general public license) and LGPL (lesser general public license) that are the most widely used, both in terms of number of projects and in number of lines of code covered.

Unfortunately, in many situations the term "free software" is frequently interpreted as "gratis", that is, with no price; a fact that forced the FSF to introduce the slogan "free as in free speech, not as in free beer". The free software environment moved at a significant pace, up to the development of

1 Richard Stallman and the FSF introduced the term “free software”. Later, the Open Source Initiative proposed “open source software”, allegedly to avoid the linguistic uncertainty associated with the English term "free", specifically used by the Free Software Foundation to preserve the underlying concept of freedom. The “Libre software” term was introduced for the same reason, and used specially in Europe. The term "FLOSS" was introduced by Rishab Gosh in the context of EU-funded project "Free/Libre and Open source software: survey and study" started in 2002 as a catch-all term for free software and open source as described in this section. In this report we will use mainly the term FLOSS as a licensing model.

complete user environments such as GNOME and KDE, and to the design in 1998 of the "open source" trademark, created to present a more pragmatic alternative to the somewhat "political" orientations of the FSF. The Open Source definition is based on a similar set of conditions:

“Free Redistribution *The license shall not restrict any party from selling or giving away the software as a component of an aggregate software distribution containing programs from several different sources. The license shall not require a royalty or other fee for such sale.*

Source Code *The program must include source code, and must allow distribution in source code as well as compiled form. Where some form of a product is not distributed with 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. Deliberately obfuscated source code is not allowed. Intermediate forms such as the output of a preprocessor or translator are not allowed.*

Derived Works *The license 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 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 software.*

No Discrimination Against Persons or Groups *The license must not discriminate against any person or group of persons.*

No Discrimination Against Fields of Endeavor *The license must not restrict anyone from making use of the program in a specific field of endeavor. For example, it may not restrict the program from being used in a business, or from being used for genetic research.*

Distribution of License *The rights attached to the program must apply to all to whom the program is redistributed without the need for execution of an additional license by those parties.*

License Must Not Be Specific to a Product *The rights attached to the program must not depend on the program's being part of a particular software distribution. If the program is extracted from that distribution and used or distributed within the terms of the program's license, all parties to whom the program is redistributed should have the same rights as those that are granted in conjunction with the original software distribution.*

License Must Not Restrict Other Software *The license must not 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 software.*

License Must Be Technology-Neutral *No provision of the license may be predicated on any individual technology or style of interface.”*

Both groups maintain a list of licenses that comply with the terms of the Free Software Definition, or the list of conditions for using the term "open source".In fact, there are more than 50 licenses identified as "open source" or "free software", but fortunately they can be classified in a very simple way as [Sun 06, UU 05]:

- "*provide* credit": use, modification, redistribution are allowed, but credit to the original author is due, if redistributed. Examples: BSD license, Apache License v2.
- "*provide fixes*": use, modification, redistribution are allowed, but source code for any changes must be provided to the original author, if redistributed. Examples: Mozilla-style licenses (Mozilla Public License).
- "*provide all*": use, modification, redistribution are allowed, but source code of any derived product must be provided, if redistributed. Example: GPL.

When code from different projects is mixed and redistributed, the issue of license compatibility becomes important. An extremely detailed matrix with licensing compatibility with regards of GPL (including the recently released GPLv3 license) is available at [Fed 07]; in any case, whenever a product is released or distributed, it is advisable to ask advice of an attorney with expertise in FLOSS licenses and intellectual property (a similar advice applies to proprietary software releases).

While FLOSS as a definition covers exclusively the licensing regime, by extension the “openness” of the code introduced the possibility of sharing development efforts among different groups, in a way similar to those of the early user groups of the sixties. In this sense, Eric Raymond introduced in his seminal paper “The cathedral and the bazaar” the concept of shared development, contrasting this “bazaar” style where every developer is free to choose on what part of the code to work, in contrast to the “cathedral” or formalized development approach that is rigid and structured [Raym 00].

While the concept took hold quickly, the reality is that collaboratively developed projects tend to be executed in a continuum between cathedral and bazaar; for example, for most projects there is a formal structure (with many sub-projects, more open to external contributions) while other are strictly formal (for example, projects that use FLOSS code in a certified environment, such as avionics or safety-critical systems). The important point raised by Raymond is the fact that both coding and ancillary activities like bug fixing and production of documentation can be shared in a large community, creating in a sense "virtual software houses" that in a voluntaristic way provide effort and resources; this helps also in the leverage of a large community of expert users, that can contribute back in a significant way, as shown in [VH 03, VH 05].

When such collaboration takes place, it may be not only in the form of source code, as for example is commented in [Jul 06]: *“In the year 2000, fifty outside contributors to Open Cascade provided various kinds of assistance: transferring software to other systems (IRIX 64 bits, Alpha OSF), correcting*

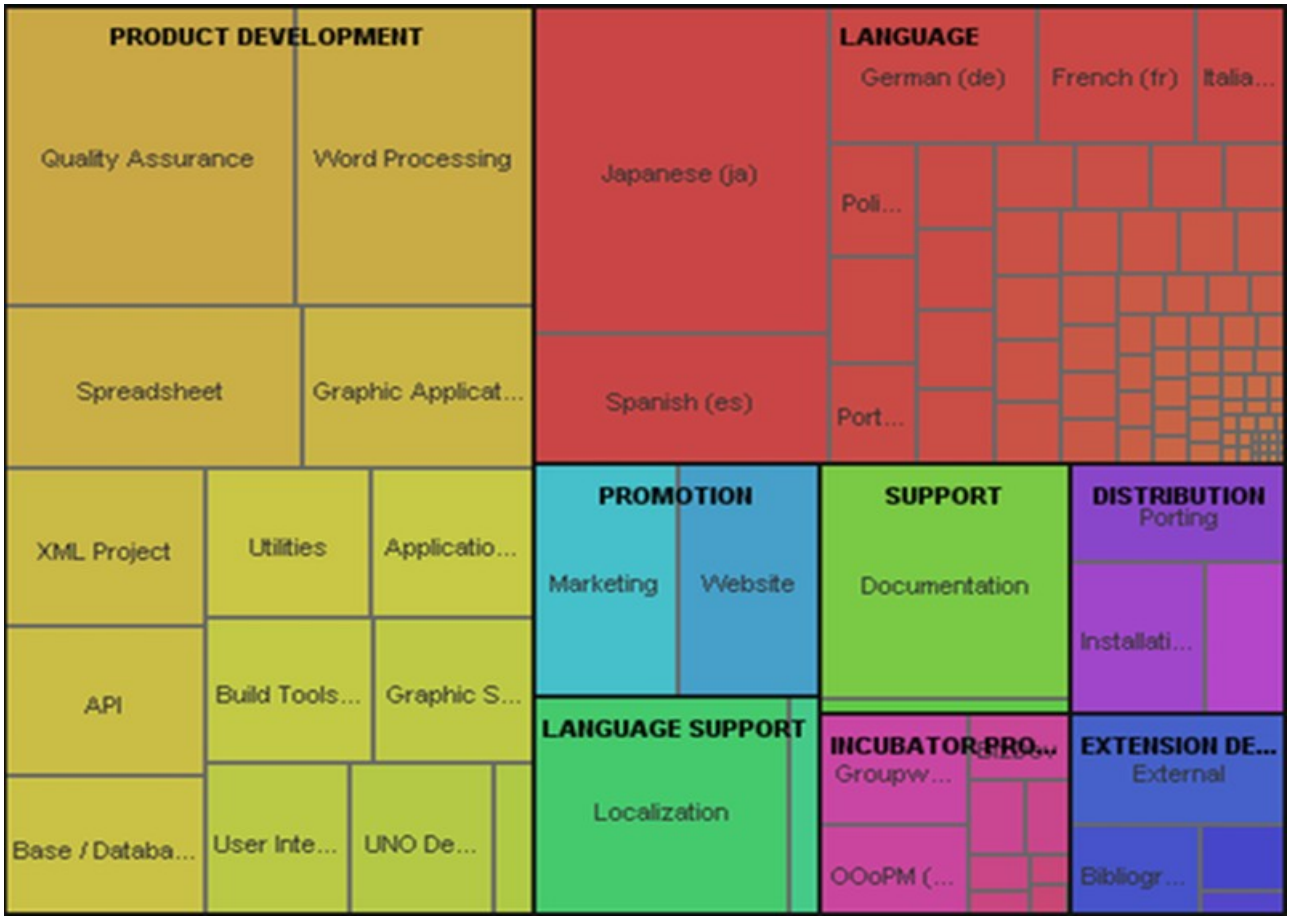
defects (memory leaks…) and translating the tutorial into Spanish, etc. Currently, there are seventy active contributors and the objective is to reach one hundred. These outside contributions are significant. Open Cascade estimates that they represent about 20 % of the value of the software."

A similar view has been presented in [Sei 06], where one of the leaders of the KDE project[2] presented the elements that collectively contribute to KDE:

- Artwork
- Documentation
- Human-computer interaction
- Marketing
- Quality Assurance
- Software Development
- Translation

If overall software suitability to the task is considered, it is clear that non-code contributions are as important as source code. For example translations, documentation and overall quality are fundamental for the software to be adopted by end-users worldwide.

Another example comes from [Mue 07], where the number of participants within individual Openoffice.org sub-projects were counted:



2 KDE is a complete user desktop environment, created originally as a Libre alternative of the Unix CDE environment, and later evolved to encompass libraries, end-user software and training material.

As it can be inferred from the area graph, there are roughly as much non-code contributors than those working on product development and related projects (that are directly related to source code).

This form of collaboration can happen even between competing companies. For example, news about potential security vulnerabilities are commonly shared among different competing Linux vendors. As an example, Mark Cox of RedHat (a company that provides and support one of the leading Linux distributions) analyzed the results of two years of incident responses, and found that the largest share of information was coming from the other peer FLOSS distributors [Cox 07].

In more recent years, companies started the adoption of this collaborative model to develop software and services, sometimes supplementing the volunteer communities and sometimes starting new projects and providing substantial resources to its continuation. This later stage (the commercialization stage) is more focused on the sustainability of business models adopted by said companies, and is the main focus of chapter 6.

2. Ten myths about free/Libre open source software

In 1999, Tim O'Reilly, founder of a popular open source-oriented publishing house, gave a keynote speech to an audience of Fortune 500 executives called "ten myths about open source software". As those myths are still perceived today, as shown by recent reports [CIO 07, ED 05, Forr 07], and are still perceived as a barrier towards FLOSS adoption, we will try to provide here a SME-oriented and pragmatic answer to all of them.

Myth #1: It's a Linux-vs-Windows thing.

Most recent debates about FLOSS were focused on an all-or-nothing perception. For example, when introducing FLOSS in a company, a full software migration is often considered as necessary. This, and the fact that there is limited knowledge of FLOSS projects except for a few very widely known ones (like Linux, Apache, OpenOffice.org), created the perception that most FLOSS is designed and targeted as a direct competitor of Microsoft products. The reality is that there is an enormous number of active projects in practically any IT field, including business-specific (such as ERP systems), being most of them cross-platform, capable of running Microsoft Windows, Apple's OSX (which is itself based on more than 300 open source projects) or Linux. As can be found in Appendix 1, there are more than 18,000 FLOSS projects that are stable and mature for adoption by SMEs.

Myth #2: FLOSS is not reliable or supported.

This myth is based on a common perception that FLOSS is exclusively developed by volunteers in a non-coordinated or unstructured way. There are many errors in this view:

- **the volunteer perception:** while volunteer contributions are a significant part (and sometimes the majority) of large scale projects, around 50% of developers have received a financial compensation for working on FLOSS projects, either directly paid to improve the projects or paid to support them. This has been shown in recent studies [Gosh 05, Gosh 06] and can be inferred directly by the fact that in the software industry at large, 68% of software products include directly FLOSS-derived code.
- **paid programmers are better:** even for the percentage of contributions that are coming from volunteers, it is commonly perceived that those should be of inferior quality, as there is no financial incentive to produce quality software. This ignores the fact that intrinsic incentives are in many cases more effective than monetary compensation [Gosh 06], and the fact that sometimes users are interested in improving the software that they are using [VH 03]. This second effect, called user-driven innovation, has been shown in past

research to be a significant force. For example, around 25% of innovations in fields like software security, printed circuit boards CAD systems and library software were designed and introduced by advanced users. The same effect provides a fundamental design feedback, as large project collects both good and bad experiences in using the software (for example, the Ubuntu Linux "Testimonial and Experiences page[3]" that allows for a form of user-driven "steering" of the project and the identification of trouble points.

- **there is no support:** most large scale project are related to companies that provide paid-for support, in a way similar to that of proprietary software companies. The availability of source code and the modification rights gives also the additional advantage that support can be obtained even for projects that are no longer active, in stark difference with proprietary software where no code escrow clause was included in the acquisition contract.
- **FLOSS is inherently unreliable:** many believe that FLOSS, as developed in an open and unstructured way, is inherently of lesser quality when compared to proprietary software. The reality is that most FLOSS projects are organized in a semi-strict structure, and only very modular projects are inherently "bazaar-style", allowing for large scale internal decoupling. In any case, the impact of FLOSS-style development has been assessed in several research papers, and for example in [Suc 04] we found: *"The hypothesis that open-source software fosters more creativity is supported by our analysis. The growing rate, or the number of functions added, was greater in the open-source projects than in the closed-source projects. This indicates that the open-source approach may be able to provide more features over time than by using the closed-source approach. Practitioners interested in capturing market share by providing additional features should look to the open-source methodology as a method to achieve this. In terms of defects, our analysis finds that the changing rate or the functions modified as a percentage of the total functions is higher in open-source projects than in closed- source projects. This supports the hypothesis that defects may be found and fixed more quickly in open-source projects than in closed-source projects and may be an added benefit for using the open-source development model."* This is consistent with results from vendors of software defect identification tools, such as Reasoning, that found that while the bug density ratio in initial project releases is on par with proprietary developments, it improves rapidly and for some projects defect densities are significantly lower than that of the average proprietary code [Reas 06a, Reas 06b][4]. This was confirmed by other studies like the reports from Coverity.

The fact that FLOSS is overall reliable can be also inferred by surveys like [CIO 07], where 79% of respondents answered positively to the question *"My company's experience with open source products other than Linux has been so good we plan to expand their use"*.

3 http://ubuntuforums.org/forumdisplay.php?f=103

4 "At a defect density of 0.09 defects per KLOC, the version of MySQL we inspected has a defect density that is about six times lower than the average of comparable proprietary projects."

In this sense, it should be no surprise that several FLOSS projects have received safety certifications, or have been used in medical devices, control systems and avionics. For example, the VISTA system is a large scale electronic health care system, developed by the US Department of Defense for its own veteran hospitals, and now used in more than 1000 hospitals and clinics in the US alone, along with many other installations across many countries. Other examples include the use of Linux in Siemens Magnetic Resonance Imaging systems used in diagnostics, the use of the open source ADACORE environment in in-flight avionics, the FIPS-140 certification of two of the most important encryption toolkits (OpenSSL and NSS), and many more.

If we take as an example the IEC 61508 safety integrity levels [Daf 06-2]:

SIL level	Dangerous failures/ hour	Risk reduction factor
4	<10exp-8	>10000
3	<10exp-7	>1000
2	<10exp-6	>100
1	<10exp-5	>10

he UK Health and Safety Executive, in a study from 2002 [HSE 02] found that Linux was robust enough, and that it could be certified up to SIL3 with limited effort. This would make it amenable for use in air traffic control displays, railways control systems and process plant control.

Myth #3: Big companies don't use FLOSS.

The easiest myth to dispel: apart from the large IT companies that are actively promoting open source software like IBM, HP, Sun, Oracle, and others, about 86% of Fortune 1000 companies are deploying or testing FLOSS, and a similar percentage is found in Europe [Aug 04]. Of those, 35% or more are deploying more than 20% of their systems as FLOSS, and 11% of companies report more than 20% of their applications as FLOSS. While usage in server-centric and IT infrastructure is more common, around 26% of large companies are mentioning the use of Linux on the desktop, and a much larger percentage are reporting the use of some other FLOSS packages, such as OpenOffice.org and Firefox on Windows desktops. A curious fact also evident from other surveys is that many companies and public administrations are not aware of their internal use of FLOSS, sometimes for simple ignorance of the licensing terms and sometimes because the product is offered or embedded in what seems like a traditional proprietary offering (for example, many security and networking products, or enterprise products like VMware ESX server, use FLOSS internally).

Myth #4: FLOSS is hostile to intellectual property.

There are several aspects that are referenced to this myth:

- **The GPL license is "viral"**: the most widely used license does have a specific clause which mandates that when a software product that is derived from GPL software code is redistributed, the entire product must comply with the conditions of the GPL. This has prompted some companies to claim that *"the viral aspect of the G.P.L. poses a threat to the intellectual property of any organization making use of it"*[5]. The reality is that for most scenarios, this clause simply provides a way to prevent appropriation of code without giving back contributions or credit, which is one of the reasons why many developers prefer the GPL to other licenses. Simple use of FLOSS in itself does not require any change to the license of internally developed software, and most companies routinely run proprietary software on top of GPL-licensed code like the Linux kernel.
- **The free software community steals the intellectual property of other companies**: this is mainly the byproduct of a legal case, in which the SCO company claimed in 2003 that IBM improperly included copyrighted material in the Linux kernel. In the original claim, it was mentioned that IBM *"put SCO's confidential and proprietary information into Linux, the free operating system"*[6] and that several millions of lines of code of the Linux kernel were stolen from SCO's Unix source code. Now, four years later, the judges have thrown out most of the claims, leaving less than 300 lines of code (mostly standard interface code) still under evaluation, out of more than 6 million lines of code of a modern Linux kernel. Recently Microsoft issued similar statements, with Microsoft's CEO Steve Ballmer[7] claiming that *"that product (Linux) uses our patented intellectual property"*, and later numbering how many patents Linux and other FLOSS products were infringing Microsoft's intellectual property. The reality is that structured FLOSS projects do have strict policies for accepting patches and external contributions. As an example, the Eclipse project has a strict due diligence process, that covers external contributions, code rights assignments, code review and license compatibility. The Eclipse Foundation also uses automated tools to check for code copying, keyword scanning for words with legal significance and a controlled release review prior to updating the code [Cam 06]. Similar processes are in place in other FLOSS projects [Rig 06].

---

5 As mentioned by Craig Mundie, Microsoft's vice president, in a talk at New York University's Stern school of Business in 2001. Other representatives of Microsoft like Bill Gates said that "[the GPL] it makes it impossible for a commercial company to use any of that work or build on any of that work", and Steve Ballmer "Linux is a cancer that attaches itself in an intellectual property sense to everything it touches ... if you use any open-source software, you have to make the rest of your software open source" (interview at Chicago Sun-Times, 2001).

6 The transcript of the initial complaint and a full list of case documents (along with significant analysis) can be found in the GrokLaw site, at http://www.groklaw.net

7 http://blogs.zdnet.com/hardware/?p=154

Myth #5: FLOSS is all about licenses.

While in a strict sense a FLOSS project is defined by its license, most aspects of open source are really related to the openness and collaborative aspects of the development, as described in chapter 1.

Myth #6: If I give away my software to the FLOSS community, thousands of developers will suddenly start working for me for nothing.

There is no guarantee that simply “dumping” source code on the web will make a FLOSS project appear, and there have been several examples of such behavior to be even negative (because the community may see this as “garbage dumping”). The reality is that for some collaboration to happen, there must be first of all a good communication, interaction strategy and effort in place. In addition, investing in community creation and dissemination efforts increase the probability of a bidirectional effort sharing. It is important to mention that surveys like OSSWatch or [CIO 07] found a significant proportion of companies and public administrations (between 14% and 25%) contribute back patches or participate actively in FLOSS communities.

Myth #7: FLOSS only matters to programmers, since most users never look under the hood anyway.

The fact that most users are not interested in the source code does not imply that having the source code available in itself is useless. Several positive aspects can be identified:

- The availability of the code allows end users to eventually pay someone for modifications or continuing maintenance even when the original FLOSS project disappears or becomes inactive.
- “Under the hood” there is not only code, but many non-code artifacts that are vital to a project, like translations, documentation, examples, etc. Many users can contribute in such aspects even if they are not programmers.
- For some projects, having the code available allows for a significant cost reduction or increases dramatically the flexibility of the offered solution. For example, in a project called MuleSource (a sophisticated middleware system) it was found that 64% of users perform at least one source code modification.

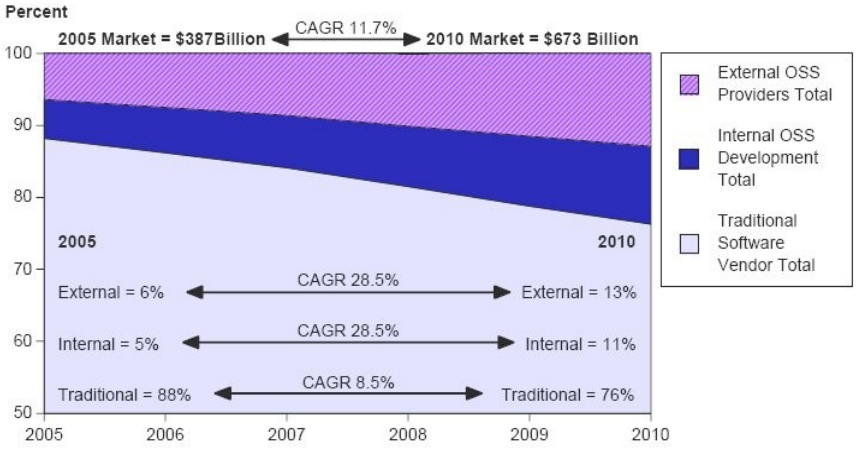
Myth #8: There is no money to be made on FLOSS.

Even many researchers have proclaimed in a way or the other that the freely

available nature of the code precludes any potential commercial exploitation. For example, in [Hahn 02]: *"The GPL effectively prevents profit-making firms from using any of the code since all derivative products must also be distributed under the GPL license"*. This of course collides with the economic results obtained by companies like HP (that in 2003 reported more than 2.5B$ in Linux-related revenues), or the 523M$ revenues reported in 2007 by RedHat. In [Gosh 06] it is evaluated that:

- Defined broadly, FLOSS-related services could reach a 32% share of all IT services by 2010, and the FLOSS-related share of the economy could reach 4% of European GDP by 2010.
- FLOSS directly supports the 29% share of software that is developed in-house in the EU (43% in the U.S.).
- FLOSS potentially saves industry over 36% in software R&D investment that can result in increased profits or be more usefully spent in further innovation.
- The notional value of Europe's investment in FLOSS software today is Euro 22 billion (36 billion in the US) representing 20.5% of total software investment (20% in the US).

Similar measures are predicted by independent consulting groups like Gartner: in [Gar 06] it is predicted that two years from now, around 25% of the total software market will be FLOSS-based (either through external providers, or by internal developments).



Another relevant aspect is that since most companies adopting FLOSS report significant cost savings, these can be directly transferred to external professional services or incorporated as additional profit margin. For example, in [Inf 07]:

	1 or MORE Open Source Products Installed	1 – 25 Open Source Products Used	25-100 Open Source Products Used	More Than 100 Open Source Products Used
No savings	7%	8%	1%	5%
Too early to tell	44%	47%	27%	31%
10% - 20%	20%	19%	22%	14%
21% - 40%	12%	12%	15%	17%
41% - 60%	7%	5%	16%	10%
More than 60%	9%	7%	18%	24%
Costs went up	1%	1%	1%	0%

Q: Estimate the percentage of your IT budget saved each year by using open source projects Base: 1-100+ open source products installed (672), 1-25 installed (536), 25-100 installed (94), more than 100 installed (42).

In a survey of 800 IT managers, InfoWorld found that of all the FLOSS adopters, those collecting the most significant benefits are those that deploy more open source products, with 24% of the "large users" (more than 100 products) reporting savings of more than 60%. It is also interesting to notice that only a very small percentage (<9%) reports that there are no savings or that costs have increased compared to proprietary software.

Myth #9: The FLOSS movement isn't sustainable, since people will stop developing free software once they see others making lots of money from their efforts.

This is connected to the view of myth #2, the idea that FLOSS is developed by volunteers, and that companies can only profit in a parasitic way from the code that is developed for free. As discussed in that part, the reality is that in most projects companies and volunteers participate in a collaborative and non-competitive way; also, the most widely used license (the GPL) forced companies to reciprocate their efforts by making dissemination of the source code mandatory whenever there is dissemination of code derived from GPL projects.

Myth #10: FLOSS is playing catch-up to Microsoft and the commercial world.

The concept of software innovation is really rooted in two different aspects: technical innovation and field innovation. While technical innovation is mostly invisible to the user, “field innovation” (for example a new kind of application) is highly visible. Maybe because of this it is widespread the perception that most FLOSS software is sort of a copy of some other (desktop) oriented proprietary application.

The reality, on the contrary, is that most proprietary software is non-innovative in this aspect. While very few examples of new concepts (like Dan Bricklin's spreadsheet idea) can be found, most applications are matched to the tasks that people performs daily, and as such there is a strong disincentive to innovate. There are very few studies comparing FLOSS with proprietary software in a replicable and objective way, and one of those is [Kli 05]:

	New technology	New for a platform	Existing technology
New market	**Radical invention (breakthrough) 5 (1.0%)**		**Marketing innovation 3 (0.6%)**
Existing market	**Technology modification 4 (0.8%)**	**Platform modification 52 (10.4%)**	**No innovation 436 (87.2%)**

The end result is that from a field innovation point of view, around 12% of the

projects in the sample are considered innovative, a percentage that is comparable to that of the proprietary software market. As for the technical innovativeness, the already cited [Suc 04] found that *“The hypothesis that open-source software fosters more creativity is supported by our analysis. ... This indicates that the open-source approach may be able to provide more features over time than by using the closed-source approach.”*

Other research, like [ARC 07], found *“the enterprises using office packages alternative to Microsoft are more innovative (average index 0.2) than those using Microsoft only (average index 0.15).* 'The correlation between innovation and the use of free/open-source software at the corporate level *is confirmed also in international comparative studies conducted by researchers from Harvard University*'”[8].

8 Emphasis in the original text.

3. Basic FLOSS adoption models

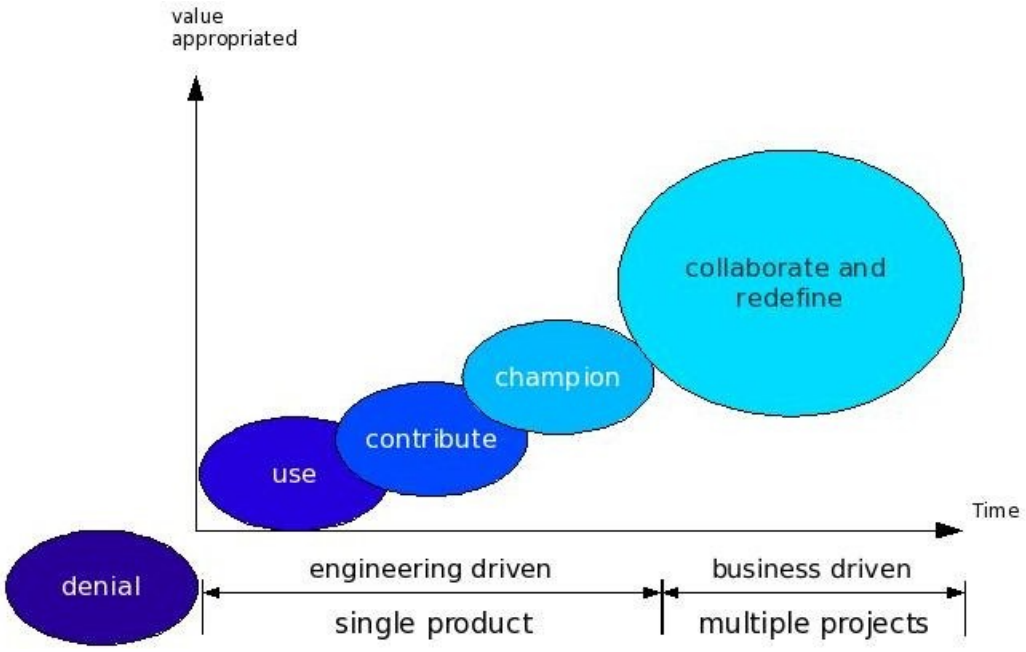
Within a company, the value that comes from FLOSS can derive from several different areas:

- basic substitution/migration: the use of FLOSS in the IT infrastructure, frequently in substitution of a proprietary software
- new deployment: the introduction of FLOSS for a new project internal to the company (adoption)
- selling services based on FLOSS
- selling products that contain FLOSS as a significant component

In this sense, a company may find useful FLOSS from a tactical point of view (FLOSS is cheaper to implement, with less constraint from a traditional vendor, or may help in introducing products in a reduced time to market) or a strategic point of view (creation of new markets, adoption of different business models). To be sustainable, a company must adopt a business model that provides a way to turn the FLOSS adoption into lower costs or increased revenues, and must also take into account the fact that at least a part of the participant community may be out of control of the company (as it commonly happens in large scale FLOSS projects, most contributors are not working for a single company).

The FLOSS adoption ladder

These different areas corresponds to individual steps in the FLOSS adoption ladder, that can be summarized as (modified from [Car 07]):



In the first stage ("use") there is simple adoption or migration, usually without any additional contact with the community, of one or more FLOSS packages. This adoption is in many cases started in a grassroots way, directly by

employees, and it is performed with the specific target of exploration or reduction of costs. Many examples of adopted packages in this area are related to desktop applications, like the Firefox web browser or the OpenOffice.org personal productivity application; in some cases, small single-purpose application servers are introduced, like mail servers or web servers for introducing web-based applications. At this stage, usually there is no or very little contribution back to the community, that in many cases is not even perceived as a peer in the potential interaction. However, most companies that started adoption of FLOSS for the internal IT infrastructure are actively extending it; for example, a [CIO 07] survey found that of those adopting Linux, 65% of companies are planning to extend its use, while only 1% plan for a use reduction. These positive results tend to increase familiarity with FLOSS in general and with the underlying collaborative model, and facilitate the upgrade to the successive steps.

In the second stage ("contribute") there is an active involvement by the company into the development of the adopted FLOSS project. This contribution may come directly in terms of code, or through participation in events, indirectly by sponsoring, or simply by acting as promoters of the project. This step requires an explicit support from management, and provides positive returns both for the project and for the company (that reduces the cost of having functionalities implemented, by sharing the development cost with the community); there is also an explicit recognition of the participation and activities of internal developers and their interaction with FLOSS projects. An example of company in this stage is Apple (as OSX leverages more than 340 different FLOSS projects).

In the third stage ("champion") the company is basing a significant part of the underlying business model on FLOSS projects, and as such devolves a significant effort in the participation activities. The basic support activities of the contribution stage is strengthened and extended, to make the company a key management point that manages not only internally-produced contributions, but external developers as well. This turns the company into a part of the much larger project ecosystem, and provides increased business opportunities thanks to this enlargement.

The fourth stage ("collaborate and redefine") is characterized by an extension of the cooperation model, from a disjoint collection of individual projects to a coordinated effort to influence the market and the customer's perception of the environment. Not only the company changes most of its internal structure to accommodate open development practices, but also encourages the creation of a network of partners and independent projects, that are perceived as potential enlargements of the business ecosystem (even if some of those same projects can become potential competitors).

The cost and activities that are specific of each stage can be synthesized as:

Stage	Main cost centers
Use	Identification of potentially interesting software, adoption, migration, training
Contribute	development time, sponsorship

Champion	development time, sponsorship, community interaction, support to third parties
Redefine	development time, project and ecosystem coordination

It may surprise the fact that among the main cost centers of the first stage ("use") the identification of applicable software is prominent. This is confirmed by independent studies, like the EU COSPA migration project. Using data from [COS 05], we find that the "searching process" (that involves both searching for software and searching for documentation) is responsible from 20% to around 40% of the support costs, in some cases even surpassing the overall training costs of a large scale migration.

4. Finding and selecting software

As briefly mentioned in the previous chapter, the software selection process is an often overlooked but extremely important component of a migration or adoption of FLOSS. As mentioned in Appendix 1, there are more than 18000 mature and stable open source project, and most of these have no strict "promotional" budget or are not backed by companies that are able to provide marketing and dissemination support.

There are three separate steps that should be taken to successfully identify a set of FLOSS packages:

- identify your requirements
- search for packages matching your functional requirements
- select the appropriate package from the matching set

The first step is an often overlooked activity, but is crucial for a successful adoption; in many cases, there are no perfect matches for a given proprietary product, but equally good alternatives that perform the necessary activity as well (and sometimes even better). In this sense, a small shortlist of "required" and "useful" functions should be a first step in performing the selection.

After the shortlist, it is necessary to find the packages that may satisfy the given requirements. There are several important web sites that provide information on available software, both in an undifferentiated way (like SourceForge, that mainly acts as a project repository) and through detailed reviews and comparisons with proprietary software.

Forge-based sites:

these sites are mostly providing support and download services, and host a number of project that varies between 150000 (Sourceforge) to a few hundred; an integrated search functionality is provided. Most are based on SourceForge code, its reimplementation (GForge), or on collaborative development platforms that provide similar services (storage, email communication, code versioning and change support, bug tracking). Some of the most important sites:

http://sourceforge.net/

http://savannah.gnu.org/

https://gna.org/

http://alioth.debian.org/

http://www.berlios.de/

http://codehaus.org/

Software announce and catalog sites:

These sites are mainly news aggregators, that provide detailed information on recently announced versions of a FLOSS package, along with information on licenses, home page and .

http://freshmeat.net/

http://www.eosdirectory.com/

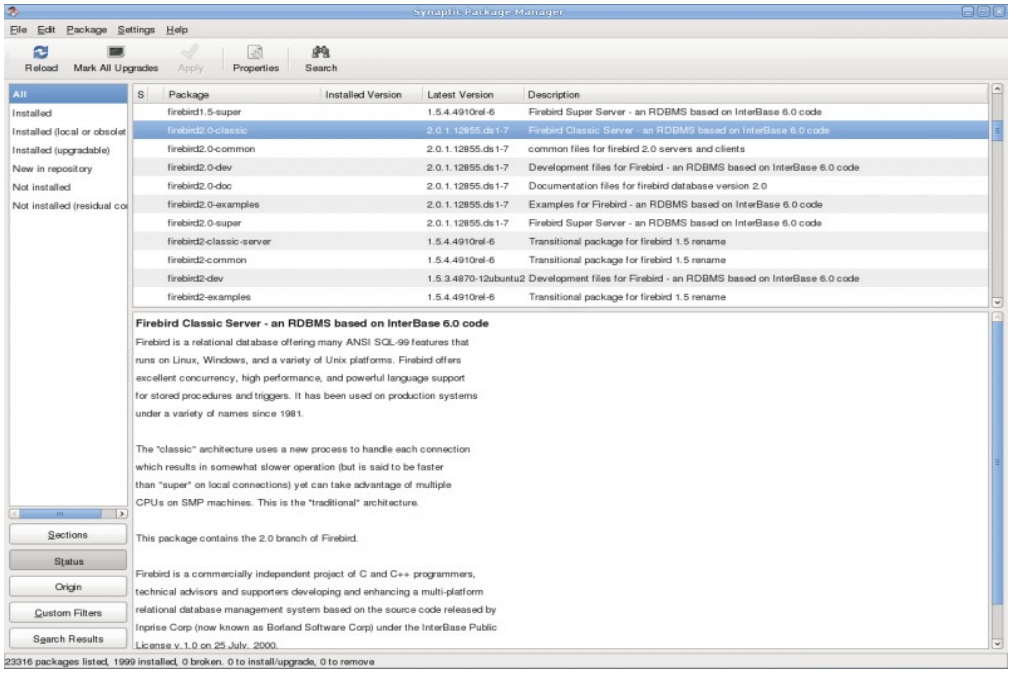
http://sourcewell.berlios.de/

List of software equivalents:

http://www.linuxrsp.ru/win-lin-soft/table-eng.html

http://www.osalt.com/

Most Linux distributions also include a package search tool, like Debian and Ubuntu's Synaptic tool:



this tool provides search and installation support for all the installable packages that are included in the distribution "repositories", specialized sites that provide binary packages of the available FLOSS projects. The repositories are divided usually into "stable" and "unstable" ones, to provide the end-users with the choice between stable software and the last version (with the latest features, but not as thoroughly tested). It should be noted that nowadays no modern, end-user targeted distribution require the user to see or interact in any way with the FLOSS source code; in this sense, if to install a package it is necessary to perform code compilation or similar activities, the package itself should be considered experimental, and its adoption should be limited to where internal, specialized support is available.

Once a set of potentially useful applications have been found, it is fundamental to evaluate between the various applications. The evaluation should be based on a first step (refinement) and a second step (liveness); the first step is used to create a list of the application that provides all the features that are necessary for the task at hand, and the second is used to prioritize among the maturity and risk of a project.

The first step is to prepare a list of all the features that are mandatory and those that are desirable (and eventually giving a positive score from 1 to 3 according to the interest in the specific feature); software that does not implement all the mandatory features should be eliminated at this stage. Then a numeric score is added to each project, by adding all the scores from the optional features; this gives an overall "feature fulfillment" score.

The second step is related to the maturity of the code, and the probability that the project will continue to exist in the future. This can be estimated using the automated tools developed in the FLOSSMETRICS project, using a set of scores that are extracted directly from the code and mailing list communication history.

Liveness parameters

ID	Measurement Idea	Procedure	New Indicators
CM–SRA-1	Retrieving the date of the first bug for each member of the community, we are able to know if the number of new member reporting bugs remains stable	Taking into account the slope of the resultant line (y=mx+b) while measuring the aggregated number and periods of one year: Green: if m > 0 Yellow: if m=0 Red: if m<0 Black if there are no new submitters for several periods	
CM–SRA-2	Retrieving the date of the first commit for each member of the community, we are able to know if the number of new member committing remains stable	Taking into account the slope of the resultant line (y=mx+b) while measuring the aggregated number and periods of one year: Green: if m > 0 Yellow: if m=0 Red: if m<0 Black if there are no new submitters for several periods	
CM-SRA-3	CVSAnalY: looking for the first commit of each detected committer in the SCM whose commit is not a code commit (for instance, ignoring source code extensions. MLS: Each new email address detected and its monthly evolution. Bicho: We measure monthly the first bug submitted by registered people. Retrieving the evolution of the first event in the community by a person and if it remains stable, can give an idea of how it evolves, and how many people are coming inside the community.	Taking into account the slope of the resultant line (y=mx+b) while measuring the aggregated number and periods of one year: Green: if m > 0 Yellow: if m=0 Red: if m<0 Black if there are no new submitters for several periods	
CM-SRA-4	Check the core group of developers (those with the 80% of the commits). Now check the first commit of each new member who starts working on the core group. Retrieving this information gives an	Taking into account the slope of the resultant line (y=mx+b) while measuring the aggregated number and periods of one year: Green: if m > 0 Yellow: if m=0 Red: if m<0 Black if there are no new submitters for several	

	estimator of how the core contributors is evolving. Thus, we can see if there is a natural regeneration of core developers.	periods
CM-SRA-5	Core Team = people with the 80% of the commits. After this, any number of people who disappears from this core team is counted as one. Taking into account this metric we can estimate if there is a dramatic decrease in the number of core developers, and so, a risk in the regeneration.	Green: There are no members leaving the project Yellow: There are some people leaving the project, one or two each year Red: A high number of people leave the project. The evolution shows an increase or even a stable period. Black: The number of people leaving the project is extremely high.
CM-SRA-6	Number of people who left the core team minus number of new members of the core team. Monthly analysis.	Green: The balance shows an increase in the number of people coming to the project Yellow: The balance is equal to 0 Red: The balance shows an increase in the number of people leaving the project Black: The balance shows a really high number of people leaving the project
CM-SRA-7	Average age of people working on a project. This metric is focused on the average of years worked by each developer. With this approximation, we are able to know of members are approaching this limit and we can estimate future effort needs.	Green: The longevity is older than 3 years Yellow: The longevity is older than 2 years and younger than 3 years Red: The longevity is older than 1 year and younger than 2 years Black: The longevity is younger than 1 year
CM-SRA-8	Evolution of people who contribute to the source code and reporting bugs. A way to retrieve this data is to analyze those committers and reporters with the same nickname.	Taking into account the slope of the resultant line (y=mx+b) while measuring the aggregated number and periods of one year: Green: if m > 0 Yellow: if m=0 Red: if m<0 Black if there are no new submitters for several periods
CM-SRA-9	Same metric than above, but this is the sum of all of them, and not the evolution. General number. We can measure the size of a community.	Taking into account the slope of the resultant line (y=mx+b) while measuring the aggregated number and periods of one year: Green: if m > 0 Yellow: if m=0 Red: if m<0 Black if there are no new submitters for several

		periods
CM-IWA-1	An event is defined as any kind of activity measurable from a community. Generally speaking, posts, commits or bug reports. Monthly analysis will provide a general view of the project and its tendency.	Taking into account the slope of the resultant line (y=mx+b) while measuring the aggregated number and periods of one year: Green: if m > 0 Yellow: if m=0 Red: if m<0 Black if there are no new submitters for several periods
CM-IWA-2	Monthly analysis will provide a general view of the project. In this way an increase or decrease in the number of commits will show the tendency of the community	Taking into account the slope of the resultant line (y=mx+b) while measuring the aggregated number and periods of one year: Green: if m > 0 Yellow: if m=0 Red: if m<0 Black if there are no new submitters for several periods
CM-IWA-3	Number of people working on old releases, out of total work on the project. We can determine how supported are the old releases for maintenance purposes.	Green: More than 10% Yellow: Between 5% and 10% Red: Between 0% and 5% Black: Nobody
CM-IWA-4	Looking at the number of committers per each file. This metric shows the territoriality in a project. Generally speaking, most of the files are touched or handled by just one committers. It means that high levels of orphaning may be seen as a risk situation. If a developer leaves the project, her knowledge will disappear and all her files are totally unknown by the rest of the developers team.	Green: Less than 50% of the files are handled by just one committer Yellow: More than 50% of the files are handled by just one committer Red: More than 70% of the files are handled by just one committer Black: More than 90% of the files are handled by just one committer
CM-IWA-5	Number of people working on the project, out of number of people working on the whole project and taking into account the whole set of activities to carry on. High number of SLOC, e-mails or bugs to be fixed per active developer may mean that they are overworked. In this case, the community is clearly busy and they need more people	Green: Less than 30.000 Lines per committer and less than 25 bugs per committer Yellow: Between 30.000 and 50.000 lines per committer and between 25 and 75 bugs per committer. Red: Between 50.000 and 100.000 lines per committer and between 75 and 150 bugs per committer Black: More than 100.000 lines per committer and more than

	to help on it.	150 bugs per committer
CM-IWA-6	Relationship between committers and total number of lines or files. With this absolute number, we are able to check the number of lines per committer. Thus, just regarding to the source code, we can say if they need more resources on it.	Green: Less than 30.000 Lines per committer Yellow: Between 30.000 and 50.000 lines per committer Red: Between 50.000 and 100.000 lines per committer Black: More than 100.000 lines per committer
CM-IWA-7	Knowledge of the current team about the whole source code, measured in number of files touched by all committers out of the total number of files. This metric gives an approximation of the number of files touched by the whole set of active committers. High percentages will show a high level of knowledge of the current developer team over the whole set of files.	Green: Less than 50 files Yellow: Between 50 and 200 files Red: Between 200 and 500 files Black: More than 500 files per committer

The evaluation becomes quite simple: if there is any red or black metric, you are looking at a high risk project, because there is a significant part of the code managed by a single, or a very small, group of people. We will estimate the number of yellow parameters that can be associated with a medium risk project by comparing our previous QSOS estimates with the new ones; it will be published directly in the guide.

5. Best practices for FLOSS adoption

The migration and adoption process is a complex, multidisciplinary effort that touches different areas and require a complete understanding of how individual workflows are composed and executed and how people interacts with IT systems in their daily work. In this sense, a FLOSS migration is a major endeavor, and as most complex efforts can easily go wrong. There are several hurdles in the execution of a migration, and some of those hurdles can be avoided easily by using simple practices. Most of the difficulties are not really technical in nature, but organizational, and will require most effort from the upper management; another important aspect is the social impact of the migration (like user acceptance), that may require special attention.

Management guidelines

The main drive for a successful migration to FLOSS always starts with a clear assessment of the IT landscape, a clear vision of the needs and benefits of the transitions and continual support. The differences of OS development models and support may require a significant change in the way software and services are accounted for and procured, and in general a shift of responsibility from outside contractors to in-house personnel.

Be sure of management commitment to the transition

Management support and commitment have been repeatedly found to be one of the most important variable for the success of complex IT efforts, and FLOSS migrations are no exception. This commitment must be guaranteed for a time period sufficient to cover the complete migration; this means that in organizations where IT directors are frequently changed, or where management changes in fixed periods of times (for example, in public administrations where changes happens frequently) there must be a process in place to hand over management of the migration. The commitment should also extend to funding (as transitions and training will require resources, both monetary and in-house). The best way to insure continued coordination is to appoint a team with mixed experiences (management and technical) to provide continuous feedback and day-to-day management.

troubleshooting point: if the only people working on planning the migration is from IT/MIS, there may be insufficient information in upper management and financial planning for continuing the migration after the initial step.

Prepare a clear overview of what is expected from the migration or adoption, including measurable benchmarks

The transition can be started for several reasons, including better control on IT costs, independence from suppliers, flexibility or support of open data standards. To be sure that the migration is effectively producing benefits or is going accord to the migration plan, it is fundamental to know beforehand what indicators will be used to evaluate the progress. Those requirements must be realistic, in particular expectations of TCO reductions must be compared with publicly available data for comparison.

troubleshooting point: if the only perceived advantage is that “the software comes from the net for free”, there may be a set of wrong assumptions that will probably lead to a final negative judgment on the migration.

Make sure that the timetable is realistic

The introduction of a new IT platform will always require a significant amount of time; as a rule of thumb the time to perform a full transition to FLOSS may be considered to be comparable to that of the introduction of a new company-wide ERP (enterprise resource planning application); for smaller transitions, time effort should be scaled accordingly.

Troubleshooting point: when migration time is measured in days, and no post-migration effort is planned, the process may be forced to a stop after the planned resources are expended.

Review the current software/IT procurement and development procedure

As implementation effort is shifted from commercial to open source software, the procurement and development process needs to be updated accordingly. In particular, the focus may change from acquisition to services, as less software is bought “shrink-wrapped” (commercially bought), and this change may require changes in how the internal IT budget is allocated.

Internally developed software will require a porting or a rolling transition to new software that is either multi-platform or accessible using standard interfaces (for example, web applications), and this should be taken into account in the overall IT plan.

Troubleshooting point: When no change of procurement and development is planned, the management may have not understood the scope of changed required for the adoption of FLOSS.

Seek out advice or search for information on similar transitions

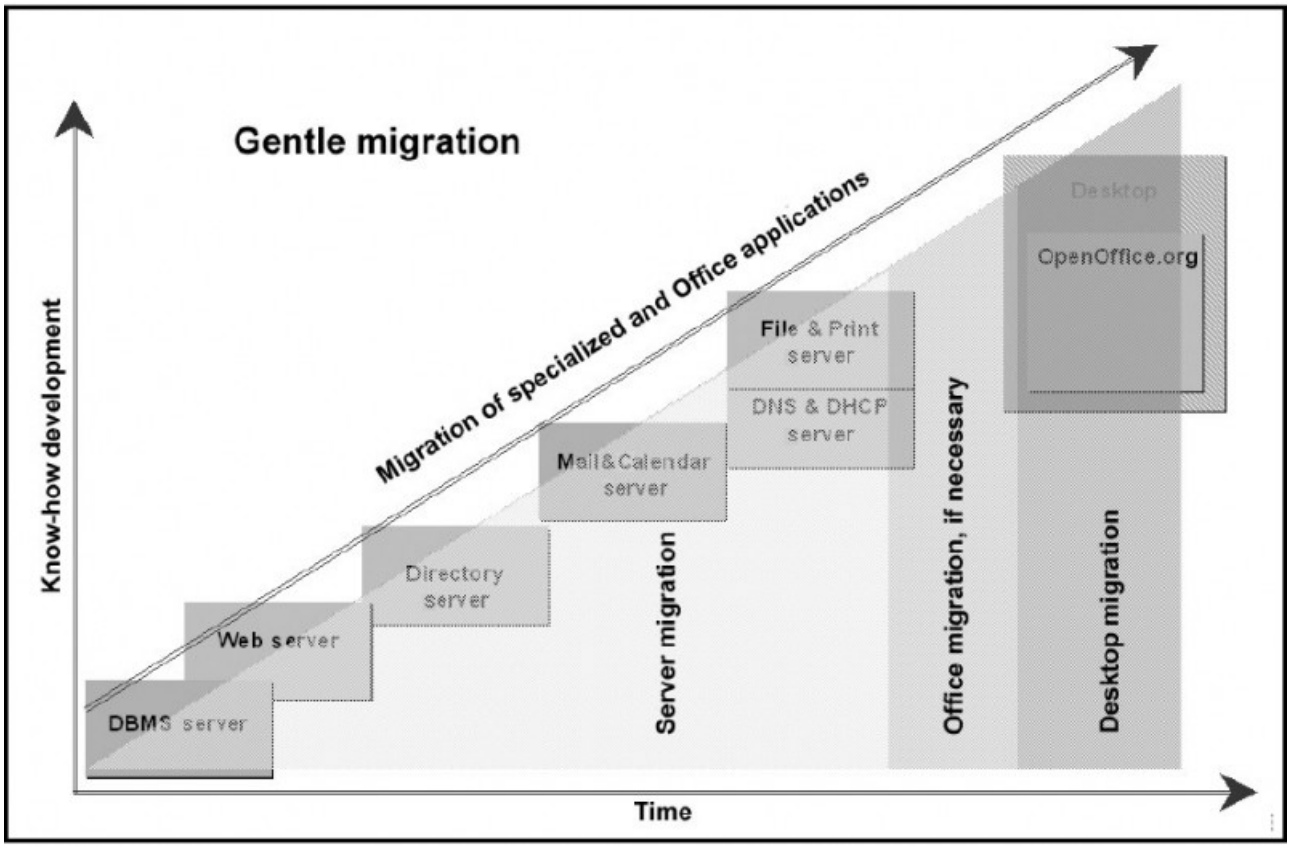
As the number of companies and administrations that have already performed a migration is now considerable, it is easy to find information on what to expect and how to proceed. In this sense, the COSPA project has developed an online knowledge base that is accessible through the main COSPA site (

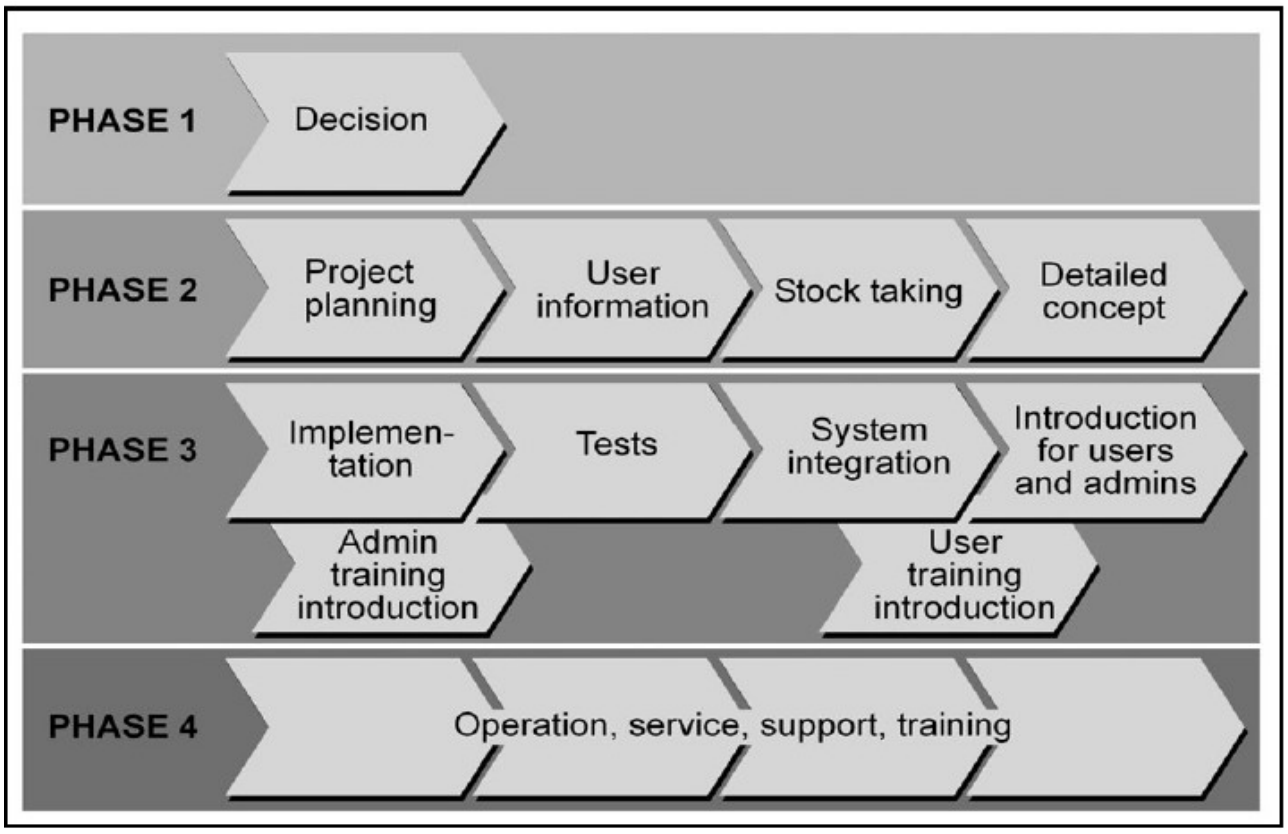
http://www.cospa-project.org); public administrations can also contact their local Open Source Competence centre, that will provide information and support in the migration process.

Avoid “big switch” transition, and favor incremental migrations

Most large scale migrations that are performed in a single, large step (involving the abrupt change from one IT environment to the other) are usually marred by extremely high support and technical costs. While the need to support more than one environment does increase support and management cost, “gentle” or incremental migrations usually bring a better overall experience for the users and result in minimal disruption on business processes.

An example of gentle migration can begin with the migration of server side applications, that are usually standards or network-based and thus easier to replace, leaving desktop and user-facing applications last. Such a scheme can be depicted as: [KBST 06]





Assign at least a person to interacting with the OSS community or the OSS vendor, and try to find online information sources

A significant advantage of OSS is the availability of online free resources, in the form of knowledge bases, mailing lists, wikis (collaborative sites) that may provide a substantial support in many cases comparable to commercial offerings. The biggest problem is the identification of such knowledge sources; in this sense assigning a resources to find, categorize and interact with such sources is a way to reduce the cost of support; a common way to provide a unified source of information is by setting up a small Intranet web page with links to online resources.

Troubleshooting point: when no one knows where to find information on the tools that are in use, or when everyone has to search on web sites on their own for finding usage tips.

Technical guidelines

A significant difference in FLOSS adoptions is the different development model adopted by most open source projects, and the difference in delivery of updates and support. This requires a change in the way adoption and updates are handled, to reduce as much as possible interoperability problems.

Understand the way OSS is developed

Most project are based on a cooperative development model, with a core set of developers providing most of the code (usually working for a commercial firm) and a large number of non-core contributors. This development model does provide a great code quality and a fast development cycle, but requires also a significant effort in tracking changes and updates. The adoption of an OSS package should be suggested when:

- when the project itself is “alive”, that is it does have an active development community. See the previous chapter on how to select and analyze a development project.
- when there is a clear distinction between “stable” and “unstable” software. In many projects, there are two distinct streams of development, one devoted to integrating the latest changes and addition, and another focused on improving stability and bug fixes; periodically, the developers will “freeze” development to turn the unstable version into the stable one, and create a new development, bleeding-edge version. This distinction allows the developers to satisfy both the users willing to experiment with the latest functionality, and those using the software for day-to-day operations, but requires an extra effort in collecting information and new versions.

If new functionalities or fixes are necessary, it may be easier to ask for a commercially supported version of the software; in many cases, the commercial vendor will also contribute financially to the open source project.

Troubleshooting point: when the IT manager or the developers think that OS is some kind of commercial software that someone has put for free on the net, and that it “just works”.

Create a complete survey of software and hardware that will be affected by the migration, and what functionality the company is looking for

There can be no successful migration when the initial situation is not known. Most companies and administrations have no process in place for auditing software and hardware platforms, and thus are unable to quantify the number of tools and software that needs to be replaced or integrated in an OSS migration. The survey process must also take into account the number of concurrent users, average use across the organization, and whether the software uses open or closed communication protocols and data formats. This

survey will be the basis for the decision of what users will be migrated first, and for taking into account the cost of software re-development or migration to a different data format. Automated software inventory tools are readily available, and may reduce the cost of performing the inventory and allow for a stricter control on installed software (thus reducing the maintenance cost).

Some of the aspects that should be surveyed are:

•used data format, both at the document exchange level, database and network protocol level

•list of used applications, including those internally developed, macros and active documents

•available functionality

•shortcomings and problems of the current infrastructure

It is fundamental that the migrated software can fulfill the same functional requirements of the current IT infrastructure, and usually improve on that in functional terms or in inherent quality (like availability, reliability, performance).

Use the flexibility of OSS to create local adaptations

The differentiating thing of OSS is the flexibility and freedom that it gives to users and developers in creating new versions or adapted versions of any package. This flexibility can greatly enhance the perceived value of OSS, for example it is possible to create customized packages that contain local configurations, special fonts and other supplemental material like preset macros and templates commonly used in the company. Also, custom look and feel may significantly improve user acceptance, both by presenting a nicer looking desktop, and by maintaining common links and menu entries.

These customization can be integrated in a simple way in the most used Linux distributions, or by creating a local repository of software. Note that in many cases, it is not necessary to produce software or code, as most adaptations are related to selecting the appropriate package, change the graphical appearance, or providing templates and presets.

There is much more software available than what is installed by default

Licensing or design issues limit substantially the amount of software that is usually included in the default install of the most used Linux distributions. For example, only a few include playback capability for the most commons audio and video format, due to licensing and patent issues; for the same reasons, some packages that may be of interest to only a minority of users are not included.

For this reason, it is important to research and include in the default installs additional package that may help in the transition period; such packages include additional fonts, multimedia tools, and other packages that may be

useful in a mixed environment.

In selecting packages, always favour stability over functionality

Among the many potential packages available for every function, there is always a balance between functionality and stability. In general, among the potential candidate packages that satisfy the functional requirements for the migration the preference should be given to the one that is more stable, thus having a longer real-world usage (and thus more information available for the administrator) and lower variability between different releases.

Troubleshooting point: When the IT administrator wants the latest version of everything on user's desktop.

Design the workflow support infrastructure to reduce the number of “impedance mismatches”

Every transition from an ICT infrastructure to another leads to some “impedance mismatch”, that is to small differences and incompatibilities; this can be observed for example by translating documents from one data format to another. The overall infrastructure should reduce the number of such transition points, for example by redesigning the document templates in the ODT open format instead of reusing previously developed versions made using proprietary tools. This reduces greatly the formatting and style differences that arise when one format is translated into another.

Introduce a trouble ticket system

A difficulty of every new IT deployment is the assessment of user satisfaction and the degree of acceptance of the new solution, especially in medium sized companies when user feedback is more difficult to collect. An online trouble ticket system may provide an easy and simple way to collect weak points in the deployment, and can help in identify users that may need additional training by analyzing the per-user submission statistics. It may also point to weaknesses in the deployment, for example by pointing to several trouble tickets related to a specific area.

Compile and update a detailed migration workbook

A large scale migration effort requires a coordinated action, and clear and updated information. The best way to provide this information is through a “migration workbook”, a single information point that provides the collection of documentation prepared for the migration (including the rationale, the detailed plan and the technical documentation) and the timetable, updated according to the project progress. This also simplifies project management

when there is a change in the team performing the migration.

Social guidelines

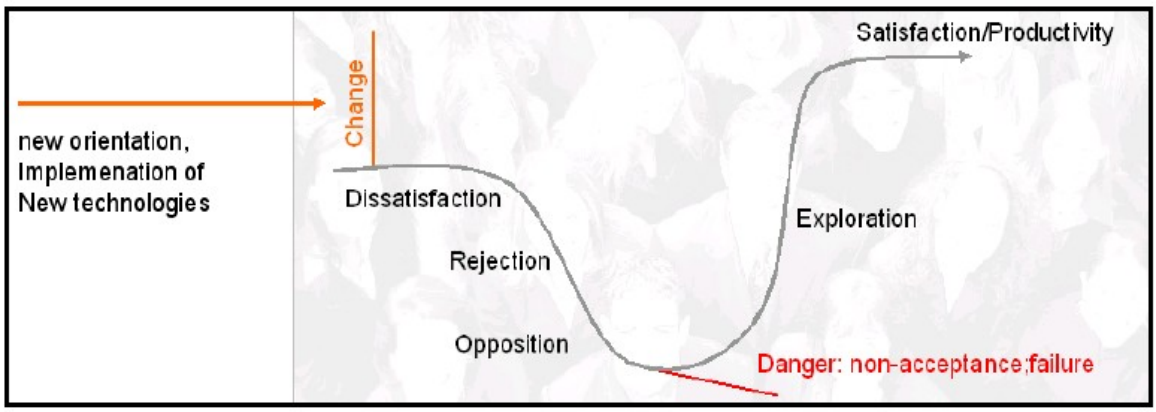
Provide background information on OSS

A significant obstacle of OSS adoption is the acceptance by the user, that usually has a very limited knowledge of open source and open data standards. In many cases, OSS is perceived as lower quality as it is “free”, downloadable from the internet like many shareware packages or like amateur projects. It is important to cancel this perception, and to provide information on how OSS is developed and what is the rationale and business model that underlie it.

Don't force the change on the users, provide explanations

The change of IT infrastructure will force a significant change in how the users work and use internal resources; this change may cause resistance by the users. Such change may be simplified by explaining clearly why and how the change will happen, and what benefits will be introduced in the long term both internally (like lower cost, better flexibility and security) and externally (openness, adherence to international standards, less burden on external users).

It is important to provide enough information and support to be able to skip the “opposition gulf”: [IBM 06]



Troubleshooting point: when internal users believe that the migration is done to pay software less

Use the migration as an occasion to improve users skill

As training for the new infrastructure is required, it may be used as a way to

improve overall ICT skills; in many companies and public administrations for example little formal training is usually performed on users. This helps not only in increasing confidence, but can also used to harmonize skills among groups and in general improve performance.

This may rise some resistance from the so called “local gurus”, that may perceive this overall improvement as a lessening of their social role as technical leaders. The best way to counter such resistance is to identify those users, and suggest them to access higher-level training material (that may be placed in a publicly accessible web site, for example).

Also, it may be useful to identify local “champions”, that is local FLOSS enthusiasts, that can provide peer support to other users, and offer them additional training occasions or management recognition. In general, it is useful to create an internal Intranet accessible page that provides links to all the different training packages.

Make it easy to experiment and learn

The licensing freedom that is the main point of OSS allows for free redistribution of software and training material; in this sense, providing users with Linux live-CDs (that require no hard disk installation) or printed material that can be brought home may help in overall acceptance.

6. FLOSS-based business models

"How do you make money with Free Software*?"* was a very common question just a few years ago. Today, that question has evolved into *"What are successful business strategies that can be implemented on top of Free Software?"*

We will quickly recap the three axis of the software landscape discussed in section 1:

The **software model** axis is the one that is discussed most often. On the one hand there is proprietary software, for which the vendor retains full control over the software and the user receives limited usage permission through a license, which is granted according to certain conditions. On the other hand there is Free Software, which provides the user with unprecedented control over their software through an ex-ante grant of irrevocable and universal rights to use, study, modify and distribute the software.

The **development model** axis describes the barrier to collaboration, ranging from projects that are developed by a single person or vendor to projects that allow extensive global collaboration. This is independent from the software model. There is proprietary software that allows for far-reaching collaboration, e.g. SAP with it's partnership program, and Free Software projects that are developed by a single person or company with little or no outside input.

The **business model** axis describes what kind of revenue model was chosen for the software. Options on this axis include training, services, integration, custom development, subscription models, "Commercial Off The Shelve" (COTS), "Software as a Service" (SaaS) and more.

These three axes open the space in which any software project and any product of any company can freely position itself. That is not to say all these combinations will be successful. A revenue model based on lock-in strategies with rapid paid upgrade cycles is unlikely to work with Free Software as the underlying software model. This approach typically occurs on top of a proprietary software model for which the business model mandates a completed financial transaction as one of the conditions to grant a license.

It should be noted that the overlap of possible business models on top of the different software models is much larger than usually understood. The ex-ante grant of the Free Software model makes it generally impossible to attach conditions to the granting of a license, including the condition of financial transaction. But it is possible to implement very similar revenue streams in the business model through contractual constructions, trademarks and/or certification.

Each of these axes warrants individual consideration and careful planning for the goals of the project.

If, for instance the goal is to work with competitors on a non-differentiating component in order to achieve independence from a potential monopolistic supplier, it would seem appropriate to focus on collaboration and choose a software model that includes a strong Copyleft license. The business model could potentially be neglected in this case, as the expected return on

investment comes in the form of strategic independence benefits, and lower license costs.

In another case, a company might choose a very collaborative community development model on top of a strong Copyleft license, with a revenue model based on enterprise-ready releases that are audited for maturity, stability and security by the company for its customers.

The number of possible combinations is almost endless, and the choices made will determine the individual character and competitive strengths and weaknesses of each company. Thinking clearly about these parameters is key to a successful business strategy.

Strategic use of Free Software vs Free Software companies

According to Gartner, usage of Free Software will reach 100 percent by November 2009. That makes usage of Free Software a poor criterion for what makes a Free Software company. Contribution to Free Software projects seems a slightly better choice, but as many Free Software projects have adopted a collaborative development model in which the users themselves drive development, that label would then also apply to companies that aren't Information Technology (IT) companies.

IT companies are among the most intensive users of software, and will often find themselves as part of a larger stack or environment of applications. Being part of that stack, their use of software not only refers to desktops and servers used by the company's employees, but also to the platform on top of which the company's software or solution is provided.

Maintaining proprietary custom platforms for a solution is inefficient and expensive, and depending upon other proprietary companies for the platform is dangerous. In response, large proprietary enterprises have begun to phase out their proprietary platforms and are moving towards Free Software in order to leverage the strategic advantages provided by this software model for their own use of software on the platform level. These companies will often interact well with the projects they depend upon, contribute to them, and foster their growth as a way to develop strategic independence as a user of software.

What makes these enterprises proprietary is that for the parts where they are not primarily users of software, but suppliers to their downstream customers, the software model is proprietary, withholding from its customers the same strategic benefits of Free Software that the company is using to improve its own competitiveness.

From a customer perspective, that solution itself becomes part of the platform on which the company's differentiating activities are based. This, as stated before, is inefficient, expensive and a dangerous strategy.

Assuming a market perspective, it represents an inefficiency that provides business opportunity for other companies to provide customers with a stack that is Free Software entirely, and it is strategically and economically sane for customers to prefer those providers over proprietary ones for the very same

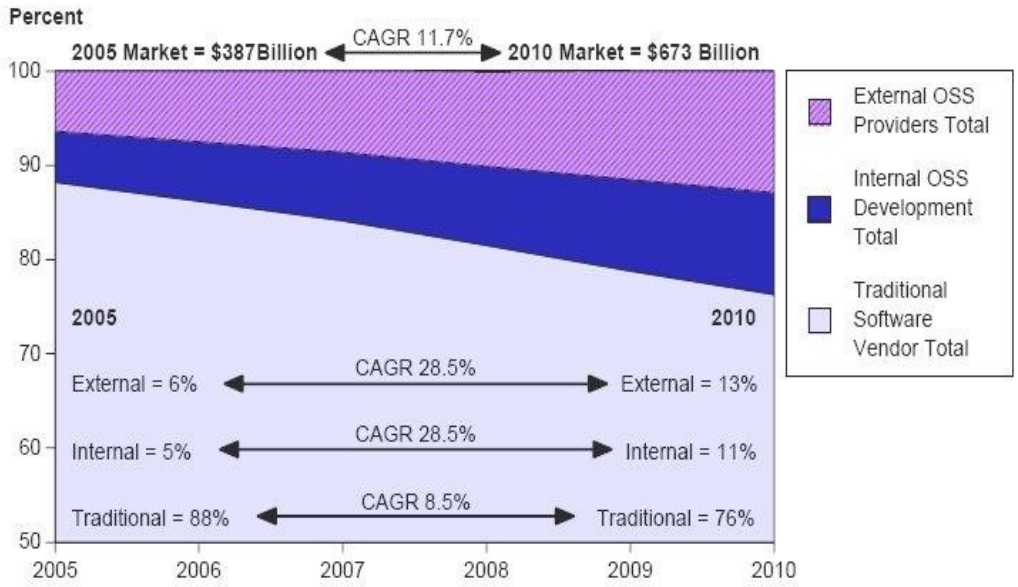
reasons that their proprietary suppliers have chosen Free Software platforms themselves.

Strategically speaking, any company that includes proprietary software model components in its revenue model should be aware that its revenue flow largely depends upon lack of Free Software alternatives, and that growth of the market, as well as supernatural profits generated through the proprietary model both serve to attract other companies that will make proprietary models unsustainable. When that moment comes, the company can either move its revenue model to a different market, or it has to transform its revenue source to work on top of a software model that is entirely Free Software.

So usage of and contribution to Free Software are not differentiators for what makes a Free Software company. The critical differentiator is provision of Free Software downstream to customers. In other words: *Free Software companies are companies that have adopted business models in which the revenue streams are not tied to proprietary software model licensing conditions.*

Economic incentives of Free Software adoption

The broad participation of companies and public authorities in the Free Software market is strictly related to an economic advantage; in most areas, the use of Free Software brings a substantial economic advantage, thanks to the shared development and maintenance costs, already described by researchers like Gosh, that estimated an average R&D cost reduction of 36%. The large share of “internal” Free Software deployments explains why some of the economic benefits are not perceived directly in the business service market, as shown by Gartner:



Gartner predicts that within 2010 25% of the overall software market will be Free Software-based, with roughly 12% of it “internal” to companies and administrations that adopt Free Software. The remaining market, still

substantial, is based on several different business models, that monetize the software using different strategies.

It is important to recognize the possibility of funding that is not directly related to a direct economic advantage. Working groups or individuals may receive funding for the development of a good software product, documentation, test cases or whatever. Usually, the only constraints imposed by the funding entity are that funds must be used to complete the project. This is typical of large computer science projects, and the funding usually comes from universities or from national science grants. In fact, many large projects in radio-astronomy, computational chemistry, and biology are funded this way. In addition, some consortium for the development of Internet tools and technologies have (or have had) such a funding structure. It is important to notice that in these cases the funding institution is not expecting to recover the investment, or to directly benefit from it. Usually, some expectation of social improvement is the reason for the funding.

Within the context of the FLOSSMETRICS project we performed a study on 218 companies that were receiving at least 25% of their revenues[9] directly or indirectly from FLOSS; this is an extension of the previous, 120 companies study that was included in the previous edition of the guide.

The main models identified in the market are:

- *Dual licensing*: the same software code distributed under the GPL and a proprietary license. This model is mainly used by producers of developer-oriented tools and software, and works thanks to the strong coupling clause of the GPL, that requires derivative works or software directly linked to be covered under the same license. Companies not willing to release their own software under the GPL can obtain a proprietary license that provides an exemption from the distribution conditions of the GPL, which seems desirable to some parties. The downside of dual licensing is that external contributors must accept the same licensing regime, and this has been shown to reduce the volume of external contributions, which are limited mainly to bug fixes and small additions.
- *Open Core* (previously called “split Free Software/proprietary” or “proprietary value-add”): this model distinguishes between a basic Free Software and a proprietary version, based on the Free Software one but with the addition of proprietary plug-ins. Most companies following such a model adopt the Mozilla Public License, as it allows explicitly this form of intermixing, and allows for much greater participation from external contributions without the same requirements for copyright consolidation as in dual licensing. The model has the intrinsic downside that the Free Software product must be valuable to be attractive for the users, i.e. it should not be reduced to “crippleware”, yet at the same time should not cannibalize the proprietary product. This balance is difficult to achieve

9 directly observed through public data or by estimates

and maintain over time; also, if the software is of large interest, developers may try to complete the missing functionality in Free Software, thus reducing the attractiveness of the proprietary version and potentially giving rise to a full Free Software competitor that will not be limited in the same way.

- *Product specialists*: companies that created, or maintain a specific software project, and use a Free Software license to distribute it. The main revenues are provided from services like training and consulting and follow the original “best code here” and “best knowledge here” of the original EUWG classification [DB 00]. It leverages the assumption, commonly held, that the most knowledgeable experts on a software are those that have developed it, and this way can provide services with a limited marketing effort, by leveraging the free redistribution of the code. The downside of the model is that there is a limited barrier of entry for potential competitors, as the only investment that is needed is in the acquisition of specific skills and expertise on the software itself. Most activities revolve around training, consulting, installation and configuration support, custom development and maintenance[10].
- *Platform providers*: companies that provide selection, support, integration and services on a set of projects, collectively forming a tested and verified platform. In this sense, even GNU/Linux distributions were classified as platforms; the interesting observation is that those distributions are licensed for a significant part under Free Software licenses to maximize external contributions, and leverage copyright protection to prevent outright copying but not “cloning” (the removal of copyrighted material like logos and trademark to create a new product)[11]. The main value proposition comes in the form of guaranteed quality, stability and reliability, and the certainty of support for business critical applications.
- *Selection/consulting companies*: companies in this class are not strictly developers, but provide consulting and selection/evaluation services on a wide range of project, in a way that is close to the analyst role. These companies tend to have very limited impact on the Free Software communities, as the evaluation results and the evaluation process are usually a proprietary asset.
- *Aggregate support providers*: companies that provide a one-stop support on several separate Free Software products, usually by directly employing developers or forwarding support requests to second-stage product specialists.
- *Legal certification and consulting*: these companies do not provide any specific code activity, but provide support in checking license compliance, sometimes also providing coverage and insurance for legal attacks; some companies employ tools for verify that code is not

10 Taking into account the characteristics of support questions, it is possible to observe that most calls are easily answerable, even with only moderately skilled people (around 80% are “easy” calls); the remaining 20% usually require a much greater effort. It is possible sometimes to create “pyramids” of support, where one company provides support for those 80% of easy calls, and moves the harder ones to another company that is more specialized on a specific package or a specific issue. This requires of course the capability of categorizing calls appropriately, and requires the existence of specific support contracts between the participants; this is usually possible only if the customer base is large enough, and so is more amenable to the medium companies.

11 Examples of RedHat clones are CentOS and Oracle Linux.

improperly reused across company boundaries or in an improper way.

- *Training and documentation*: companies that offer courses, on-line and physical training, additional documentation or manuals. This is usually offered as part of a support contract, but recently several large scale training center networks started offering Free Software-specific courses.
- *R&D cost sharing*: A company or organization may need a new or improved version of a software package, and fund some consultant or software manufacturer to do the work. Later on, the resulting software is redistributed as open source to take advantage of the large pool of skilled developers who can debug and improve it. A good example is the Maemo platform, used by Nokia in its Mobile Internet Devices (like the N810); within Maemo, only 7.5% of the code is proprietary, with a reduction in costs estimated in 228M$ (and a reduction in time-to-market of one year). Another example is the Eclipse ecosystem, an integrated development environment (IDE) originally released as Free Software by IBM and later managed by the Eclipse Foundation. Many companies adopted Eclipse as a basis for their own product, and this way reduced the overall cost of creating a software product that provides in some way developer-oriented functionalities. As an example, there is a large number of companies, universities and individual that participate in the Eclipse ecosystem; as recently measured, 25% of the committers work for IBM, with individuals accounting for 22%, and a large number of companies like Oracle, Borland, Actuate and many others with percentages that go from 1 to 7%[12]. This is similar to the results obtained from analysis of the Linux kernel, and show that when there is an healthy and large ecosystem the shared work reduces engineering cost significantly; in [Gosh 06] it is estimated that it is possible to obtain savings in terms of software research and development of 36% through the use of Free Software; this is, in itself, the largest actual "market" for Free Software, as demonstrated by the fact that the majority of developers are using at least some Free Software within their own code (56.2%, as reported in [ED 05]).

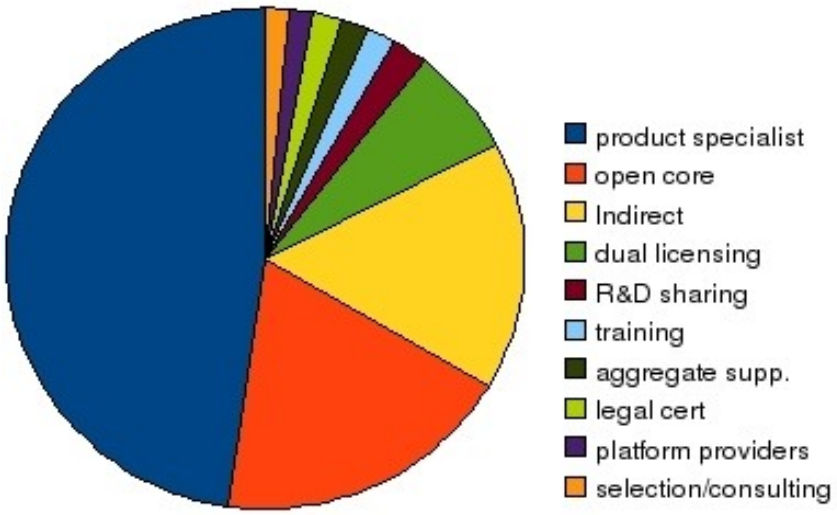
12 Source: Eclipse commit dashboard, http://dash.eclipse.org/dash/commits/web-app/commit-count-loc.php

- *Indirect revenues*: A company may decide to fund Free Software projects if those projects can create a significant revenue source for related products, not directly connected with source code or software. One of the most common cases is the writing of software needed to run hardware, for instance, operating system drivers for specific hardware. In fact, many hardware manufacturers are already distributing gratis software drivers. Some of them are already distributing some of their drivers (specially those for the Linux kernel) as Free Software.

The loss-leader is a traditional commercial model, common also outside of the world of software; in this model, effort is invested in a Free Software project to create or extend another market under different conditions. For example, hardware vendors invest in the development of software drivers for Free Software operating systems (like GNU/Linux) to extend the market of the hardware itself. Other ancillary models are for example those of the Mozilla foundation, which obtains a non trivial amount of money from a search engine partnership with Google (an estimated 72M$ in 2006), while SourceForge/OSTG receives the majority of revenues from e-commerce sales of the affiliate ThinkGeek site

We found (confirming previous research from the 451 group) that at the moment there is no “significant” model, with companies more or less adopting and changing model depending on the specific market or the shifting costs. For example, during 2008 a large number of companies shifted from an “open core” model to a pure “product specialist” one to leverage the external community of contributors.

According to the collected data, among Free Software companies the “Fully Free Software” approach is still prevalent, followed by the “Open Core” and the “Dual Licensing” mode:



Model name	# companies
product specialist	131
open core	52
indirect	44
dual licensing	19
R&D sharing	6
training	5
aggregate supp.	5
legal cert	5
platform providers	4
selection/consulting	4

Some companies have more than one principal model, and thus are counted twice; in particular, most dual licensing companies are also selling support services, and thus are marked as both. Also, product specialists are counted only when there is a demonstrable participation of the company into the project as “main committer”; otherwise, the number of specialists would be much greater, as some projects are the center of commercial support from many companies (a good example is OpenBravo or Zope).

Another relevant consideration is the fact that platform providers, while limited in number, tend to have a much larger revenue rate than both specialists or open core companies.

Many researchers are trying to identify whether there is a more “efficient” model among all those surveyed; what we found is that the most probable future outcome will be a continuous shift across model, with a long-term consolidation of development consortia (like Symbian and Eclipse) that

provide strong legal infrastructure and development advantages, and product specialists that provide vertical offerings for specific markets. This contrasts with the view that, for example, “mixed” models provide an inherent advantage; for example, Matthew Aslett of the 451 group (one of the leading researchers in Free Software business models) wrote:

“The Open-Core approach is mostly (though not exclusively) used by vendors that dominate their own development communities. While this provides benefits in terms of controlling the direction of development and benefiting from the open source distribution model there are also risks involved with promoting and managing community development - or not. In fact, many of these companies employ the majority of the developers on the project, so they are actually missing out on many of the benefits of the open source development model (more eyeballs, lower costs etc).

Additionally, by providing revenue-generating features on top of open source code, Open-Core vendors are attempting to both disrupt their segment and profit from that disruption. I previously argued that “it is probably easier in the long-term to generate profit from adjacent proprietary products than it is to generate profit from proprietary features deployed on top of the commoditized product.”

While Open-Core is definitely the commercial open source strategy of the day and is effective in building the revenue growth required to fuel an exit strategy, I have my doubts as to whether it is sustainable in the long-term due to a combination of the issues noted above.”

The fact that Free Software is in a sense a non-rival good also facilitates cooperation between companies, both to increase the geographic base and to be able to engage large scale contracts that may require multiple competencies. Three main collaboration strategies were identified among smaller companies: geographical (same product or service, different geographical areas); “vertical” (among products) or “horizontal” (among activities). Geographic cooperation is simpler, and tends to be mainly service-based; an example is the Zope Europe Association, that unites many service providers centered on specific Zope and Plone expertise. Vertical cooperation is done by companies that performs an integrated set of activities on one or more packages. Multiple vendors with overlapping products can collaborate on a single offer (eg. operating system and Groupware), that may form a more interesting or complete offer for the selected customer segment.

OSS Vendor Business model	Vendor example	Number of covered products	Economic advantage for the vendor	Economic advantage for the adopter
Dual licensing	MySQL	single or few	Dissemination for the product with reduced costs, creation of external ecosystem of add-ons (outside the source), visibility, self-segmentation of the market	The adopter may opt for the open source edition if it is deemed sufficient; for the proprietary part, reduction in cost may give better price/quality ratio
Open Core	Zimbra	single or few	Reduction of R&D, reduced maintenance costs, visibility, increased dissemination, external ecosystem of add-ons, self-segmentation of the market for the proprietary add-ons	The adopter may opt for the open source edition if it is deemed sufficient; for the proprietary part, reduction in cost may give better price/quality ratio
Product specialists	Alfresco	single or few	Reduction of R&D, reduced maintenance costs, visibility, increased dissemination, external ecosystem of add-ons	Reduction in cost may give better price/quality ratio for the adopted software, stability, integrated support reduces external costs
Platfrom Providers	RedHat	many	Reduction of R&D, reduced maintenance costs, visibility, increased dissemination, external ecosystem of software and additions	Reduction in cost may give better price/quality ratio for the adopted software, stability, integrated support reduces external costs, legal protection is included, easy to find trained personnel, availability of long-term options
Software Selection	Navica	many	Cost of software certification and selection can be partially shared across customers, as most adopters have a large share of common needs	Reduced selection costs; reduced risk of wrong choice
Aggregate support providers	OpenLogic	many	Cost of support can be partially shared across customers, economies of scale	A single point of control and cost for a large number of project, reduced negotiation efforts for large number of individual vendors, simplified management and governance
Legal certification and insurance	Palamida	many	Cost of legal certification and secondary-level insurance can be shared across the most used OSS projects	Equivalent to insurance; provides a materialized and stable costs against uncertain, difficult to quantify negative events
Training and documentation	Gbdirect	many	A significant portion of training development costs can be shared across customers, economies of scale, reuse of community-developed material	Lower cost for training compared to self-managed training (from source code, publicly available documentation)
R&D cost sharing	Eclipse	single or few	Reduction of R&D, reduced maintenance costs	(same as vendor- in this case, vendor and adopter coincide)

OSS Vendor Business model	Potential disadvantages of the model	Sale condition	Freeriding protection	External ecosystem
Dual licensing	Low external participation (limited code contributions)	integration of the product with non-OSS components in externally distributed products	license choice	limited (very little external contributions, mainly debug activity and external products)
Open Core	Difficult to estimate the right balance between open and closed parts, external groups may create substitutes for the proprietary parts	Need for the proprietary additions or need of support	license choice, segmentation on features	potentially large, depending on the balance open/proprietary
Product specialists	Low barrier of entry for third-parties	Value perceived by user must be higher than the cost of going to an unsupported recompilation (eg. CentOS); usually mission-critical environments, need of support or lack of internal expertise	license choice	yes
Platfrom Providers	Platform engineering requires large R&D efforts even with shared resources	Value perceived by user must be higher than the cost of going to an unsupported recompilation (eg. CentOS); usually mission-critical environments, need of support or lack of internal expertise	license choice, copyrighted and trademarked elements included in the product	yes
Software Selection	Limited market, difficulty in following rapid evolution of the products covered (evaluation costs)	Complex requirements, many areas or strict vertical requirements to match, possibly large company size	Selection documents are usually proprietary; selection requires human intervention (non-replicable)	no
Aggregate support providers	Limited market, may be perceived as in partial competition with existing specialists	Large number of managed projects, use in mission-critical infrastructure	Inherent in the non-transferability of support contracts	no
Legal certification and insurance	Limited market, difficult to estimate risk probabilities, need to cover separate legal frameworks across the world with different rules	Potential legal risk	Inherent in the non-transferability of certification and insurance	no
Training and documentation	May be perceived as in partial competition with existing specialists, human intensive, most of it cannot be replicated at low cost	Lack of internal experts (or too high cost for creation of internal skills), complex configuration and setup of OSS product	Training material are usually non-public, trainers are inherently non-replicable	no
R&D cost sharing	Establishing the management and contribution structures may be complex and costly, requires constant effort	Significant R&D costs, higher than the cost of management of the shared community	license choice	yes
Indirect revenues	Requires a large external market for incentives, may be dependent on a single (or small number) of actors increasing risk	There should be an external source of revenue linked to adoption (eg. Ecommerce sales of related products, search engine back-payments, etc.) Usually linked to high adoption numbers	license choice, copyrighted and trademarked elements included in the product	yes

7. R&D sharing

In the previous chapter we already mentioned as a potential model the idea of sharing research and development efforts, by creating one or more open source projects and by facilitating reuse.

One of the more visible form is in “integrated reuse”, the leverage of OSS components to reduce development and maintenance costs. I will take some examples from an excellent thesis by Erkko Anttila, “Open Source Software and Impact on Competitiveness: Case Study” from Helsinki University of Technology. Erkko interviewed many actors from Nokia and Apple about their adoption of OSS in the Maemo platform and in OSX, and measured the OSS contribution through the traditional (albeit not always accurate) COCOMO model. Here are some results:

Maemo: the total software stack includes 10.5 million lines of code (product and development tools), which is split into 85% coming directly from OSS, and 15% either modified or developed by Nokia. In source code lines the respective amounts are 8.9 Million lines of OSS code and 1.6 million lines of Nokia developed software. Out of the 15% created by Nokia, 50% are made available to the community as modifications to components or totally new components, leaving roughly 7.5% of the software stack closed. (…) Based on the COCOMO model we can estimate the value of the utilized OSS to be $228,000,000, including both product software and tools.”

Apple: “Based on the COCOMO model the total cost of internally developing the OSS included in the Darwin core and the used development tools would be $350,000,000.”

More recently the release of the source code for the Palm Pre mobile device shows that the amount of code changed in the largest packages is quite small; for example, the patch distributed by Palm for the Linux kernel is less than 4% of the total code size, and consists mostly of patches from other projects, like the OMAP porting code or from audio/video support libraries.

The code reuse is not, however, the only advantage. As Ari Jaaksi of Nokia mentioned during one of his presentations: “No need to execute complex licensing negotiations; Saving can be up to 6- 12 months in real projects”. 6-12 months of totally non-productive wait are already important, but when added to the developers time saved by reuse it is possible to estimate that for end-user products the total savings are between 12 and 18 months; and for consumer products (especially in IT) reducing time to market by one year means having a significant first-mover advantage.

The reuse of code is a longstanding practice in software engineering; doing software takes time and money, and code needs to be maintained for a long time- adding additional costs on top. In one of the most widely known article in software engineering (”No silver bullet: essence and accidents of software engineering“), Frederick Brooks exposes some fundamental reasons behind the inherent difficulty of making software, especially large scale software systems. He also coined his law, the “no silver bullet law”:

> *There is no single development, in either technology or in management technique, that by itself promises even one*

> *order of magnitude improvement in productivity, in reliability, in simplicity.*

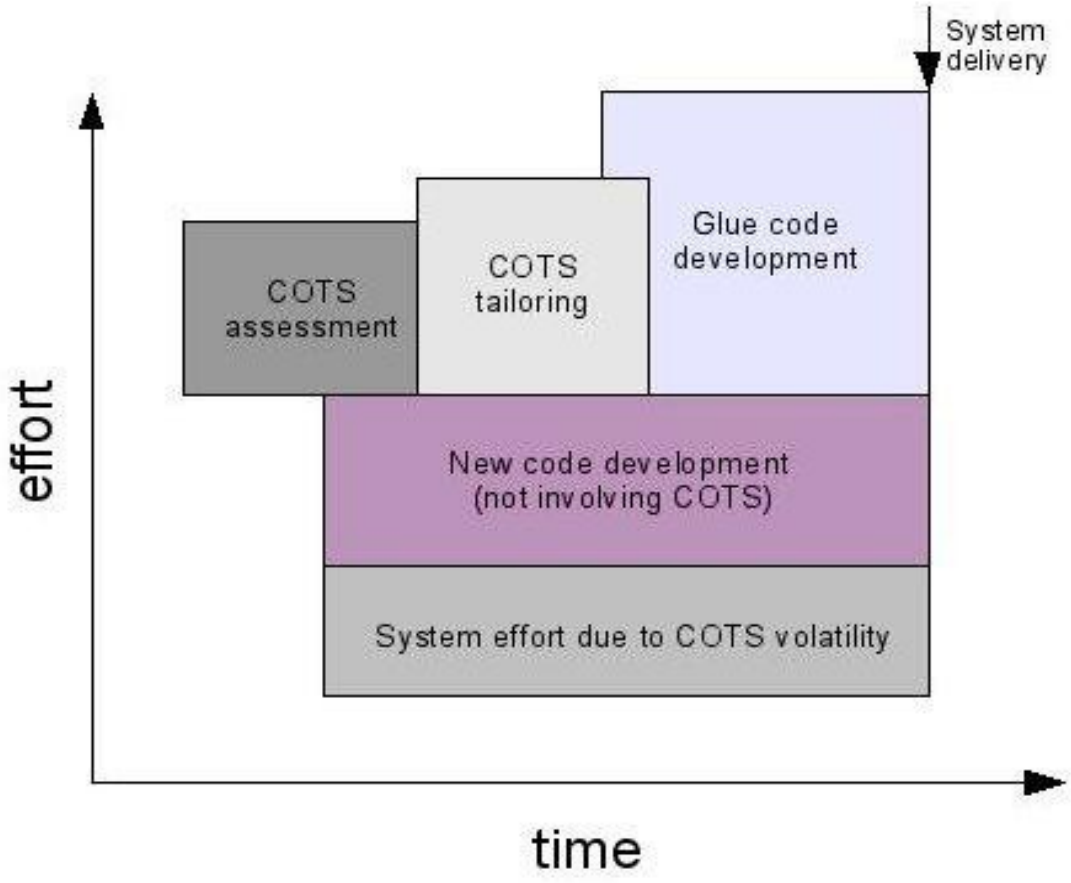
Despite many trials, and many technologies (better languages, OOP, formal methods, automatic programming and many others..) the law has remained true until now. In the same article, however, Brooks marks some potential attacks on the inherent difficulty of making software:

- buy, don't build (that is, if possible don't code at all)
- requirement refining, rapid prototyping, incremental building
- great designers

It is quite easy to make a parallel with open source style development, that promotes the same ideas:

- reuse components and source code from other projects
- release early/release often (or allow anyone read access to CVS for making their own version)
- meritocracy (small group of respected core developers, and many smaller contributors)

In the software engineering world the reuse of code coming from the "external" world is commonly called COTS, Commercial Off The Shelf, and has been studied for many years. Boehm and others created a model for mixed development that can be graphically presented as:



As can be seen in the image, there are costs that are related to the integration of COTS (in our case, OSS) within a newly developed product. These costs are related to the evaluation (and searching) of OSS, “tailoring” (the adaptation of the code for the project needs), and development of glue code (the layer of code between OSS modules and between OSS and internally developed code).

It is possible to estimate code cost and effort using the COCOMO II model, adapted to a model where a varying percentage of code is developed or reused from OSS. First of all, some assumptions:

- The average company cost of a developer is fixed at 25€ per hour. It should be a reasonable approximation of European costs (in particular, costs in Mediterranean areas like Spain, France, Italy, Greece); we know that it is lower than other estimates (especially US ones), but this way we provide a “lower bound” for savings instead of averages.
- The “tailoring” of code is performed on 15% of the OSS code; percentage comes from several separate projects, with estimates ranging from 5% for mature projects with structured and well-documented interfaces to 20% for complex, deeply-interlocked code like that found in embedded systems. Tailoring cost is higher than traditional coding; for this reason, the COCOMO complexity index is increased to 6 compared to new-code development.
- Volatility is based on our own model for cost estimation and data from literature on COTS (”Empirical observations on COTS software integration effort based on the initial COCOTS calibration database”, Abts C., Boehm B.W., Bailey Clark E.) and it can be approximate with an average effort equivalent to 1.5 to 2.5 full time person-year.

This is the result:

Project size (lines of code)	% of OSS	total cost (Keuro)	Savings	duration (years)	avg. staffing
100000	0	1703	0%	1.7	20.5
100000	50	975	43%	1.3	15.4
100000	75	487	71%	0.9	8.6
1000000	0	2200	0%	3.3	141.7
1000000	50	12061	45%	2.6	103.2
1000000	75	3012	86%	2	32
10000000	0	295955	0%	7.5	818
10000000	50	160596	46%	5.9	631.2
1000000	75	80845	73%	3.8	421

In the case of 10Mlines of code, the saving is estimated at more than 210M€, that is consistent with previously mentioned estimates of savings by Nokia in reusing open source within Maemo. Even for the “small” project of 100000 lines, the savings are estimated at 1.2M€. Another interesting aspect is related to staffing and time: not only the use of OSS can reduce development time substantially, but it allows for a substantial reduction in the amount of staff necessary for the development. In the smallest example (100000 lines of code, still substantial) the average staffing is reduced from more than 20 developers to slightly less than 9, bringing this project within reach even by small companies, and in my personal view it explains the exceptional take-up of OSS by new and innovative companies, that even before external sources of capital (like VCs) are capable of creating non-trivial projects with very limited

resources.

The reduction in staffing needs, and the increased efficiency introduced by FLOSS may explain why some research found that FLOSS-using SMEs are more efficient. From a recent research from the TEDIS group of Venice University[13]: “Finally, comparing the individual data on firms with turnover of less than 500,000€ with the variable on size classes of customers (by number of employees), one can hypothesize a correlation between the use of software Open Source and the ability to attract customers of relatively larger scale. At the same turnover, in other words, companies “Open Source only” seem to have more chances to obtain work orders from companies with more than 50 employees (ie medium - large compared to our universe of reference).”

This, given the relative similarity of other data (like revenue-per-employee of the cluster) provide at least an hint that OSS gives “leverage” in the kind of activities that a small company can create or propose to the market.

13 Report from the TEDIS research on italian OSS companies, http://opensource.univiu.org/

Bibliography

[ARC 07] Applied Research and Innovation Fund, InnovationBG 2007 report

[Aug 04] Augustin, L. *Living with open source: the new rules for IT vendors and consumers.* OSBC 2004 conference

[Cam 06] Campbell, J. *Due Diligence at Eclipse: How it Benefits our Community.* EclipseCon 2006 presentation

[Car 07] Carbone, P. *Value Derived from Open Source is a Function of Maturity Levels*, OCRI conference "Alchemy of open source businesses", 2007

[CIO 07] CIOInsight, *CIOINSIGHT OSS survey 2007.*

[COS 05] EU COSPA project, *D6.1 Report evaluating the costs/benefits of a transition towards ODS/OS.*

[Cox 07] Cox, M. *Information sources.* Blog entry, http://www.awe.com/mark/blog/200704101400.html

[DB 00] Daffara, C. Barahona, J.B. *Free Software/Open Source: Information Society Opportunities for Europe?* working paper, http://eu.conecta.it

[Daf 06] Daffara, C. *Sustainability of FLOSS-based business models,* II Open Source World Conference, Malaga 2006

[Daf 06-2] Daffara, C. *Introducing open source in industrial environments. 3rd* CALIBRE workshop

[Daf 07] Daffara, C. *Business models in OSS-based companies.* Accepted paper, OSSEMP workshop, Third international conference on open source. Limerick 2007

[Dal 05] Dalle, J.-M., et al., *Advancing Economic Research on the Free and Open Source Software Mode of Production*, in *Building Our Digital Future: Future Economic, Social & Cultural Scenarios Based On Open Standards*, M. Wynants and J. Cornelis, Editors. 2005, Vrjie Universiteit Brussels (VUB) Press: Brussels

[ED 05] Evans Data, *Open Source Vision report*, 2005

[EKM 05] Eckert D., Koch S., Mitlohner J. *Using the Iterated Prisoner's Dilemma for Explaining the Evolution of Cooperation in Open Source Communities* . Proceedings of the First International Conference on Open Source Systems , Genova 2005

[Fed 07] Fedora Project Wiki, *Licensing.* http://fedoraproject.org/wiki/Licensing

[Fog 05] Fogel, K., *Producing Open Source Software: How to Run a Successful Free Software Project*. 2005: O'Reilly

[Forr 07] Forrester consulting, *Open Source Software's Expanding Role in the Enterprise* . March 2007

[Gar 06] Gartner Group, *Open source going mainstream.* Gartner

report, 2006

[Gosh 05] Gosh, et al. *Free/Libre/Open Source Software Worldwide impact study: FLOSSWorld*. FLOSSWorld project presentation. http://www.flossproject.org/papers/20051217/flossworld-intro3.pdf

[Gosh 06] Gosh, et al. *Economic impact of FLOSS on innovation and competitiveness of the EU ICT sector*. ec.europa.eu/enterprise/ict/policy/doc/2006-11-20-flossimpact.pdf

[Hahn 02] Hahn, W.R. (editor), *Government policy towards open source software.* AEI-Brookings, 2002.

[HSE 02] UK Health and Safety Executive, *Preliminary assessment of Linux for safety related systems.* Research report 011/2002

[IBM 06] IBM, *Linux Client Migration Cookbook, Version 2: A Practical Planning and Implementation Guide for Migrating to Desktop Linux.* Available online at http://www.redbooks.ibm.com/abstracts/sg246380.html?Open

[IDC 06] IDC, *Open Source in Global Software: Market Impact, Disruption, and Business Models.* IDC report, 2006

[INES 06] INES IST project, *Final project report.* http://www.euroines.com/down/INES_final_report.pdf

[Inf 07] Infoworld white paper, *OPEN SOURCE MANAGEMENT: Trends, Requirements and Future Needs for the Open Source Enterprise*

[Jaak 06] Jaaksi, A. *Building consumer products with open source.* LinuxDevices dec. 2006, http://www.linuxdevices.com/articles/AT7621761066.html

[Jul 06] Jullien N. (ed) *New economic models, new software industry economy.* RNTL report

[KBST 06] Germany KBSt, *Migration guide*.

[Kli 05] Klincewicz, K. *Innovativeness of open source software projects.* Technical report, School of Innovation Management, Tokyo Institute of Technology. 2005

[Mue 07] Mueller, M. *Openoffice.org projects by Members,* http://blogs.sun.com/GullFOSS/entry/openoffice_org_projects_by_members

[OECD 02] OECD, "OECD/Eurostat task force on software measurement in the national accounts", Conference of European Statisticians, Joint ECE/Eurostat/OECD meeting on national accounts, 2002

[Ost 04] Osterwalder A, *The business model ontology - a proposition in a design science approach ,* PhD Dissertation, University of Lausanne, Switzerland, 2004

[Ost 05] Osterwalder A, Pigneur Y., *E-business models and disruptive behaviours,* http://www.businessmodeldesign.com/presentations/PACIS05.ppt

[QSOS 06] QSOS project, *Method for Qualification and Selection of Open Source software (QSOS) version 1.6*.

[Raym 00] Raymond, E.S., *The Cathedral and the Bazaar*, in *The Cathedral and the Bazaar*. 2000

[Reas 06a] Reasoning Inc. *A Quantitative Analysis of TCP/IP Implementations in Commercial Software and in the Linux Kernel.*

[Reas 06b] Reasoning Inc. *How Open Source and Commercial Software Compare: Database Implementations in Commercial Software and in MySQL.*

[Rig 06] Rigby P.C., German D.M. *A preliminary examination of code review processes in open source projects.* University of Victoria technical report, 2006, http://opensource.mit.edu/papers/Rigby2006TR.pdf

[Ros 05] Rosen L., *Open source licensing.* Prentice Hall, 2005

[Sei 06] Seigo A., *The quest for project identity and definition. Keynote speech,* Akademy conference 2006.

[Sch 02] Schiff, A. The Economics of Open Source Software: A Survey of the Early Literature. Review of Network Economics, 1 (1), March 2002

[Spi 02] Spiller, D. and T. Wichmann, *FLOSS 3: Basics of Open Source Software Markets and Business Models*, in *FLOSS - Free/Libre Open Source Software: Survey and Study*. Berlecon Research, Berlin 2002

[Stu 07] Stuermer, M. *How money influences open source projects and its contributors.* LinuxTag 2007, Berlin.

[Suc 04] Succi, Paulson, Eberlein. *An Empirical Study of Open-Source and Closed-Source Software Products*, IEEE TRANSACTIONS ON SOFTWARE ENGINEERING, V.30/4, april 2004

[Sun 06] Sun Microsystems, *Free and Open Source licensing.* White paper, www.sun.com/software/opensource/whitepapers/Sun_Microsystems_OpenSource_Licensing.pdf

[UUS 05] Ueda, M., Uzuki T., Suematsu C. *A cluster analysis of open source licenses.* Proceedings of the First International Conference on Open Source Systems, Genova 2005

[VH 03] Von Hippel, E. and G. von Krogh, *Open Source Software and the "Private-Collective" Innovation Model: Issues for Organizational Science.* Organization Science, 2003. **14**(2): p. 209-223

[VH 05] Von Hippel, E. *Democratizing innovation*. MIT press, 2005

Appendix 1: estimating the number of active FLOSS projects

A recurring debate discussion among FLOSS-supporters and detractors is related to the estimation of the real number of active FLOSS projects. While it is easy to look at the main repository site (sourceforge.net) that boasts more than 100.000 projects, it is equally easy to look in more depth and realize that a significant number of those projects are really abandoned or have no significant development.

For the purpose of obtaining some unbiased estimates, we performed a first search among the main repository sites and FLOSS announce portals; we also set a strict activity requirement, stately an activity index from 80 to 100% and at least a file release in the last 6 months. Of the overall 155959 projects, only 10656 (6.8%) are "active" (with a somehow very restrictive definition; a more relaxed release period of 1 year shows an active percentage of 9.2% or 14455 projects).

However, while Sourceforge can rightly be considered the largest single repository, it is not the only potential source of projects; there are many other vertical repositories, among them BerliOS, Savannah, Gna! and many others, derived both from the original version of the Sourceforge code and many more based on a rewritten version called GForge.[14]

The result summary is:

Repository name	Number of projects
All GForge sites[15]	16776
Berlios Sourcewell	3340
Savannah	2793
Gna!	1039

That gives a total of 23948 projects, to which (using a sampling of 100 projects from each) we have found a similar number of active projects (between 8% and 10%).

The next step is the estimation of how many projects of the overall FLOSS landscape are hosted on those sites, and for performing this estimate we took the entire FreshMeat[16] announce database, as processed by the FLOSSmole project[17] and found that the projects that have an homepage in one of the repository sites are 23% of the total. This count is however biased by the fact that the probability of a project to be announced on FreshMeat is not equal for all projects; that is, english-based and oriented towards a large audience have a much higher probability to be listed. To take this into account, we performed

14 It has been suggested to the authors that in this way we can end up counting twice those projects that move from one site to others. The reality is that as the "old" project becomes inactive, it is removed from the count and so this risk is limited to those that performed the move in the last 12 months only (as moving is rather uncommon, this is however a very small number that should not influence the overall percentages).

15 As reported in the GForge site count, http://gforge.org/docman/view.php/1/52/gforge-sites.html

16 A popular FLOSS announcement portal. www.freshmeat.net

17 a collaborative collection and analysis of FLOSS data, http://ossmole.sourceforge.net/

a search for non-english based forges, and for software that is oriented towards a very specific area, using data from past IST projects like Spirit and AMOS. We have found that non-english projects are underrepresented in FreshMeat in a significant way, but as the overall "business-readiness" of those projects is unclear (as for example there may be no translations available, or be specific to a single country legal environment) we have ignored them. Vertical projects are also underrepresented, especially with regard to projects in scientific and technical areas, where the probability of being included is around 10 times lower compared to other kind of software. By using the results from Spirit, a sampling from project announcements in scientific mailing lists, and some repositories for the largest or more visible projects (like the CRAN archive, that hosts libraries and packages for the R language for statistics, that hosts 1195 projects) we have reached a lower bound estimate of around 12000 "vertical" and industry-specific projects.

So, we have an overall lower bound estimate of around 195000 projects, of which we can estimate that 7% are active, leading to around 13000 active projects. Of those, we can estimate (using data from Slashdot, FreshMeat and the largest Gforge sites) that 36% fall in the "stable" or "mature" stage, leading to a total of around 5000 projects that can be considered suitable for an SME, that is with an active community, stable and with recent releases.

It should be considered that this number is a lower bound, obtained with slightly severe assumptions; also, this estimate does not try to assess the number of projects not listed in the announcement sites (even vertical application portals); this is a deliberate action, as it would be difficult to estimate the reliability of such a measure, and because the "findability" of a project and its probability of having a sustained community participation are lower if it is difficult to find information on the project in the first place; this means that the probability of such "out of the bounds" projects would probably be not a good opportunity for SME adoption in any case.

Appendix 2: USB-based SME toolkits

One of the difficulties of spreading or presenting information on OSS to small and medium enterprises is the actual presentation of the software itself, or of a collection of OSS packages, in a way that is low-cost, easy to use, and compatible with present hardware and software actually used in the company. In the past the main channel for distributing applications was the use of live-CDs, that is Linux distributions that include additional packages, delivered as a self-booting compact disc that at boot presented a set of activities or applications that could be run by the end user. This approach has the advantage that CDs are easy and low cost to produce, but it actually is not practical for large scale or complex applications (that require too much time to boot from slow media like a CD), the fact that actual use of the application requires near-perfect hardware recognition by the Linux operating system (with no support for already prepared data like connection information or passwords to access the Internet) and the fact that in most cases it is not possible to have a writable part to save some of the experimental data created by the user.

For this reason, we believe that a better approach may be obtained through a different media, namely USB keys of limited capacity (1Gb is usually sufficient). USB ports are present in most PC (sometimes when CD is not included, like in netbooks or some notebooks), are much faster than CDs, and allow for writing persistent data.

There are two potential ways to create a "SME toolkit" based on USB: the first is the use of the key as a boot device, and the second through virtualization. The first approach leverages the same principle of the live-cd, but uses an additional partition on the USB key to write data; a simple way to create the correct USB image is the use of software products like UnetBootin [0]; the most recent Ubuntu distribution already includes a tool called Ubuntu Live USB creator, while Fedora users have access to Fedora Live USB creator. All these tools transfer the live CD image of Linux onto the USB key, adding also the necessary boot files and creating a writable partition. While the method is simple and requires no modification to the host system, it still does not solve the problem that local hardware may be undetected or not properly configured, and the fact that live CDs require substantial effort to integrate complex server like software packages.

The virtualization approach leverages open source virtualization systems like VirtualBox, already included in the software catalog. VirtualBox can create a complete emulation of a server or desktop environment, leveraging the host operating system. The approach for the creation of a virtualization-based usb toolkit is the following:

- identify the interesting software application
- see if it is already packaged as a Vmware or VirtualBox image
- if not, start from a minimal install image and install the application inside the virtual image
- prepare a formatted, empty and large enough USB key for what is

necessary

- copy the installable VirtualBox binaries (for windows, linux and OSX) inside of the USB key
- copy the prepared virtual image with the desired application
- put a simple link inside of the key with the VirtualBox command (a .bat file for windows, a .sh script for linux) that runs VirtualBox with the path to the image

Inside of the key it is also possible to put some additional documentation, like this guide, the material from the SELF project[18] and any training material that may be specific for the application selected. In the same USB key, a small readme file can be added that explains how to install VirtualBox and how to start the virtual machine.

18 http://selfproject.eu/

Software Catalog Introduction

This software catalog is a companion document of the FLOSS guide for small and medium enterprises prepared in the context of the FLOSSMETRICS EU project; it is based on the work of the Innov7 OpenTTT project (www.openttt.eu), that helped in the identification of needs through a large number of interviews and audits within European SMEs interested in FLOSS. Within the project we identified two main areas of interest: horizontal (expressed by companies across a wide range of industry domains, like ERP systems or security software) and vertical (specific to a single industry area, like machine maintenance). As one of the hurdles identified by SMEs in the FLOSS adoption process is the identification of suitable solution, we have collected a sample of applications in the following areas:

- Security
- Data protection and recovery
- Virtualization and remote access
- Desktop, device, network and server management
- Identity, access management
- Database and DB management
- Software Development
- ERP
- CRM
- Groupware
- VoIP, conferencing and messaging
- Document management
- Vertical business applications
- Content management systems
- Elearning applications
- Graphics Video and CAD
- Desktop applications
- Engineering and manufacturing
- Health Care

This catalog should be considered just a way to provide potential users initial suggestions, and in no way it can be considered exhaustive; the inclusion of a project should not be seen as a specific endorsement by the Commission or the FLOSSMETRICS and OpenTTT project. The text and images are from the respective projects whenever available, otherwise text and were prepared by the author. We welcome any addition and suggestion, both in terms of changes to existing descriptions and new additions. The preferred format is a half or full page text with one or two of sufficient resolution for the printed media; text should present actual capabilities of the software presented in its open source form (for software that is available in a FLOSS version and a commercial one) in the available version. Changes should be submitted to the

author, at the email address cdaffara@conecta.it ; future versions will be released at the address http://guide.conecta.it/

Security

ClamAV

http://www.clamav.net

Clam AntiVirus is an open source (GPL) anti-virus toolkit for UNIX, designed especially for e-mail scanning on mail gateways. It provides a number of utilities including a flexible and scalable multi-threaded daemon, a command line scanner and advanced tool for automatic database updates. The core of the package is an anti-virus engine available in a form of shared library.

CLIP

http://oss.tresys.com/projects/clip

The Certifiable Linux Integration Platform (CLIP) project provides a security hardened operating system platform to host secure applications. CLIP defines a specific configuration of Security Enhanced Linux (SELinux) designed to provide the foundation for hosting secure applications. This configuration consist of a separation of roles, mandatory access control (MAC), discretionary access control (DAC), and data separation. With this foundation in place, the hosted application needs only to concern itself with the specific security details of its task and not necessarily those associated with these overhead functions. By using CLIP, implementors can provide evidence of compliance with established operating system security requirements. These established operating system security requirements are the Director of Central Intelligence Directive 6/3 “Protecting Sensitive Compartmented Information within Information Systems” (DCID 6/3) Protection Level 4 (PL4), National Security Systems (NSS) Instruction 1253 “Security Controls Catalog for National Security Systems” High Impact requirements, Department of Defense (DoD) Instruction Number 8500.2 “Information Assurance (IA) Implementation” MAC I Classified requirements, Defense Information System Agency (DISA) Information Assurance Support Environment (IASE) Security Technical Implementation Guides (STIG) Unix V5R1. The requirements identify the following four areas: Confidentiality, Integrity, Availability and Accountability.

COBIA

http://cobia.stillsecure.com/

The Cobia Unified Network Platform is free software containing routing, firewall, DHCP, and core network and security services. These services are offered as plug-n-play modules: antivirus, url filter, anti-spyware and VPN.

Endian

http://www.endian.com

Endian Firewall Community is a "turn-key" linux security distribution that turns every system into a full featured security appliance. The software has been designed with "usability in mind" and is very easy to install, use and manage, without losing its flexibility. The features include a stateful packet inspection firewall, application-level proxies for various protocols (HTTP, FTP, POP3, SMTP) with antivirus support, virus and spamfiltering for email traffic

(POP and SMTP), content filtering of Web traffic and a "hassle free" VPN solution (based on OpenVPN). The main advantage of Endian Firewall is that it is a pure "Open Source" solution that is sponsored by Endian.

Nessus

http://www.nessus.org/download/

The Nessus vulnerability scanner, is the world-leader in active scanners, featuring high speed discovery, configuration auditing, asset profiling, sensitive data discovery and vulnerability analysis of your security posture. Nessus scanners can be distributed throughout an entire enterprise, inside DMZs, and across physically separate networks. While version 3 is distributed with a commercial license, version 2 is still available under the GPL.

OSSIM

http://www.ossim.net/

Ossim stands for Open Source Security Information Management. Its goal is to provide a comprehensive compilation of tools which, when working together, grant a network/security administrator with detailed view over each and every aspect of his networks/hosts/physical access devices/server/etc...

Besides getting the best out of well known open source tools, some of which are quickly described below these lines, ossim provides a strong correlation engine, detailed low, mid and high level visualization interfaces as well as reporting and incident managing tools, working on a set of defined assets such as hosts, networks, groups and services. All this information can be limited by network or sensor in order to provide just the needed information to specific users allowing for a fine grained multi-user security environment. Also, the ability to act as an IPS (Intrusion Prevention System) based on correlated information from virtually any source result in a useful addition to any security professional.

PreludeIDS

http://prelude-ids.org/

Prelude is an Hybrid IDS framework, that is, it is a product that enable all available security application, be it open source or proprietary, to report to a centralized system. In order to achieve this task, Prelude relies on the IDMEF (Intrusion Detection Message Exchange Format) IETF standard, that enables different kinds of sensors to generate events using an unified language. Prelude benefits from its ability to find traces of malicious activity from different sensors (Snort, honeyd, Nessus Vulnerability Scanner, Samhain, over 30 types of systems logs, and many others) in order to better verify an attack and in the end to perform automatic correlation between the various events.

SmoothWall

http://www.smoothwall.org/

SmoothWall Express is a network firewall produced by the SmoothWall Open Source Project Team. Designed with home and small business users in mind, Express is based upon a security-hardened subset of the GNU/Linux operating system and is completely Free to use, download and distribute.

SNORT

http://www.snort.org/

Snort is a free software / open source network intrusion detection and prevention system (IPS) capable of performing packet logging and real-time traffic analysis on IP networks. The large number of signatures available cover a wide range of attacks, fingerprint probes, web attacks and more.

Untangle

http://www.untangle.com

Untangle delivers an integrated family of applications that help you simplify and consolidate the network and security products you need, in one place at the network gateway. The most popular applications let businesses block spam, spyware, viruses, and phish, filter out inappropriate web content, control unwanted protocols like instant messaging, and provide remote access and support options to their employees. Every downloadable application is pre-configured and guaranteed to work together. It integrates:

- Spam Blocker
- Web Filter
- Protocol Control
- Virus Blocker
- Spyware Blocker
- Phish Blocker
- Intrusion Prevention
- Attack Blocker
- Firewall
- Remote Access Portal
- OpenVPN
- Untangle Reports
- Router

Data protection and recovery

Areca Backup

http://areca.sourceforge.net/

Areca is a personal file backup software developed in Java. Among the features:

- Archives compression (Zip & Zip64 format)
- Archives encryption (Triple DES & AES encryption algorithm)
- Storage on local hard drive, network drive, USB key, FTP / FTPs server (with implicit and explicit SSL / TLS)
- Source file filters (by extension, subdirectory, regular expression, size, date, status, usage)
- Incremental / Full backup support
- Archives merges / deletion : You can merge contiguous archives in one single archive or safely delete your latest archives.
- As of date recovery : Areca allows you to recover your archives (or single files) as of a specific date.
- Transaction mechanism : All critical processes (such as backups or merges) support a transaction mechanism (with commit / rollback management) which guarantees your backups' integrity.
- Backup reports : Areca generates backup reports that can be stored on your disk or sent by email.
- Post backup scripts : Areca can launch shell scripts after backup.
- Files permissions and symbolic links backup. (Linux only)
- Archives content explorer. (including a 'find file in archives' feature)
- Archive description : A manifest is associated to each archive, which contains various informations such as author, title, date, description, and some technical data.
- File history explorer : Areca keeps track of your file's history (creation / modifications / deletion) over your archives.
- Backup simulation : useful to check wether a backup is necessary
- User's actions history : Areca keeps an history of all user's actions (archives deletion, merges, backups, recoveries).
- Archive's indicators : Areca computes a lot of indicators for you, which will help you in the everyday management of your archives.

CleverSafe

http://www.cleversafe.org/

Cleversafe uses Cauchy Reed-Solomon Information Dispersal Algorithms (IDAs) to separate data into unrecognizable Data Slices and distribute them,

via secure Internet connections, to multiple storage locations on a Dispersed Storage Network (dsNet). Cleversafe Dispersed Storage contains 3 layers: a Source Computer, an Accesser, and Slicestors for storage. Source computers are used to submit, retrieve or delete end users' data by connecting to an Accesser using an iSCSI interface. Source computers perform standard file system operations (e.g. copy, modify and delete), and end users may create, modify and delete files using any file-based software. An Accesser is the iSCSI target and is mounted as a drive to the Source Computer. The Accesser software transparently stores and retrieves slices to the separate Slicestors even though the files appear as singular files within the file system on the Source Computer. Cleversafe Dispersed Storage employs Slicestors to store unique Slices (not copies of data). Due to the Cauchy Reed-Solomon Information Dispersal Algorithm (IDA) used in Cleversafe Dispersed Storage software, this design allows complete data retrieval if the threshold number of Slicestors are available. A Cleversafe Dispersed Storage Network (dsNet) can tolerate multiple failures of hardware, storage locations or administrators, while still keeping data secure and easy to reassemble. Only a majority of Slices is needed to perfectly recreate the original data.

iFolder

http://www.ifolder.com

iFolder is a simple and secure storage solution that can increase your productivity by enabling you to back up, access and manage your personal files-from anywhere, at any time. Once you have installed iFolder, you simply save your files locally-as you have always done-and iFolder automatically updates the files on a network server and delivers them to the other machines you use.

Restore

http://restore.holonyx.com/

RESTORE was developed by Holonyx and is a free, open source, enterprise network backup and recovery solution for Windows, Novell, Mac OS X (data fork), Unix and Linux systems. RESTORE is scalable to a complete backup solution for multiple workstations, servers, and data centers. It operates over local area networks, wide area networks, and the Internet. Among the features:

- Browser Based- Access your RESTORE system remotely from anywhere using the internet. This allows for users and administrators to run backups or check the status of automated backups at any time from any web accessible location
- Access Backups via WebDAV- RESTORE provides the ability to access prior backups via WebDav.
- Web Host Model Reseller environment- RESTORE DC was developed with the web hosting environment in mind also, shifting customer backups from a cost of doing business and turning it into an income generator.
- Permissionable at User Level- Give individuals and groups specified permissions on filestores.

- Security- Set up what you want your users and groups to access.
- Multiple Revisions- of filestores, which allow you to choose the specific filestore you wish to recover at a certain time.
- Error Reporting- Receive reports of errors on the system on various levels and at various intervals.
- Dynamic Scheduling- Allows for simple and complex scheduling that is fully customizable.
- Backup Many Operating Systems- Linux, OS X, Windows (95, 98, 2000, ME, XP NT) and Novell Netware.
- Rapid Recovery- Quickly and easily restore files that you need recovered in real time.
- Incremental- RESTORE will backup only the files that have been modified since the previous backup took place, optimizing disk space and bandwidth usage.
- SSH/SFTP- Backup Linux/Unix operating systems including OS X.
- MySQL Database- You can backup your MySQL Database.
- Servers and Workstations- Backup all server and workstations regardless of operating system.
- FTP Sites- Allows your company to backup websites and online storage.
- Notification- RESTORE will email the administrator and users of successful and failed backups.

Virtualization and remote access

2X terminal server

http://www.2x.com

2X ThinClientServer PXES edition makes the move to thin client computing easy by delivering a solution to convert existing PCs to thin clients and centrally manage thin client devices from any vendor (HP, Neoware, Wyse, Maxspeed and more). User's connection & device hardware settings (RDP / NX, screen size, Applications that users have access to, Terminal Servers and VMware virtual desktops) can be controlled centrally by device, user, group or department (Active Directory / LDAP) via the web based interface. 2X ThinClientServer PXES edition is the next generation of PXES 1.0, the popular free Linux thin client OS. The new version of PXES incorporates the Linux thin client OS, and also includes a server to allow for central configuration & management of the thin clients. Among the features:

- Converting existing PCs to thin clients
- Manage users' connection settings centrally by user, group or department
- Limit users to 2X published applications rather than giving access to a whole desktop
- Thin client vendor independent: Manage any thin client / PC centrally
- Supports virtually all thin clients and computer hardware
- Multiple full desktops per ThinClient
- Support for printer and sound redirection in 2X published applications
- Hotplugging engine support
- ThinClientOS diagnostic tools
- Automatic update notification

Eucalyptus

http://eucalyptus.cs.ucsb.edu/

EUCALYPTUS - Elastic Utility Computing Architecture for Linking Your Programs To Useful Systems - is an open-source software infrastructure for implementing "cloud computing" on clusters. The current interface to EUCALYPTUS is compatible with Amazon's EC2 interface, but the infrastructure is designed to support multiple client-side interfaces. EUCALYPTUS is implemented using commonly available Linux tools and basic Web-service technologies making it easy to install and maintain.

KVM

http://kvm.qumranet.com/

Kernel-based Virtual Machine (KVM) is a Linux kernel virtualization infrastructure. KVM currently supports native virtualization using Intel VT or AMD-V; limited support for paravirtualization is also available for Linux guests

and Windows in the form of a paravirtual network driver, a guest virtual memory manager, and CPU optimization for Linux guests.

OpenVZ

http://openvz.org/

OpenVZ is an operating system-level virtualization technology based on the Linux kernel and operating system. OpenVZ allows a physical server to run multiple isolated operating system instances, known as containers, Virtual Private Servers (VPSs), or Virtual Environments (VEs). It's similar to FreeBSD Jails and Solaris Zones; as compared to virtual machines such as VMware and paravirtualization technologies like Xen, OpenVZ is limited in that it requires both the host and guest OS to be Linux (although Linux distributions can be different in different containers). The use of a single kernel image allows for a significant reduction of virtualization overhead, that for most loads is limited to a few percent. All the virtual machines are also manageable from a single console, for example supporting concurrent execution of a command in all the virtualized instances.

OpenXVM

http://www.openxvm.org/

xVM Server is a data-center grade, bare-metal virtualization engine that provides hypervisor life-cycle management for servers. It is designed to be a cross-platform, high efficiency, open source hypervisor capable of hosting multiple guest operating systems (including Solaris, Windows, and Linux), with advanced CPU and memory handling capabilities. The server is being built using technology from the Xen open source project as well as Sun Logical Domains (LDOMS). xVM Server turns the computer into a dedicated virtualization Software Appliance with a top-of-the-line, easy-to-use interface you attach to over a standard https connection. The data model is exposed as public programming interfaces via WS-MAN allowing direct web-service access to the public APIs from any WS-MAN client.

X2Go

http://x2go.berlios.de/index-en.html

x2go is a "server based computing environment" combining the advantages of different existing solutions. x2go is "end user ready" and has improved usability. It can be sized from single PC-installations to enterprise networks with multiple servers and LDAP Trees. x2go is a fast, secure and simple way to connect to your desktop over local LAN or even over a low bandwidth internet connection. x2go is open source and available for different cpu architectures. x2go comes with kcontrol plugins which will help you administrating a x2go environment. We have added "live filter search widgets" and other innovative ideas to help you with your daily work. x2go supports LDAP and adds no scheme or other modification and it's possible to use existing installations. User sessions can be graphically stopped, shared or discarded. With x2go spyglass you can see what's going on on all connected clients in your x2go environment. The thumbnail previews can be filtered by users, groups, rooms, ip-zones and you can arrange them by their true physical position. If you want to allow somebody to use this application you only need to add him/her to the referring posix group.

Xen

http://www.xen.org/

The Xen hypervisor, the powerful open source industry standard for virtualization, offers a powerful, efficient, and secure feature set for virtualization of x86, x86_64, IA64, PowerPC, and other CPU architectures. It supports a wide range of guest operating systems including Windows, Linux, Solaris, and various versions of the BSD operating systems. It is the basis of several other virtualization systems, like Citrix or Oracle.

Desktop, device, network and server management

CMDBuild

http://www.cmdbuild.it/

CMDbuild is a web-based configuration and management database. The system manages hardware resources, software, services and documents in an integrated fashion, and is inspired by the ITIL best practices. It can be integrated with external help desk and automated inventory systems.

Enomalism

http://www.enomalism.com/

The Enomalism Virtualized Management Dashboard (VMD) is a powerful web-based virtual server manager. Designed to answer the complexity of managing globally disperse virtual server environments. Enomalism helps to ease the transition to a virtualized environment by reducing an IT organizations overall workload. The easy to use dashboard can help with issues including deployment planning, load balancing, automatic VM migration, configuration management, and capacity diagnosis. Similar to VMware's Vmotion, Enomalism supports live relocation and dynamic memory control for virtual machines using Intel Virtualization Technology (Intel VT) or AMD Virtualization (AMD-V) hardware-assisted virtualization, which enables dynamic resource scheduling and “no-downtime maintenance” of Microsoft Windows-based virtual infrastructures. The Enomalism simple firewall allows you to assign your virtual machines resources to user-defined groups and define firewall rules in terms of these groups and end usage. As VM resources are added to or removed from groups, the appropriate rules are enforced. Similarly, if a group's rules are changed these changes are automatically applied to all members of the affected group. Perfect for diverse & geographically disperse hosting environments.

Hyperic

http://www.hyperic.com/

Hyperic HQ is the industry's only comprehensive product that provides cross-stack visibility for software in production, whether it's open source, commercial, or a hybrid. As a result, companies can now centrally manage the fast-moving technologies of the Next Generation Data Center, and more efficiently and effectively avoid costly downtime. An extensible system, Hyperic HQ manages all kinds of operating systems, web servers, application servers and database servers. Using the Hyperic HQ Portal, the software can be quickly configured to monitor, alert, diagnose and control most types of applications. Key benefits include:

- Auto-Discovery of asset inventory with one click
- Monitors metrics of 65+ technologies across 9 OSes
- Tracks performance, configuration and security changes
- Maximizes availability with alerting and corrective control actions to

address problems before they occur

- Extends, Customizes to best manage your unique environment needs
- Accurately model and display relationships between your hardware, software, and services
- Detect every aspect of your hardware and software automatically, including memory, CPU, disk & network devices, and version & configuration information
- Generate events about any change in configuration or key attributes of any managed resource and use it to alert IT administrators
- Check the health of your hardware and software resources from a single, easy-to-navigate view
- Collect real-time and historical metrics from production hardware, network and application layers of your infrastructure without invasive instrumentation
- Define intelligent alerts which help you anticipate problems before they cause outages
- Compare and correlate metrics for different resources with customizable indicator views that help you understand interactions between them
- Chart key metrics for resources and groups in a single view to quickly assess the state of your environment
- Report real-time and historical details of any log event generated by any managed resource
- Track the configuration of any host or application to facilitate impact analysis and change control
- Enforce security policies by detecting and logging any physical or remote access into any host in your environment
- Define alerts to track to specific log messages anywhere in your environment
- Correlate any log event, configuration change, or security event to the availability of your environment

NetDirector

http://www.netdirector.org

NetDirector is a client-server application that allows you to simultaneously manage a large number of servers from a single web browser running on any platform. The NetDirector Server Manager web user Interface uses AJAX (asynchronous javascript and XML) to give the same rich client experience of a desktop application but with the flexibility to use the server manager from any desktop browser.

OpenQRM

http://www.openqrm.org

openQRM is a proven, open source systems management platform that integrates with existing components in complex data centers to create scalable and highly-available infrastructures. Among the features:

- Manages thousands of servers
- Tracks your data center’s usage and utilization while generating detailed reports
- Assigns servers to users and applications according to defined policies
- Dynamically adjusts the amount of allocated servers according to actual usage
- Provides high availability for enterprise services and applications
- Redeploy applications and prepare machines for maintenance with a single click
- Separate running applications from physical servers, thereby allowing flexible use of resources and ease of management
- Advanced image management allows shared resources between similar environments
- Supports booting servers from local disk, NAS or iSCSI
- Supports different partitioning technologies, such as VMWare and Xen
- Full support for servers running Linux 2.4 and 2.6
- Partial support for servers running Microsoft Windows
- Use simple tools to add servers and applications to the openQRM management coverage
- Integrate and leverage existing infrastructure software such as VMWare, Nagios and others
- Use ready made packages to support specific configurations like 3-tier web applications environment
- Secure Web Interface provides easy management and control
- Powerful Command Line Interface (CLI) allows custom scripts
- Complete "triggers" mechanism allows users to hook their own applications and scripts to events happening in the system
- Advanced Plug-in architecture allows the addition of new components to any part of the system — including user interface, monitoring agents, decision engines and more
- Plug-ins can be written in Java, PHP or any scripting language
- Open Source Code allows advanced users to modify the system according to their needs

Opsi

http://www.opsi.org/

opsi - in production use since 10 years - provides a tool for remotely installing

operating systems, deploying software and inventorying hard- and software. While it is based on a Linux server its primary targets are Windows work stations.

Spacewalk

http://www.redhat.com/spacewalk/

Spacewalk is an open source (GPLv2) Linux systems management solution. It is the upstream community project from which the Red Hat Network Satellite product is derived. Spacewalk manages software content updates for Red Hat Enterprise Linux and other Linux distributions such as Fedora, CentOS, and Scientific Linux, within your firewall. You can stage software content through different environments, managing the deployment of updates to systems and allowing you to view at which update level any given system is at across your deployment. A clean central web interface allows viewing of systems and their software update status, and initiating update actions. In addition to software content management, Spacewalk provides provisioning and monitoring capabilities. It will enable you to kickstart systems, as well as manage and deploy configuration files. Spacewalk's monitoring feature allows you to view monitoring status for your systems alongside their software update status. Spacewalk also has virtualization capabilities to enable you to provision, control, manage, and monitor virtual Xen guests.

Screenshot Screenshot

WireShark

http://www.wireshark.org

Wireshark is the world's foremost network protocol analyzer, and is the de facto (and often de jure) standard across many industries and educational institutions. It features:

- Hundreds of protocols are supported, with more being added all the time
- Live capture and offline analysis
- Standard three-pane packet browser
- Multi-platform: Runs on Windows, Linux, OS X, Solaris, FreeBSD, NetBSD, and many others
- Captured network data can be browsed via a GUI, or via the TTY-mode TShark utility
- The most powerful display filters in the industry
- Rich VoIP analysis
- Read/write many different capture file formats: tcpdump (libpcap), Catapult DCT2000, Cisco Secure IDS iplog, Microsoft Network Monitor, Network General Sniffer (compressed and uncompressed), Sniffer Pro, and NetXray, Network Instruments Observer, Novell LANalyzer, RADCOM WAN/LAN Analyzer, Shomiti/Finisar Surveyor, Tektronix K12xx, Visual Networks Visual UpTime, WildPackets EtherPeek/TokenPeek/AiroPeek, and many others

- Capture files compressed with gzip can be decompressed on the fly
- Live data can be read from Ethernet, IEEE 802.11, PPP/HDLC, ATM, Bluetooth, USB, Token Ring, Frame Relay, FDDI, and others (depending on your platfrom)
- Decryption support for many protocols, including IPsec, ISAKMP, Kerberos, SNMPv3, SSL/TLS, WEP, and WPA/WPA2
- Coloring rules can be applied to the packet list for quick, intuitive analysis
- Output can be exported to XML, PostScript, CSV, or plain text

Zenoss

http://www.zenoss.com/

Zenoss provides a complete suite of software and services help you succeed in monitoring your IT infrastructure. Our software provides a single, integrated solution for monitoring your entire IT infrastructure - network, servers, applications, across the full lifecycle - inventory, configuration, availability, performance, events. Through our unique approach our goal is to overcome the common hurdles to achieving effective IT monitoring and management. At the heart of Zenoss Core is Zenoss Configuration Management Database (CMDB). The CDMB houses a unified model of the IT environment and is basis of Zenoss' "model-driven" IT monitoring and approach. Among the features:

- Modeling of entire environment including networks, servers, software, and applications
- Mapping of IT elements and cross-platform information into a normalized data schema
- Logical and physical grouping and mapping to business systems, locations and responsible parties
- Population through auto-discovery, web services API, XML import/export, and manual user input
- Configuration policies that specify required configuration items
- Autodiscovery
- automatic change history and detection
- scheduling
- Grouping, Organization, Association, Classification
- reporting

ZipTie

http://www.ziptie.org/

ZipTie is an open source framework for Network Inventory and Configuration Management. It will help you discover and manage your network devices such as routers, switches, and firewalls. ZipTie is free to download, use, and distribute under the Mozilla Public License (MPL v1.1). It supports out of the box the following hardware:

- Cisco IOS based routers/switches
- Juniper devices
- Linksys VPN routers
- Vyatta routers
- Nortel BayStack switches

Identity, access management

Authentic

http://www.entrouvert.com/en/authentic/

Authentic is a Liberty Alliance identity provider aiming to address a broad range of needs, from simple to complex setups. It provides Single Sign-on (SSO), Single Logout (SLO) and attribute exchange. It is highly and easily customisable. Its Liberty conformance relies on Lasso, a free (GNU GPL) implementation of the Liberty Alliance certified by the consortium in may 2005. Authentic implements every feature required by the Identity Provider Conformance Matrix. Among the features: Liberty Alliance conformance: support of ID-FF 1.2, ID-WSF and partially SAML 2.0; authentic can behave as a proxy, redirecting service providers requests towards other identity providers, can use the ID-WSF Personal Profile Authentic to allow identity attribute sharing, automatically creates its own metadata file and and integrates easily Service Providers ones.

DogTag

http://pki.fedoraproject.org/wiki/PKI_Main_Page

The Dogtag Certificate System is an enterprise-class open source certificate authority (CA). It is a full-featured system, and has been hardened by real-world deployments. It supports all aspects of certificate lifecycle management, including key archival, OCSP, smartcard management, and much more. Dogtag is a collection of technologies that allow enterprises to deploy PKI on a large scale. It has features such as: certificate issuance, revocation, and retrieval, CRL generation and publishing, certificate profiles, simple Certificate Enrollment Protocol (SCEP), Local Registration Authority (LRA) for organizational authentication and policies, eEncryption key archival and recovery, smartcard lifecycle management.

FederID

http://federid.objectweb.org/xwiki/bin/view/Main/

The FederID project aim to offer a real solution of Identity Management and Identity Federation. It is based on several OSS components:

- InterLDAP: Based on J2EE and OpenLDAP, InterLDAP makes it possible to manage the complete cycle of an identity through its attributes, its accesses and its prerogatives. It is the essential tool to provide an advanced interface of consultation and administration of an LDAP directory
- LASSO: Lasso is a free software C library aiming to implement the Liberty Alliance standards; it defines processes for federated identities, single sign-on and related protocols. Lasso is built on top of libxml2, XMLSec and OpenSSL and is licensed under the GNU General Public License (with an OpenSSL exception)
- Authentic: Authentic is a Liberty Alliance Identity Provider. It provides Single Sign-On (SSO), Single Logout (SLO) and attributes sharing
- LemonLDAP: The LemonLDAP project is a reverse proxy SSO developed

with the French Ministry of Finances under GNU GPL license. LemonLDAP is a network service which is a single entrance point of all HTTP requests aimed to the various protected Web applications. With the help of an LDAP directory, it offers a single mechanism of authentication and access control to these applications.

FreeIPA

http://www.freeipa.com/page/Main_Page

FreeIPA is an integrated security information management solution combining Linux (Fedora), Fedora Directory Server, MIT Kerberos, NTP, DNS. It consists of a web interface and command-line administration tools. Currently it supports identity management with plans to support policy and auditing management.

HardTokenManagement

http://hardtokenmgmt.org/

HardToken is an Hard Token Management Framework in Java used to manage the complete lifecycle of an organizations smartcard and/or USB dongles. It communicates with the tokens through a PKCS11 interface so it is possible to change hardware as long as they supply it with a good implementation of PKCS11. It comes along quite with a few ready made modules that can be composed to fit the need of the organization. The Hard Token Management Framework is an Add-on to EJBCA Certificate Authority; the current application suite of modules using the hard token management framework 'ToLiMa' have the following features.

- Issue tokens, regular, temporary and project
- Unlock PIN of a token without exposing the PUK code for the users or administrators
- Revoke lost cards
- Renew expiring cards
- Activate cards in the organizations systems
- It is also possible to issue and unlock tokens on an approval basis, used in scenarios were no token administrator is available (for instance in 24/7 operational environments). Then it is possible for a colleague of the end user to generate a request of the action which is sent to a central support unit for review and approval.

Mandriva directory server

http://mds.mandriva.org/

Mandriva Directory Server is an enterprise directory platform based on LDAP designed to manage identities, access control informations, policies, application settings and user profiles. The Mandriva Directory Server (MDS) is a Free Software project that features:

- user authentication and management thanks to LDAP and Kerberos
- an extensible, nice looking and AJAX powered PHP web interface called MMC (Mandriva Management Console), provided with 6 modules:

- Users and groups management
- SAMBA accounts and shares management
- Printing management
- Email delivery management
- Web proxy blacklist management
- Open-Xchange users management
- a Python dedicated management API for LDAP, SAMBA, Open-Xchange and SQUID (core of the MDS and the MMC)
- a policy system, that will allow to define users right on network resources

Thanks to the MMC, the MDS can fully replace a Windows NT4 server.

OpenPEC2

http://www.openpec.org/

An implementation of Italian's Certified Email, a server-based infrastructure that provides encryption, guarantee of reception and non-repudiability of email.

OpenSSO

https://opensso.dev.java.net/

The Open Web SSO project (OpenSSO) provides core identity services to simplify the implementation of transparent single sign-on (SSO) as a security component in a network infrastructure. OpenSSO provides the foundation for integrating diverse web applications that might typically operate against a disparate set of identity repositories and are hosted on a variety of platforms such as web and application servers. This project is based on the code base of Sun Java System Access Manager, a core identity infrastructure product offered by Sun Microsystems. OpenSSO provides complete access management, federation and secure web services functionality in a single Java distribution. The solution helps organizations manage secure access to Web applications - both within the enterprise and across business-to-business (B2B) value chains. By utilizing a central point of authentication, role-based access control, and single sign on (SSO), OpenSSO provides an effective and scalable security model across all Web-based applications, simplifying the exchange of information and transactions while protecting the privacy and security of vital identity information. OpenSSO supports the latest federation standards, including Liberty Alliance, Security Assertion Markup Language and WS-Federation. Its support of these standards helps create a federated framework and authentication-sharing mechanism that is both easy to use and interoperable with existing enterprise systems.

OpenTrust-PAM

http://www.opentrust.com/content/view/237/205/lang,en/

Web reverse proxy for Single Sign On (SSO). It can apply a security policy (profiles stored in a LDAP directory) to an existing set of applications, consolidate websites, encrypt all communications, and rewrite simple URLs.

Among the features:

- Business application access management
- Authentication unity
- Level 7 application firewall
- URL dynamic rewrite (HTTPS)
- Automatic adjustment to strong authentication according to the security policy
- Integration of the intranet in a customized portal with access rights
- Multiple websites consolidated in a central URL tree structure and/or using several virtual hosts as proxy front-ends
- Integrated cache to speed up flows
- HTTP 1.0 and HTTP 1.1 including fragmented transfer coding
- SSLv2, SSLv3, TLSv1
- Support for URL, HTTP header and script dynamic rewrite
- Security policy linked to LDAP directory
- Oracle Forms protocol support

PacketFence

http://www.packetfence.org/

PacketFence is an open-source network access control (NAC) system. Deployed in academic networks around the world, PacketFence is reliable, extremely configurable, and built upon unmodified open-source code (Fedora, LAMP, Perl, and Snort). PacketFence is designed to operate in heterogeneous environments and uses vendor-agnostic isolation techniques including DHCP scope changes and ARP cache manipulation ("passive" mode). Among the features:

- Authenticate users using any authentication Apache supports (even more than one!)
- Registration-based and scheduled vulnerability scans.
- Captive portal-based user registration and remediation.
- Passive operating system fingerprinting using DHCP
- Ban unsupported operating systems (eg. Windows 95/98/ME) or NAT-based routers.
- Automatically register game consoles or VoIP phones.
- Log location-based information using DHCP option-82.
- Protect multiple networks and 802.1q trunks.

SSLExplorer

http://3sp.com/showSslExplorerCommunity.do

SSL-Explorer is the world's first open-source, browser-based SSL VPN solution. This unique remote access control solution provides you with a means of securely accessing intranet applications and resources using a standard web browser. No client-side software needs to be installed on your user's systems and maintenance is centralised and simple. SSL-Explorer relies on the ubiquitous Java web technology and hence requires just a standard web browser to take advantage of full remote access. Network traffic can be tunnelled through the SSL connection with ease and your email and intranet web/file resources are securely accessible from outside the corporate network with just a single firewall configuration required post-installation. Among the features:

- Versions available for Microsoft Windows XP/2000/2003/Vista, Apple Mac OS X Tiger (or later) and Linux operating systems
- Standards compliant HTML supported on all modern browsers include Internet Explorer 5, IE6, IE7, Mozilla Firefox, Opera and Safari browsers among many more
- Granular policy-based rights management
- Remotely browse Windows filesystems via Windows Explorer
- Microsoft Outlook Web Access 2003 supported - move vulnerable OWA servers out of the DMZ
- Reverse proxy web forwarding supported with HTTP rewrite technology
- Active Directory authentication supported
- Built-in database authentication supported
- UNIX authentication supported
- Configurable authentication schemes
- Access your desktop remotely
- Intranet resources may be securely externalized using web forwarding
- Accessible using zero-footprint VPN client
- Connect using any modern web browser
- Supports access through HTTP or SOCKS proxy
- Local and remote tunneling via SSL
- Session inactivity timeouts
- Web application URL masking
- No dedicated appliance necessary

Univention Corporate Server

http://www.univention.de

Univention Corporate Server (UCS) is an easy-to-use

Linux distribution based on Debian GNU/Linux and has a central common server/client and site/platform management system. UCS can be used to

replace or complement existing server infrastructures, but also to provide a complete Linux desktop that can be managed centrally.

- central control and policy-based
- administration of users and groups in Linux & heterogenous environments
- printers, share,s IPmanagement mail, groupware, fax solutions
- a LDAP based software management, a Thin Client Infrastructure

VELO

http://docs.safehaus.org/display/VELO/Home

VELO is an Open Source Identity and Access Provisioning server. Among the features:

- SPML V2 compliance.
- Role Based Access Control (RBAC)
- Consolidated Employee Identity Attributes repository
- Accounts Attribute Synchronization
- User and Access Reconciliations
- Integrated work-flow engine for complex business processes
- Self Service interfaces
- Support many resources
- Support Complete Account Operations
- Specific typed actions can be added easily
- Centralized Password Policy and Password Synchronization.
- Auditing & Compliance.
- Powerful scripting support for complex processes via Scripting expressions
- Supports more than 20 different scripting languages! new
- Remote services access via Web-Services.
- Extensible via Events.
- Advanced Report Designer & Web-based Reporting Manager.
- Pluggable Authentication Handlers.
- Jboss and Glassfish Support

ViaFirma

http://www.viafirma.com

Architecture). Any application can include authentication and digital signature features using the services offered by this system, obliterating the problems and technical complexities related to the use of digital certificates for your applications, difficulties like cryptography of public key, validation using CRL's or OCSP, the certificates reading, the use of an electronic ID card (DNIe), etc. VIAFIRMA Allows the authentication with digital certificates: electronic ID card (DNIe), FNMT, Camerfirma, ANCERT, Avansi DR... In any support: software, Smartcard, token... and allows the digital recognized signature of documents.

WIKID

http://www.wikidsystems.net/

WiKID is a two-factor authentication system. It consists of: a PIN, stored in the user's head; a small, lightweight client that encapsulates the private/public keys; and a server that stores the public keys of the client's and the user's PIN. When the user wants to login to a service, they start the client and enter their PIN, which is encrypted and sent to the server. If the PIN is correct, the account active and the encryption valid, the user is sent a one-time passcode to use instead of a static password. You can think of WiKID as 'certificates on steroids'. It is more secure than certificates because the required PIN is only stored on the server, so it is not susceptible to offline passive attacks. It is easier because user enrollment is automated and you don't have to deal with a full certiticate infrastructure. You can also compare WiKID to hardware tokens: it is much easier to implement, more extensible, yet just as secure. Stealing either the token or the PIN does you no good. You must steal both, just like a hardware token.

Database and DB management

DBDesigner4

http://fabforce.net/dbdesigner4/

DBDesigner 4 is a visual database design system that integrates database design, modeling, creation and maintenance into a single, seamless environment. It combines professional features and a clear and simple user interface to offer the most efficient way to handle your databases. DBDesigner 4 compares to products like Oracle's Designer, IBM's Rational Rose, Computer Associates's ERwin and theKompany's DataArchitect but is an Open Source Project available for Microsoft Windows 2k/XP and Linux KDE/Gnome. It is release on the GPL. Starting from a reverse engineering engine to automatically retrieve a model from existing databases, extensive modeling tools and editors to a syncronisation function which will apply model changes automatically to the underlying database - it is all part of DBDesigner 4. DBDesigner 4 supports two switchable userinterfaces. The Design Mode is used to create and maintain the visual databases model. The Query Mode is used to work with table data and build complex SQL query statements for the use in PHP, Kylix or another programming language.

FirebirdSQL

http://www.firebirdsql.org

Firebird is a relational database offering many ANSI SQL standard features that runs on Linux, Windows, and a variety of Unix platforms. Firebird offers excellent concurrency, high performance, and powerful language support for stored procedures and triggers. It has been used in production systems, under a variety of names, since 1981. The Firebird Project is a commercially independent project of C and C++ programmers, technical advisors and supporters developing and enhancing a multi-platform relational database management system based on the source code released by Inprise Corp (now known as Borland Software Corp) on 25 July, 2000.

Ingres

http://www.ingres.com/products/ingres-database.php

Ingres Database is the open source database management system that can reduce IT costs and time to value while providing the strength and features expected from an enterprise class database. Ingres Database is a leader in supporting mission-critical applications and helping manage the most demanding enterprise applications of Fortune 500 companies. Focused on reliability, security, scalability, and ease of use, Ingres contains features demanded by the enterprise while providing the flexibility of open source. Core Ingres technology forms the foundation, not only of Ingres Database, but numerous other industry-leading RDBMS systems as well. Among the features: Sarbanes Oxley / HIPPA Compliancy - Ingres supports roles, role separation, and Kerberos authentication to meet the demands for increased data protection. Ingres also provides the robust auditing features many current regulations require to protect your sensitive data. Scalability: Large tables can be divided into partitions, based on range, a list of values or a hash value to improve performance. The table appears as a single entity to users,

but access is improved by eliminating partitions for data retrieval. Ingres supports multiple levels of sub-partitions to give you the ability to design tables to match your usage requirements. Ingres Database also helps manage growing amounts of data in a cost-effective manner using a variety of compression algorithms. High Availability: Information in Ingres can be centrally located or distributed across geographically dispersed servers using sophisticated multi-master replication to provide high availability failover sites or workload distribution. Ingres can also run on clusters of servers, providing transparent high availability and as well as scalability benefits. Flexible Backup and Recovery: Data integrity is provided by transaction journaling and the ability to back up data online or offline. Recovery can be complete to a specific point in time for the entire database, or for a more confined set of data.

MySQL

http://www.mysql.com/

The MySQL database has become the world's most popular open source database because of its consistent fast performance, high reliability and ease of use. It's used on every continent -- Yes, even Antarctica! -- by individual Web developers as well as many of the world's largest and fastest-growing organizations to save time and money powering their high-volume Web sites, business-critical systems and packaged software -- including industry leaders such as Yahoo!, Alcatel-Lucent, Google, Nokia, YouTube, and Zappos.com. Not only is MySQL the world's most popular open source database, it's also become the database of choice for a new generation of applications built on the LAMP stack (Linux, Apache, MySQL, PHP / Perl / Python.) MySQL runs on more than 20 platforms including Linux, Windows, OS/X, HP-UX, AIX, Netware, giving you the kind of flexibility that puts you in control. Among the features:

MySQL Enterprise Server 5.0 delivers new enterprise features, including:

- ACID Transactions to build reliable and secure business critical applications
- Stored Procedures to improve developer productivity
- Triggers to enforce complex business rules at the database level
- Views to ensure sensitive information is not compromised
- Information Schema to provide easy access to metadata
- Distributed Transactions (XA) to support complex transactions across multiple databases
- Pluggable Storage Engine Architecture for maximum flexibility
- Archive Storage Engine for historical and audit data
- Federated Storage Engine to create a single logical database from many physical servers
- Emergency Hot Fix Builds

PostgreSQL

http://www.postgresql.org/

PostgreSQL is a powerful, open source relational database system. It has more than 15 years of active development and a proven architecture that has earned it a strong reputation for reliability, data integrity, and correctness. It runs on all major operating systems, including Linux, UNIX (AIX, BSD, HP-UX, SGI IRIX, Mac OS X, Solaris, Tru64), and Windows. It is fully ACID compliant, has full support for foreign keys, joins, views, triggers, and stored procedures (in multiple languages). It includes most SQL92 and SQL99 data types, including INTEGER, NUMERIC, BOOLEAN, CHAR, VARCHAR, DATE, INTERVAL, and TIMESTAMP. It also supports storage of binary large objects, including pictures, sounds, or video. It has native programming interfaces for C/C++, Java, .Net, Perl, Python, Ruby, Tcl, ODBC, among others, and exceptional documentation. An enterprise class database, PostgreSQL boasts sophisticated features such as Multi-Version Concurrency Control (MVCC), point in time recovery, tablespaces, asynchronous replication, nested transactions (savepoints), online/hot backups, a sophisticated query planner/optimizer, and write ahead logging for fault tolerance. It supports international character sets, multibyte character encodings, Unicode, and it is locale-aware for sorting, case-sensitivity, and formatting. It is highly scalable both in the sheer quantity of data it can manage and in the number of concurrent users it can accommodate. There are active PostgreSQL systems in production environments that manage in excess of 4 terabytes of data. PostgreSQL prides itself in standards compliance. Its SQL implementation strongly conforms to the ANSI-SQL 92/99 standards. It has full support for subqueries (including subselects in the FROM clause), read-committed and serializable transaction isolation levels. And while PostgreSQL has a fully relational system catalog which itself supports multiple schemas per database, its catalog is also accessible through the Information Schema as defined in the SQL standard. Data integrity features include (compound) primary keys, foreign keys with restricting and cascading updates/deletes, check constraints, unique constraints, and not null constraints. It also has a host of extensions and advanced features. Among the conveniences are auto-increment columns through sequences, and LIMIT/OFFSET allowing the return of partial result sets. PostgreSQL supports compound, unique, partial, and functional indexes which can use any of its B-tree, R-tree, hash, or GiST storage methods.

SAPDb/MaxDB

https://www.sdn.sap.com/irj/sdn/maxdb

MaxDB™ is the database management system developed and supported by SAP AG. It has its focus on the requirements of SAP customers and SAP applications and can be used as a less expensive alternative to databases from other vendors for your own or third-party applications as well. It is a competitive database management system for medium to large server configurations and also a convincing offering for a desktop or laptop database management system, as MaxDB is very easy to install and operate. The key benefits of MaxDB are its many built-in self-administering features. MaxDB is available for the most prominent operating system/hardware platforms Microsoft Windows, Linux, and UNIX. Today we count more than 10000 SAP customers running MaxDB and liveCache installations, proving MaxDB's reliability, scalability and availability for configurations of all sizes. MaxDB is

also widely used within SAP, for example for the Service Marketplace, the documentation development in Knowledge Warehouse, and also SDN recently was migrated to MaxDB. SDN currently is one of the largest SAP NetWeaver Portal implementation with over 600,000 named users, and it runs on MaxDB and Linux-x64.

SymmetricDS

http://symmetricds.org/

SymmetricDS is web-enabled, database independent, data synchronization/replication software. It uses web and database technologies to replicate tables between relational databases in near real time. The software was designed to scale for a large number of databases, work across low-bandwidth connections, and withstand periods of network outage. By using database triggers, SymmetricDS guarantees that data changes are captured and atomicity is preserved. Support for database vendors is provided through a Database Dialect layer, with implementations for MySQL, Oracle, SQL Server, PostgreSQL, HSQLDB, and Apache Derby included. Synchronization can be configured to push data (trickle-back) or pull data (trickle-poll) at an interval. SymmetricDS allows for 2-tier and even n-tier synchronization.

Software Development

Aptana

http://www.aptana.com/products/studio/community

Aptana Studio's community edition is the free, open source Web development environment optimized for use with Ajax libraries and scripting languages like JavaScript, Ruby and PHP. Aptana Studio is considered by many devleopers the best-in-class authoring environment for today's more rich and interactive Web pages and Ajax applications. The free version includes the core pieces of Aptana Studio's editing, debugging, synchronization, and project management capabilities, including pieces for scripting, customizing and extending Aptana Studio. Perhaps that's why there's already been more than 2.3 million downloads. Support for Adobe AIR, Apple iPhone, PHP, and Ruby on Rails development comes via additional development plugins which are also free.

Eclipse

http://www.eclipse.org/

Eclipse is an open source community, whose projects are focused on building an open development platform comprised of extensible frameworks, tools and runtimes for building, deploying and managing software across the lifecycle. It is written primarily in Java to provide software developers and administrators an integrated development environment (IDE). The initial codebase originated from VisualAge, open sourced by IBM and later managed by the Eclipse foundation. It is an extensible and powerful IDE, that through plug-ins can substantially increase its functionalities and domain. It can be used with Java, C/C++, Fortran and many other languages, and it provides the foundation for more specialized IDEs.

Gambas

http://gambas.sourceforge.net/

Gambas is a full-featured object language and development environment built on a BASIC interpreter. It is released under the GNU General Public Licence; its architecture is largely inspired by Java, with a language modelled on basic (like Visual Basic). While Gambas is not intended to be a clone of Microsoft Visual Basic, there are many similarities between the two languages, and many one-to-one relationships between features.

kdevelop

http://www.kdevelop.org/

The KDevelop-Project was founded in 1998 to build up an easy to use IDE (Integrated Development Environment) for the KDE environment. The current version supports many programming languages such as Ada, Bash, C, C++, Fortran, Java, Pascal, Perl, PHP, Python and Ruby, and the integration of the QTDesigner graphical editing application for development using the cross-platform Qt system.

NetBeans

http://www.netbeans.org/

A free, open-source Integrated Development Environment for software developers. You get all the tools you need to create professional desktop, enterprise, web, and mobile applications with the Java language, C/C++, and Ruby. NetBeans IDE is easy to install and use straight out of the box and runs on many platforms including Windows, Linux, Mac OS X and Solaris. The NetBeans editor indents lines, matches words and brackets, and highlights source code syntactically and semantically. The editor supports several languages including Java, Ruby, C/C++, XML, HTML, RHTML, Javadoc, JavaScript, and JSP. It can be extended to support any other language. The IDE's refactoring actions allow you to restructure code without breaking it; the editor provides automatic code completion in several languages, including Java, Ruby, XML, C/C++, HTML, RHTML, JSP, JavaScript.

once:radix

http://sourceforge.net/projects/onceradix

once:radix is a Rapid Application Development environment for building Intranet and eXtranet systems. i.e. It is a package for building Rich Business Applications. Among the features: an effective and flexible user interface, multi-company: Supports separate business entities operating completely independently, creating the opportunity to host several organisations on the one server; or combined, allowing a group of entities to operate under a common structure. Extensible: i.e. a system built using once:radix may include additional fields and business rules without complex programming. The business rules may be processed server side (as data is retrieved from the database) using Javascript or client side (e.g. as buttons are clicked or data in fields changes) using once:script. The once:editor allows fast and easy creation and editing of new and existing layouts. oED operates within the web browser producing very compact code that conforms to industry standards for XHTML 1.0 (strict) and CSS 2.1.

QtCreator

http://www.qtsoftware.com/products/developer-tools

As the name implies, Qt Creator is a complete integrated development environment (IDE) for creating applications with the Qt application framework. Qt is designed for developing applications and user interfaces once and deploying them across several desktop and mobile operating systems. It includes:

- An advanced C++ code editor
- Integrated GUI layout and forms designer
- Project and build management tools
- Integrated, context-sensitive help system
- Visual debugger
- Rapid code navigation tools
- Supports multiple platforms

Spago4Q

http://www.spago4q.org

Spago4Q (SpagoBI for Quality) is a platform for maturity assessment, effectiveness of development software process and quality inspection of the released software: this goal is achieved by evaluating data and measures collected from the project management and development tools with non-invasive techniques. Spago4Q architecture, obtained as a verticalization of SpagoBI (the Business Intelligence Free Platform SpagoBI) is designed in order to be easily adapted to complex organizational contexts. It integrates an advanced meta-model which makes Spago4Q fully independent from the adopted software development processes, infrastructure tools, measurement and assessment frameworks. Spago4Q supports companies and organizations both in the certification process and, more in general, in monitoring a formalized development process.

TopCased

http://www.topcased.org

TOPCASED is an integrated System/Software engineering toolkit compliant with the requirements of critical and embedded applications. It covers the stages from requirements analysis to implementation, as well as some transversal activities like anomaly management, version control, and requirements traceability. TOPCASED is strongly model-oriented : not only TOPCASED provides model editors, model checkers and model transformations, but is also itself based on modelling and code generation. TOPCASED is a meta-tool : you can develop your own graphical editors and model transformation using TOPCASED. TOPCASED (Toolkit in OPen source for Critical Applications and SystEm Development) is a system/software engineering workshop based on Eclipse. It aims to provide the tools required to go from requirements to the implementation stages. The current version includes several graphical editors (ECORE, UML 2, SAM - Structured Analysis Model, AADL - Architecture Analysis and Design Language), an OCL checker, several code generators (SMUC, UML2C, UML2Java, UML2Python), a document generator, gPM, xHDL tools, Tramway, and more. External tools can be easily connected to the workshop. It is the outcome of a large European research projects, with partners like AirBus, Atos Origin, EADS, INRIA, Siemens VDO, Rockwell Collins and Thales.

WaveMaker

http://www.wavemaker.com/

WaveMaker Visual Ajax Studio is an easy-to-use visual builder that enables the drag & drop assembly of scalable, web-applications using Ajax widgets, web services and databases. The WaveMaker development platform includes a built in Java and web server. WaveMaker applications are based on open source Java and Javascript components, including Dojo, Tomcat, Spring and Hibernate. WaveMaker applications can also deploy to any standard Java server, including JBoss, WebLogic and WebSphere.

ERP (Enterprise Resource Planning)

CK-ERP

http://ck-erp.org

CK-ERP is an open source accounting / MRP / ERP / CRM system that runs on top of multiple middlewares. It provides accounting and back office functionalities to SMEs and utilizes the underlying middleware to administer accounts/groups. It comprises 22 modules - Administration, Multilingual Facility, Contact Management, Customer Relationship, Customer Self Service, Vendor Relationship, Material Requirement Planning, Warehouse, Inventory, Service, Accounting Ledger, Bank Reconciliation, Accounts Payable, Accounts Receivable, Purchase Order, Sales Order, Quotation, POS for Cashier, POS for Manager, Human Resources, Staff Self Service and Payroll. Operating platform can either be LAMP or LAPP. Backend database engine can be anyone of MySQL, PostgreSQL and SQLite.

Compiere/Adempiere

http://www.compiere.com/company/index.php

http://adempiere.red1.org/

One of the most important open source ERP projects, Compiere (and the recently created fork Adempiere) are complete and sophisticated mid-tier ERP systems. Among the features:

- Standard and Customizable Financial Reports - Generate standard financial and managerial reports including Balance Sheet, Profit and Loss, Statement of Cash Flows and many others. Additional reporting options include customizing reports with Compiere's internal report writer, data access using your choice of 3rd party report writers, or data exports for analysis in spreadsheet or OLAP tools.
- Comprehensive Financial Management - Compiere offers comprehensive financial management capabilities. All functional elements of Compiere are global-ready, supporting the complexities of businesses that span multiple organizations, currencies, accounting schema, tax laws and languages. Compiere enables you to customize the system to meet your needs without risking violation of accepted accounting and tax rules.
- Customer-specified Chart of Accounts - At the heart of every financial accounting system is a chart of accounts. Compiere ships with several charts of accounts for you to use. It also provides a streamlined process for you to continue using your own chart of accounts.
- Accounting Rule Enforcement - Compiere strictly enforces base accounting rules to ensure balanced accounting entries and overall system integrity. An example of a base rule is that the system will reject an entry if the accounting date is in a closed period.
- Tax Calculation and External Reporting - Most tax entries are created by the transaction. Compiere calculates, manages and applies multiple taxes (e.g. GST/PST) as well as local tax. Tax rules create correcting tax entries for Sales Tax and VAT systems. Compiere automates the

preparation of reporting to external tax agencies.

- Banking Relationship Management - Compiere automates the management of your banking relationships and accounts. Compiere supports the import and export of bank statements using OFX, IFX and SWIFT formats.
- Quotations - Compiere provides for the creation and printing of customer quotations based on general or customer specific price lists. Quotations can be made "binding," in which case they reserve inventory. Quotations may also be modified at any time and can be automatically converted to a Sales Order without additional data entry.
- Sales Orders - A Sales Order is the "fulfillment control document" that is the foundation for generating Sales Order, shipment and invoicing documentation. In addition, Vendor Purchase Orders may be created automatically for the items specified on a sales order and directly shipped to the customer if appropriate. Different types of sales orders cause different business process behavior in Compiere. For example, a "Prepaid Order" will not allow shipments until payment occurs. A "Point of Sale" order assumes the customer is at the counter with the goods in hand and generates all transactions including stock decrement, invoicing, and payment through the entry of a single document. A "Standard Order" by comparison, will check availability before accepting the order then queue the order for fulfillment by the warehouse and then generate an invoice in the next invoice run or otherwise in accordance with the invoice rules for that customer. Compiere supports the following Sales Order Situations: Standard order, POS order, credit order, warehouse order, prepay order, RMA.
- Shipments - Based upon the details captured on the Sales Order, one or more shipments can be generated immediately or automatically when inventory subsequently becomes available. Compiere automatically back orders unavailable items. Compiere can be configured to allow shipments to be effected from the shipment documentation or alternatively provide for a more disciplined warehouse approach by requiring explicit confirmation of picking and/or shipment prior to the generation of invoice documentation. Confirmations can be used to manage movements of inventory from, say, a receiving area to 'put away' areas from which it then becomes available for further processing.

Other specific functionalities:

- product catalog
- price lists
- bill of materials
- distribution and multi-warehouse control
- material receipts, replenishment
- costing of products and services
- material receipts, vendor invoices

- CRM, sales management, customer tracking, customer profitability analysis
- integrated e-commerce
- point of sale
- integrated reporting

Several extensions and plugins exist, for example the Libero manufacturing customization (adds MRP, CRP, shop floor control, capacity control) or localised master structures for individual countries balance codes.

ERP5

http://www.erp5.org

A sophisticated and complete ERP system, ERP5 covers accounting, customer relationship management, trade, warehouse management, shipping, invoicing, human resource management, product design, production and project management. All resources in ERP5 can be variated in any number of dimensions, providing built-in configuration for products and reduced design cost for bill of materials (BOM) and bill of operations (BOO) as well as structured rule-based approaches to complex pricing. It has been implemented in vertical industries like banks, aerospace, health care, apparel, and government agencies. A specific mobile interface has been recently added, with the initial certification of the Nokia E61 smartphone.

Some features [source: Herzog, "a comparison of open source ERP systems]:

- Trade provides purchase, sale, order and warehouse management
- functionality.
- PDM (Product Data Management) allows product definition, variations,
- categorization, bill of materials (BOM) and a multimedia catalog. There is
- also a special PDM module for the apparel industry available, which
- supports all document types required for the handling of fabrics, models,
- sizes, CAD files, etc.
- MRP (Manufacturing Requirements Planning)
- CRM (Customer Relationship Management)
- Accounting
- HR (Human Resources)
- The E-Commerce online shop supports XML based synchronization with
- a backend server.
- CMS (Content Management System) to store, index and classify all
- documents and unstructured data.
- Groupware

Lx-Office

http://www.lx-office.org/

Lx-Office is an Open-Source (GPLv2) solution for enterprise resource planing and accounting. It meets German regulations regarding financial reports and taxes.

It also offers several options for customer relationship management.

Lx-Office is web-based and works with almost every web-browser. The data is stored in a SQL-database (Postgresql). Besides the standard features for accounting, customer and vendor management, quotations, sales orders and invoicing, LX-Office offers a cash box module and an interface for different online-shops.

OpenBravo

http://www.openbravo.com/

Openbravo is an open source ERP solution designed specifically for the SME (small to midsize firm). Developed in a web based environment, it includes many robust functionalities which are considered part of the extended ERP: procurement and warehouse management, project and service management, production management, and financial management. It supports:

- procurement management: Purchase planning, based on production necessities, keeping in mind minimum stock levels, goods receipts dates, and pending requests, Purchase orders. Rates applications: prices, discounts and price limit controls. Warehouse control of goods pending receipt. Correction of orders. Creation of purchase orders from sales orders. Refunds to the vendor. Receipts. Automatic creation from pending order lines. Automation of incoming goods (location according to priority). Refunds to the vendor (according to stocks). Cancellation of delivery notes. Purchase invoices. Application of rates: prices, discounts and control of price limit. Automatic creation from order lines or delivery note lines pending invoicing. Invoicing of goods processed in consignment. order. Cancellation of invoice (leaving pending for invoicing the associated documents). Relationship between orders, delivery notes and invoices. Expense Invoices. Massive printing of documents. Purchasing order reports, vendor invoices.
- Warehouse management: The warehouse management processes built into Openbravo allows the inventory in your organization to always be up to date and correctly valued. The possibility of defining the warehouse structure of your organization to unit level (storage bins) facilitates the exact localization of your stock at any time. Additionally, the capacity for managing product lots and the possibility of using serial numbers assure compliance with the tracking requirements imposed by the majority of industries. Among the features: Warehouses and storage bins (multiple warehouse use available). Stock products in multiple units (for example in kilograms and boxes). Personalized product attributes in the warehouse (color, size, quality description, etc.). Lot and serial numbers. Printing of labels. Barcodes (EAN, UPC, UCC, Code, others.). Management of bundles in warehouses. Restocking control.Traceability configurable by product. Movement among warehouses.Picking

strategies (according to stock, with rules of priority by expiry, location, etc.). Physical inventory. Inventory planning. Continuous inventory. Reports of movements, tracking, stock, arrivals/departures, expiry, inventories, locations, etc. Personalized reports.

- Project and service management: This functionality is orientated towards companies whose activities are based on the delivery of projects and services. With relationship to projects, Openbravo allows for the management of budgets, phases, tasks, expenses and purchases related with each individual project. These projects may be related to monitoring construction projects or even sending out and sales and purchase related requests. The service component permits companies to define services and resources and control all activities. These activities may or may not be billable, for internal or external customers, and be monitored for incurred expenses at a detailed level. Functionalities: Project types, phases and tasks. Expenses associated with a project. Made-to-order projects and generation of sales orders from templates. Construction projects. Invoice to origin (by project). Rates by project. Budget report. Tracking of actions regarding budget estimates. Generation of purchase orders. Project reports. Resources. Register of services. Internal expenses. Invoicing of expenses. Invoicing of services. Levels of service. Activities report.
- Production management: Plant structure, production plans, BOM's, MRP, manufacturing orders, job reports, costs of production, work incidences, preventive maintenance types, etc. The production functions and plant management in Openbravo allow a complete shaping of the productive structure of each organization (sections, cost centers and work centers) as well as the relevant data for production: production plans (operation sequences), and products used to make one another. Currently, the functionality provided by Openbravo is orientated towards covering the usual necessities of a discrete production environment: production planning and requests related to procurement using MRP, creation of manufacturing orders, job reports (notification of times and consumption), calculating costs of production, notification of job incidents and maintenance reports. Features: Plant structures. HFG's (Homogeneous Functional Groups) or Cost Centers. Work centers and machines. Materials Requirement Planning (MRP) keeping in mind client requests, existing clients, stock levels, and minimum order quantities. Production plans, with multiple arriving products and multiple departing products. Production orders. Sequence creation and products for each order phase. Confirmations with data relating to the production plan and pre-filled sequence. Calculation of production costs with the possibility of adding indirect costs. Work incidences. Types of equipment and management of each piece of equipment. Preventive maintenance and maintenance types.
- Financial management: The financial management functionality provided by Openbravo is designed to minimize manual data input on behalf of the user, thereby freeing them from tedious, routine tasks and allowing greater focus on other, more value added tasks. This increase in productivity is due to the financial department acting as collector of all the relevant actions generated from the other management

departments. This occurs in such a way that these have an automatic reflection in the general accounting, in the accounts receivable and accounts payable as soon as they are produced. The module covers accounting, receivables and payables, assets, amortization.

- Business intelligence: Nowadays, business organizations handle a great deal of data in the practice of their business activities. This does not necessarily mean that they have available to them the necessary information for the management of their enterprise. The BI component of Openbravo, integrated into the management system, will help you to monitor of the state of your company, providing you with the relevant information for decision-making. The predefined balanced scorecard will allow you to verify, through the monitoring of a series of key indicators, if the defined strategy is being correctly implemented in your organization.

Open for Business

http://ofbiz.apache.org/

The Apache Open For Business Project is an open source enterprise automation software project licensed under the Apache License Version 2.0. By open source enterprise automation we mean: Open Source ERP, Open Source CRM, Open Source E-Business / E-Commerce, Open Source SCM, Open Source MRP, Open Source CMMS/EAM, and so on.

Apache OFBiz offers a great deal of functionality, including:

- advanced e-commerce
- catalog management
- promotion & pricing management
- order management (sales & purchase)
- customer management (part of general party management)
- warehouse management
- fulfillment (auto stock moves, batched pick, pack & ship)
- accounting (invoice, payment & billing accounts, fixed assets)
- manufacturing management
- general work effort management (events, tasks, projects, requests, etc)
- content management (for product content, web sites, general content, blogging, forums, etc)

Several ERP systems are based on OfBiz, including Neogia (http://www.neogia.org), OpenTaps (http://www.opentaps.org/) and others.

PostBooks

http://www.openmfg.com/postbooks

PostBooks is a full-featured, fully-integrated accounting, ERP, and CRM system, based on the award winning OpenMFG ERP Suite. Built with the open source PostgreSQL database, and the open source Qt framework for C++, it

provides the ultimate in power and flexibility for a range of businesses and industries. It includes the following modules:

- Accounting (general ledger, accounts receivable and payable, bank reconciliation, financial reporting)
- Sales (quotes, order entry, sales reporting, shipping)
- CRM (universal address book, incident management, opportunity management, to-do lists, project management)
- Purchasing (purchase orders, receiving, vendor reporting)
- Product Definition (items, infinite-level bills of material)
- Inventory (multiple locations, other advanced warehouse features)
- Light Manufacturing (work orders, strong support for make-to-order)
- OpenRPT open source report writer

Project-open

http://www.project-open.org/

The aim of the finance module is to provide the company's senior management with a real-time view to all relevant financial information of the company. For this purpose]project-open[provides a number of specialized modules that cover all important areas of small and medium-sized project organizations. The main features are:

- Finance- Invoicing, Timesheet management, Travel costs, Fixed costs, Provider costs (via Web interface), Cost Center Permissions, Financial reporting, Export interfaces to Excel, KHK Kaufmann, ContaPlus, SQL-Ledger and SAP-FI
- Project Management: The PM module integrates project-related information from all]po[modules into "project rooms" or "e-rooms", allowing you to collaborate online with providers and customers (Extranet). Sophisticated access permissions allow you to protect your business critical information. Features: Projects, subprojects and project task, Project templates, Project-related chat rooms, Project reports and -tracking, Risk Management, "Earned Value" project completion tracking, Gantt scheduling, Project filestorage, Project discussions, Project news, Incident management, Import interface to MS-Project, Integration with cost management, Integration with invoicing
- Customer Management: The Customer Management module ("CRM-light") unifies all functionality related to the management or customer relationships. Features: Customer contact management, Integrated customer, interaction history, Online web registration, Customer tracking, Customer classification and status engine, Import interfaces with MS-Outlook and ACT!
- Supplier Management: The Supplier Management Module unifies all functionality related to the management of suppliers in project-oriended organizations. The strategic suppliers for this type of businesses are usually freelancers and other types of human resources, so the boundary between HR and suplier modules is blurry. Features: Supplier contact

management, Integrated supplier interaction history, Freelance skill database, Supplier web invoice tracking, Supplier quality module.

- Human Resources Management Module: The Human Resources Management Module mainly deals with the management of staff employees. Features: Employee payroll information, Employee recruitment process, Employee portraits are shown together with their office.
- Knowledge Management Module: Full-text seach engine for Intranet, discussions, wiki, blog, filestorage, extensible permission management to control the access to business critical knowledge resources
- Translation Module: Translation workflow, Translation quality, Translation project status reports, Integration with invoicing module
- Data Warehouse & Business Intelligence: Multidimensional view to all corporate data, Predefined multidimensional cubes, Implementations available for open-source (Mondrian) and commercial (MS-SQL-Server) OLAP servers, Predefined models for extraction of CRM key performance indicators (in collaboration with Loyalty Matrix)
- Systems Integration: Authentication integration with corporate LDAP server, XML-RPC, SOAP and PL/SQL (ODBC) Interfaces.

TinyERP/OpenERP

http://www.tinyerp.com/ http://www.openerp.com/

Tiny ERP (recently renamed OpenERP) is a free ERP and CRM solution. The main technical features are: a GTK2 client, a distributed server, flexible workflows, an object database (on top of PostgreSQL), dynamic GUIs, customizable reports, SOAP and XML-RPC interfaces. More than 200 modules, including:

- accounting: management of general, analytic and auxiliary accounts. Multilevel charts without limitations, management of virtual accounts, ability to work on several fiscal years at the same time managementof partial enclosure. 5 modes of entry: by documents, quick entry in list mode, models, subscription. Automation of counterparts and taxes: by account, by partner or by products. Entries automatically created thanks to the integration of the other modules of Tiny ERP.
- production: Management, Production control, Production planning. Efficient holding of bill of materials and range. Provisions and treatment of stock exception. Integrated scheduler. Multi level bill of materials without any limit on the number of levels. Configurable products and properties. Sample of bill of materials. Substitution of bill of materials. Integration of subcontracting as well as services/tasks. Rebus management. Range for different levels. Quick production or per series. Management of reviews. Tool for duplication of bill of materials. Reutilization of range at different levels for bill of materials. Work per cycle or per hour. Machines, tools, labor. Integrated to general and analytic accounts. Integration of schedules. Planning of estimated expenses and comparisons. Management of variants and models. Multiple units of measure and automatic conversions. Substitutions

products. Product properties. Possible automatic update of the cost price. Several production logic. Possible use of DLC, DLUO, alert dates and repurchase date of stocks. Packaging management. Standard tools management SSCC. Management of production lots, consumer lots. Serial number management. 12 code-bar supported. Upstream/downstream traceability. Control and follow-up of technicians. Follow-up of anticipated materials in comparison with really consumed materials. Slide/paste for reordering production orders. Comparison of anticipated and real time by post of responsibility. Automation of series. Consumption and production in several times. Production support at the producers. Support of double units of measure if necessary. Valuing of stock automated. Automated serialization or non automated serialization.

It does integrate a complete CRM system, eProcurement, EDI, manufacturing scheduling using MRP and MRP2.

Wavelet ERP

http://www.wavelet.biz/

An integrated ERP designed for franchise and chain stores. It does feature several horizontal and customized modules:

- Trading - This module consists of point of sales features and functionality, from issuing of cashsale, invoice, sales return, purchase return, internal stock transfer across different branches, RMA (Return Merchandise Authorization), and many other functionality are specific for chain store businesses that heavily involved in trading and distributions. It supports various features related to retail industry like auto configuration of Easy Payment Scheme and so on.
- Inventory Module - This module provides various functionality to manage and keep track of inventory in large environment. Users carry out maintenance of inventory master records here, and generate all sort of reports ranging from sales report, stock aging, tracing the inventory path, serial number tracking, and many forms of stock balance reports in matrix format.
- Finance Module - This module allow the users to create Payment Vouchers, Receipt Vouchers, perform Bank Reconciliation, Managing various cash books and reports related to daily operations of the finance department.
- Accounting Module - This module is tightly integrated with all other modules in the system. Users can drill down all the way to the source documents from the balance sheet or profit and loss account. The accounting module also supports multiple companies in the same database, which means group consolidation could be performed on a real time basis across multiple subsidiaries for group accounting.
- Customer Module - This module allow the user to manage customer records, send auto email promotions, and various Account Receivable reports, Monthly Statement, Outstanding Invoices, customer transaction history etc.

- Supplier Module - This module allow you to manage your Account Payables and other supplier information. We provide features and functionality from Purchase Order and other work flow and processes for procurement. As it is tightly integrated with the inventory module, all stocks are updated on a real time basis.
- System Administration - System administration module allow the users to view comprehensive audit trails, manage users, and define detailed permission settings.
- Manager Module - This is a decision support tool for senior managers or directors of the company to gain a bird's eye view of the enter company performance using key statistics and performance indicators within a dashboard.
- Warehouse Management - Our warehouse management module is used by a License bonded warehouse in Singapore. This warehouse module focus on managing the various "lots" in the warehouse, and support up to 4 packing level. Records of permit number, HS Code, and other information could be easily generated from the system.
- E-Commerce - Our e-commerce module comes with a back-end configuration interface to provide easy maintenance of online product catalog, real time order placement with integration with all credit cards (including JCB, DINERS etc), Maybank, RHB Bank, Hong Leong Bank, FPX, BumiPutera Commerce Bank, Mobile Money and Many more. Besides, the front end e-commerce is tied with the back-end order processing, delivery management, trip organization, inventory module, account receivable, finance, accounting etc.
- Customer Loyalty Programme - The module allow the merchant to create member cards, keep track of customer's demography and generate promotional letters etc. The cash rebate voucher feature provides real time synchronization to prevent fraud, as well as updating the accounting module seamlessly.
- Footwear - The footwear module is specifically catered for apparel industry. It supports multiple sizes and colours per article. Most of the functionality in the trading module is included.
- Automotive repair workshops - Our system provides car care companies to keep track of their job sheet, and auto conversion of these job sheets to invoice. Tracking of multiple vehicles per account, and other work flow related to auto care industry. The government service tax reports automatically filter out items that are taxable from the rest.

CRM (Customer Relationship Management)

CiviCRM

http://civicrm.org/

CiviCRM is the first open source and freely downloadable constituent relationship management solution. CiviCRM is web-based, open source, internationalized, and designed specifically to meet the needs of advocacy, non-profit and non-governmental groups. Integration with both Drupal and Joomla! content management systems gives you the tools to connect, communicate and activate your supporters and constituents. It includes modules for online fundraising and donor management, events and participants tracking, personalized email blasts and newsletter.

CentraView

http://www.centraview.com

CentraView is a leading Open Source Centralized Business Management (CBM) solution that delivers an ideal combination of Contact Management, Salesforce Automation (SFA), and Customer Relationship Management (CRM) functionality and much more, all through a standard web browser. CentraView is much more than just CRM or SFA. We offer a comprehensive business management suite that reduces the need to purchase many different software applications that don't talk to one another. Ultimately we provide you with that all important "Centralized View" of all your customer information. Among the features:

- Enterprise quality contact management
- A Web email client that works with POP and IMAP, and automatically relates all emails with customer records
- Group calendaring
- Activity tracking and reporting
- Centralized file management
- Marketing functions including mass emailing through a mail merge utility
- Sales force automation including comprehensive opportunity tracking and proposal creation
- Project tracking with unlimited tasks and sub-tasks, milestones, alerts and emails, and time and expense tracking
- Web ticketing entered via email and the customer and employee portals
- Frequently Asked Questions (FAQ) and Knowledge Base (KB) systems
- Accounting views for relating order, invoice, expense and other information with customer records
- Human resource module for expense form and time sheet submission

and more

- Synchronization with MS Outlook, Outlook Express, Palm, Pocket PC, and Blackberry through the CompanionLink conduit. Synchronizes all contacts, calendar items, activities, and notes.
- A customer portal that may be configured to meet your branding strategy
- A configurable interface that is easily editable via style sheets.
- An online help system
- Administrative modules to configure the software for your specific requirements

CREAM

http://www.campware.org/en/camp/cream_news/

Cream is a multilingual customer relationship management (CRM) system for media organizations that features powerful modules for sales automation, customer service, subscription management, incoming and outgoing email, template-based HTML newsletters, and a WYSIWYG editor.

Highlights of Cream feature set:

- Receive e-mail functionality (text and HTML)
- Sending HTML emails
- Editing HTML emails with a WYSIWYG HTML editor
- Newsletter subscriptions for anonymous users
- External HTML forms for newsletter subcriptions and unsubscriptions
- Sending HTML newsletters
- Editing HTML newsletters with WYSIWYG HTML editor
- Powerful filter for sending newsletters to either newsletter subscribers or all customers based on type, category, product, or campaign
- Import of products and customers
- 'Communication' and 'Sales' tabs in user interface
- Completely localizable user interface
- Localizations to Dutch, German, Spanish, Russian, Ukrainian and Serbian languages
- Home page with shortcut and summary links
- Help page with FAQ, Support and Forum links
- The application now also works on Windows

EGS

http://www.enterprisegroupwaresystem.org/

Enterprise Groupware System is a fully Open Source web-based CRM &

business system released under the GPL. Among the functionalities:

- Manage accounts, leads and customers
- Track sales opportunities and pipelines
- Organise your activities
- Plan campaigns
- Manage projects, tasks and resources
- Track hours and resources for project usage
- Complete time sheets
- Organise your customer support and emails

Hipergate

http://www.hipergate.org/

hipergate is an open source web based application suite. Its mission is to cover a full range of technical requirements in any organization. All applications are addresses from Internet Explorer, without needing any other additional software in the client computer. This suite is multi-company capable, and can be used in a single company, a corporate group or working as an ASP solution capable of serving an unlimited quantity of single customers. It provides a Collaborative tools and Groupware Module, a contact management module, project management, eCommerce, content management, massive email handling and corporate library.

LoopFuse

http://loopfuse.com/

LoopFuse is the enterprise-grade marketing and sales automation suite offering organizations the ability to generate leads from their website, score and route leads, marketing campaign capabilities, full web analytics support, and full CRM integration with most major vendors. LoopFuse also offers the capability to measure ROI within marketing and sales department initiatives.

- LoopFuse Web Analytics component allows organizations to better tune their websites to increase message response with accurate statistics covering a wide-range of metrics. Our integrated lead generation platform, enables you to generate increased demand for your products and services, providing a continuous flow of qualified leads to your sales team. Automated lead generation allows marketing organizations to have a measurable process that can be adjusted in order to maximize sales results.
- The LoopFuse marketing campaign manager gives marketing organizations complete control over all marketing initiatives, including: email marketing, internet marketing, and traditional/print marketing. Our innovative ability to tie these marketing initiatives in to your CRM information and web analytics, means that marketing organizations can now calculate the exact ROI value for all their campaign initiatives, be it a banner ad, email campaign, or even a highway billboard.
- LoopFuse OneView stores all demographic, product interest, viewing

habits data in your dedicated database, so you can segment the data by this information and queue them for further nurturing, export to a CRM, or export in a raw format.

- OneView's CRM Integration feature, allows organizations to automate the process of routing segmented (or all) potential leads to your sales professionals. LoopFuse can export as much, or as little information as a marketing organization would like, providing sales professionals with all the information they need on a qualified prospect.
- Once you have segmented your leads, qualified, or even routed them to your sales professionals, OneView allows marketing organizations to have a bird's eye view of how a potential lead has progressed through you marketing and sales funnel, and valuable historic/demographic data that will increase the "Lead Intelligence" factor for your sales professionals.
- Automated Lead Scoring allows you to perform automated scoring of all leads and organizations in your database. The lead scoring process is automated, allowing you to create Lead Scoring Rules, that are executed on a frequency basis.

OpenCRX

http://www.opencrx.org/

A complete and powerful CRM system. It provides: Account/Contact Mgmt, management of complex legal entities, leads/opportunities, quotes, sales orders, invoices, territory management, product catalogs, multiple pricing and discounting, task management, collaborative sales support, customer service and support (incident/case management, contract management, collaborative service support, FAQ, effort tracking and billing), alerts, document management.

OpenEMM

http://www.openemm.org

OpenEMM is a feature-rich, industrial-strength enterprise software for professional e-mail newsletters and e-mail marketing. Moreover, OpenEMM lets you send event and time triggered transaction e-mails. OpenEMM is the first open source application for e-mail marketing. The OpenEMM code base has been developed since 1999 and is used (as part of the commercial ASP product E-Marketing Manager) by companies like BenQ, CA, IBM, Siemens, Deutsche Telekom, Tiscali, etc. It features target groups, integrated HTML editor, complete reporting and statistics functionalities.

SugarCRM

http://www.sugarforge.org/content/open-source/

SugarCRM is the most widely used open source CRM system; with a strong developer community and a large number of ancillary projects hosted in the SugarForce, the development site managed by the main developers. SugarCRM features the following functions to help streamline your business:

- Account, Contact, Opportunity and Lead Management: Manage the important details about your valuable accounts including organisational

contacts, outstanding activities, leads and opportunities.

- Sales activity management: Management of important sales activities, including sales calls, meetings, tasks and recording of notes and email related to the account, opportunity or lead.
- Dashboard: The Dashboard provides a single-view of the important statistics about sales performance including Pipeline by sales stage, Pipeline by month, Opportunity by outcome, and opportunity by sales stage.
- Case Management and Bug Tracking: Optional Case and Bug Management functions to ensure customers are being looked after, and to provide critical information about the customers' situation.
- Customisable user interface: SugarCRM can be customised in-place by an end user without the involvement of expensive external consultants. Its easy to add new or remove fields, change the contents of dropdown lists and modify what function tabs are visible, either per user or for the entire organisation.

vTiger

http://www.vtiger.com/

A complete CRM system, providing lead and opportunity management, activity and reporting subsystems, dashboards, integration with Microsoft Outlook and Mozilla Thunderbird, easy product customization, campaign management. It also integrates Inventory Management functions, such as Products, Price Books, Vendors, Sales Quotes, Purchase Orders, Sales Orders, and Invoices with CRM modules, such as Leads, Accounts & Contacts, and Opportunities. Using vtiger CRM you can achieve the seamless integration between pre-sales and post-sales activities in a single application.

XRMS

http://xrms.sourceforge.net

A complete and customizable web-based CRM system. Among the features:

- Customer Management: Contains a very complete set of fields for tracking Companies, their Contacts, and a wide variety of information about them.
- Sales Force Automation: Provides extensive support for tracking Opportunities and Leads through the selling cycle. Allows configurable sales processes and supports different processes depending on the opportunity type.
- Customer Support: XRMS uses Cases to track client support issues. Cases are completely configurable and can be associated with workflows and role assignments.
- Campaign Management: Campaigns are marketing-related activities, such as direct mailings or conferences, and are directed towards generating leads. XRMS provides basic campaign management functionality for tracking leads generated through the sales process. This functionality is currently in active development.

- Correspondence Management: Users can send e-mails to company contacts, and may use either standard or custom templates. Templates can be easily created to contain pre-written text that may be altered prior to being sent.
- Customer Interaction and Activity Tracking: Provides tracking for any action taken by users that puts them in touch with a contact in a company (e.g., calls, letters, meetings, and e-mails). Activities are linked to Companies and Contacts and can also be related to Campaigns, Cases and Opportunities. Activities may have multiple Participants from different Companies.
- Reporting and Analytics: The browser interface provides flexible displays of data that allows for sorting and grouping of data, reordering or hiding columns, and exporting table data for analysis. Some standard reports are included, but custom reports can also be created. Reports may also be generated with third party business intelligence tools, such as Crystal Reports.
- Document Management: Files and folders may be attached to any entity. Files may be of any type, and PDFs and MS Office files are fully searchable.

Groupware

Bedework

http://www.bedework.org

Bedework is an open-source, enterprise calendar system for higher education designed to conform to current calendaring standards. Built in Java, Bedework has a centralized server architecture allowing immediate update of public and personal information. Based on version 2 of the UW Calendar, it has been rearchitected and reimplemented to support many new features. Features:

- It supports iCal, iTIP, CALDAV;
- Full CalDAV access control is available allowing the sharing of calendars and calendar entities based on authentication status and identity.
- Support for scheduling of meetings including invitations and their responses is available. Caldav scheduling (still in draft) is also supported.
- Freebusy is supported and the busy time is displayed as attendee lists are built. In the near future it will be possible to carry out scheduling with other bedework systems though real-time protocols.
- Access control allows users to determine who may attempt to schedule meetings with them. Automatic responses to meeting requests is an option which can be used to enable simple resource scheduling by, for example, 'inviting' a resource to a meeting.
- Bedework supports public events and calendars. All public entities are subject to full access control allowing an institution to limit visibility of events and calendars to specific groups, users or any authenticated user. Events and calendars may be world readable for guest access. The public view is configured through preferences allowing adminstrators to change the default skin, the default view and add or remove subscriptions from the public view.
- Support is available for departmental "calendar suites" allowing sub-organizations to maintain their own calendars with whatever degree of visibility is appropriate. Departmental events are owned by a special departmental owner to which preferences are attached allowing special skins for the departmental view.

Chandler

http://chandlerproject.org

Chandler consists of a cross-platform (Windows, Mac OS X and Linux) Chandler Desktop application and Chandler Hub, a sharing service and web application. Chandler is open source and standards-based. It integrates email, calendaring, sharing, tasks and todo in a novel approach called Triaging. Among the features:

- Context sensitive Who and Date columns dynamically display item metadata

- Create and edit Notes, Messages, Tasks and Events
- Set up special Chandler IMAP folders to move messages from your favorite email application into Chandler Desktop
- Designate items for NOW or LATER
- Set up Ticklers to automatically re-focus your attention on an item at a later date and time
- Events are automatically triaged based on when they happen
- Address events to send them as invitations
- Mark emails as tasks to add them to your task list
- Schedule tasks on your calendar
- Chandler Collections can hold any kind of item: notes, messages, tasks and events
- A single item can be in as many collections as you want
- See all the collections an item appears in
- Use the Quick Entry field to create notes, messages, tasks and events with a set of simple commands
- Search across all of your collections
- Overlay multiple calendars
- Get a summary of what's on your schedule in the Preview Pane
- Navigate the calendar with the Mini-Calendar
- Get a sense of how full your days are with the mini-calendar Busy-Bars
- Use the Quick Entry field to create events, type event dates in plain English
- Create recurring events: Daily, weekly, biweekly, monthly events
- Set alarms for before or after events
- Use time zones; or manage your calendar without time zones
- Hand out View-Only or View and Edit Chandler Sharing URLs to friends and colleagues
- Provide collaborators with easy access to shared information from Chandler Hub in any web browser
- Collaborators can view and edit shared collections without having to sign up or log into a Chandler Hub account
- See who last edited an item and when
- Manage and resolve conflicts
- Send items to other Chandler Desktop and email clients
- Edit and Update items with other Chandler Desktop applications

- Receive items sent by email from other Chandler Desktop applications
- Receive emails sent from any email clients through your special Chandler IMAP folders

Darwin Calendar server

http://trac.macosforge.org/projects/calendarserver/wiki

The Darwin Calendar Server is a standards-compliant server that allows multiple users to collaboratively share calendaring information. It provides a shared location on the network to store schedules, and allows users to send each other and manage invitations. In order to provide interoperability with multiple calendaring clients, the server implements the CalDAV protocol, which is an extension of WebDAV.

DotProject

http://www.dotproject.net/

PHP web-based project management framework that includes modules for companies, projects, tasks (with Gantt charts), forums, files, calendar, contacts, tickets/helpdesk, multi-language support, user/module permissions and themes.

eGroupware

http://www.egroupware.org

eGroupWare is a free enterprise ready groupware software for your network. It enables you to manage contacts, appointments, todos and many more for your whole business. It comes with a native web-interface which allowes to access your data from any platform all over the planet. Moreover you also have the choice to access the eGroupWare server with your favorite groupware client (Kontact, Evolution, Outlook) and also with your mobile or PDA via SyncML. At the time, it supports more than 25 languages including rtl support.

Features:

- Calendar - Powerful calendar which also supports scheduling of groups, resources and even contacts.
- AddressBook - Contact-manager using SQL or LDAP
- WebMail - Userfriendly IMAP mail-client
- Infolog - Powerful replacement for ToDo, Notes and Phonecalls, CRM customer relationship management.
- ProjectManager - Element based Projectmanager higly integrated with all other eGW apps.
- Resources - Resources managment (inventory) and booking tool integrated into eGW calendar.
- FileManager - Managing files stored in the VFS (virtual file system) based on files, sql-db or webdav.
- SiteMgr - Userfriendly intuitve web autoringsystem with fine granulated access control lists.

- Timesheet -time-tracker application well integrated with projectmanager.
- Tracker - tracking of bugs or other, integrated with projectmanager.
- Wiki - eGW's eGW's Tavi:WikkiTikkiTavi clone.
- KnowlegeBase - Knowledge base.
- Workflow engine

eProjectManagement

http://www.studip.de/

eProjectmanagement is related to the learning management system Stud.IP. It is based on the same proven technology, but offers an adjusted range of functions. eP is a new special line of development for small and middle sized enterprises and or public administrations.

eP offers an open-source and web-based platform for:

- knowledge-management,
- project-management,
- information-management,
- communication, controlling,
- further education,
- cooperation,
- coordination,
- resource-management,
- work schedule administration and personnel controlling.

Evolution

http://www.gnome.org/projects/evolution/

Evolution provides integrated mail, addressbook and calendaring functionality to users of the GNOME desktop. Among the features:

- Intelligent Junk Mail Control
- Search Folders (formerly called vFolders)
- support for signing and encrypting mail via GPG (GNU Privacy Guard) and S/MIME
- Desktop Integration
- Filters
- Searching
- Web calendars
- support for Exchange 2000/2003 and GroupWise
- Multiple Account Management

FIN calendar server

http://www.theatlantis.net/

Fin is Java based, platform independent and has been tested on Linux, Win32, MacOSX, Solaris. For persistence Fin use Java Persistence API and can be installed on all the popular open source databases like PostgreSQL, MySQL, Hypersonic, SapDB or commercial databases like Oracle. Major features:

- Easy GUI based installer
- Support for major client desktop clients such as ThunderBird, Evolution, ICal and OutLook
- Integrated LDAP AddressBook
- Email Notification
- Shared and private calendar support
- Full support for meeting scheduleing and RSVP
- Protocol support for: WCAP, iCalendar, IMip/ITip

GanttProject

http://ganttproject.biz/

GanttProject is a free and easy to use Gantt chart based project scheduling and management tool. Our major features include:

- Task hierarchy and dependencies
- Gantt chart
- Resource load chart
- Generation of PERT chart
- PDF and HTML reports
- MS Project import/export
- WebDAV based groupwork

The application is cross-platform (written in java) and can be executed in reduced form directly through Java WebStart.

Group-Office

http://www.group-office.com/

Group-Office is a Groupware suite containing a base system and different modules. The modules are designed in a way that groups of people can collaborate online. Shared calendars, addressbooks, projects, files and e-mail are the key features of the project. Users use their favorite browser to access their groupware from all over the world. Features:

- Addressbook: You can create templates for both E-mail messages and OpenOffice.org templates. By linking the addressbook to these templates you can fill those documents automatically with address info and automatically generated beginnings such a dear sir Smith. With these templates it's possible to create mailing lists. It's also possible to

create custom fields for your own personal requirements. Companies are separated from the contacts for easy administration and a quick overview of employees.

- Filesystem: The filesystem module is used to store your personal files online and share them if you want with other users. It looks like the filemanager people would expect. You can easily cut, paste and copy files to different directories that you can access by a treeview. Sharing files online with your relations was never easier. By creating Samba shares to the files and the upcoming webDAV support this filemanger is very easy to enroll in an existing filesystem.
- Calendar: In a corporate environment a calendar can't be missed. This calendar allows you to plan all sorts of recurring events and set reminders for them. The easy to use interface will never let you miss an event. It's easy to set up multiple calendars and share them with other users. The calendar supports the import and export of the popular iCalendar standard. This makes it possible to synchronise the Group-Office calendar with other calendar software that support the iCalendar protocol.
- email: With the e-mail client you can add your IMAP and POP3 mail accounts and view your e-mail online with this easy to use mail client. It supports multiple folders and filters. The mail composer can create both HTML and plain text e-mails.
- projects: With the projects module you can easily administrate your working hours. By using a clock in and clock out function you'll get accurate and easy time registration. You can load the working hours back based on project, client or employee.

Kablink

http://kablink.org/

Kablink (previously called ICEcore) is an open source project whose mission is to make it simple and convenient to work together inside an enterprise. Designed from the ground up with team collaboration and communities of practice in mind, Kablink allows teams to share content and ideas and provides tools that allow you to customize the experience for exactly the type of work you do. Make teams work like never before. kablink gives you a team workspace—your own intranet—in which you can implement enterprise document management, online project management, web calendars, automated workflows ... actually, any groupware-driven business function. Create content, share ideas, find answers, locate experts, see who's available, and meet anytime, anywhere—all within a single, integrated environment. Accelerate adoption with kablink's unified social networking facilities. kablink runs circles around mix-and-match tools with an integrated group workspace for team collaboration. Plus, real-time presence enables you to run WebEx-like conferences, knowing exactly who is free to participate. Increase collaboration in small teams, throughout a department, even across the extended enterprise. With kablink, your document and project management activities can scale to meet ever-changing needs.

Kolab

http://kolab.org/

Kolab is a secure, scalable and reliable groupware server. It is formed by a number of well-known and proven components or the standards tasks such as E-Mail, Directory Service and Web Service. Kolab adds intelligent interaction between the components, a web administration interface, management of free-busy lists etc. Various clients can access Kolab, among them Kontact (KDE), Outlook (Windows) and Horde (Web).

Full seamless support of mixed clients environments (Outlook/KDE/Web), a web administration interface, supported languages: Deutsch (German), English, Français (French), Nederlands (Dutch), a shared address book with provision for mailbox users as well as contacts, POP3 as well as IMAP4(rev1) access to mail, Client-side full support of S/MIME E-Mail encryption possible (officially Sphinx-interoperable).

Kontact

http://kontact.kde.org/

The KDE Kontact Personal Information Management suite unites mature and proven KDE applications under one roof. Thanks to the powerful KParts technology, existing applications are seamlessly integrated into one. The components of KDE Kontact are tailored to work well with each other. This results in features like intuitive drag-and-drop between appointment handling, task lists and contacts. KDE Kontact supports various groupware servers. When using these servers your workgroup has access to features like shared email folders, group task lists, calendar sharing, central addressbooks and meeting scheduling.

MailArchiva

http://www.mailarchiva.com/

MailArchiva is a state-of-the-art email archiving system for companies of all sizes. It works in conjunction with popular mail systems to archive all incoming, outgoing and internal emails. The MailArchiva system consists of multiple agents and an archiving server; the archiving server is entirely cross-platform and can run on any operating system. Several agents are included that provide for connectivity to Microsoft Exchange, Postfix and other mail systems. Among the features:

- granular archiving rules
- compression
- encryption
- search & retrieval
- auditing

MindQuarry

https://www.mindquarry.org/

Mindquarry Collaboration Server is a web-based collaboration platform that supports your teamwork by combining file sharing, Wiki for knowledge management and collaborative task management. It provides 4 main views:

- Teams: With Mindquarry teams you can analyse and manage your teams and team members.
- Files: Mindquarry file sharing stores all your documents and keeps a history of changes.
- Wiki: The Wiki is your personal idea-store, blackboard and glossary for sharing information and creativity.
- Tasks:With the task management block you can see your todo list and assign tasks to your team members.
- It provides a java-based desktop client, that allows for synchronization of Workspaces, quick creation of Wiki content and easy task management.

OnePoint

http://www.onepoint.at/

OnePoint project is a complete and full-featured project management application, delivered as a web-based system or as a desktop java application. It features gantt charts, work breakdown structure, milestone trend analysis, resource utilization, integrated document management and project templates.

OpenGroupware

http://www.opengroupware.org/

Opengroupware is a complete groupware server, featuring:

- Contact Management: Saves and organizes thousands of personal and company contacts, telephone, fax, addresses, e-mail contact addresses just to mention a few. Easily configurable with extensive and speedy search capabilities, categorization and remotely accessible.
- Group Calendar: Manage meetings and events for an entire group or individual set of accounts. Attach notes to appointments. Link appointments to contacts and projects. Automatic detection of conflicts.
- Resources Planner: Keep track of your company's resources such as automobiles, projectors or conference rooms. Searchable timeslots to check for availability of specific resources or resources assigned to a specific group. Automatically check for resource conflicts upon appointment creation.
- Task Management: You may organize tasks by person, group or specific project. "Todo" lists can be ordered by priority, due date, processing status etc. An overview of all tasks is stored in the projects application as well as sorted by company. All tasks are also summarized on the personal page.
- E-Mail Client: The integrated (IMAP4 based) e-mail client offers a comfortable environment for reading and creating e-mails as well as organizing email by folders. A global, and configurable contact directory eliminates the endless search for the correct e-mail address.
- Projects and Documents: Share documents and files, locally or remotely, in groups or privately in a project centric environment. Link projects to

customer or employee contacts and or link tasks to projects. Store email, Office documents such as faxes in the document archive which can be associated with any project. Finally, link any OGo application with your project. A true project centric environment.

- News: The Newsboard gives you the opportunity to publish important information or articles to the Intranet. Defineable headlines that can be linked to other related articles or news items. In addition, the Newsboard shows upcoming appointments and tasks and serves as a personal page.
- Palm Sync: Using the Palm application you can synchronize data from your Palm device to the other OGo applications. Use the Palm application to resolve remote synchronization conflicts and to configure how and when Palm data is synchronized with the global enterprise database.
- There is an open source plugin for proprietary clients like Outlook, developed by the french company Dawan, and available at http://open-source.dawan.fr/Plug-in-Outlook.html

OpenProj

http://openproj.org/openproj

OpenProj is a free, open source desktop alternative to Microsoft Project. The OpenProj solution is ideal for desktop project Click to enlarge in a new windowmanagement and is available on Linux, Unix, Mac or Windows. OpenProj is a complete desktop replacement of Microsoft Project and even opens existing native Project files. The OpenProj solution has Gantt Charts, Network Diagrams (PERT Charts), WBS and RBS charts, Earned Value costing and more. It features several views:

- Gantt Chart
- Tracking Gantt Chart
- Network Diagram
- Resource View
- Projects View
- WBS Chart
- RBS Chart
- Report View
- Task Usage Detail
- Resource Usage Detail

OpenWorkbench

http://www.openworkbench.org

Open Workbench is a robust, mature tool for project scheduling and management. It conforms to and supports the underlying ideals of project management while presenting information in a way that is intuitive and easy to learn. Tens of thousands of project managers around the world use Open

Workbench to plan and execute complex projects. All projects proceed through a series of tasks (or stages) during their lifecycle. By using Open Workbench, these critical tasks or stages become more manageable, making projects more likely to succeed. Open Workbench enables project managers to create work breakdown structures (WBS) with tasks and milestones, set baselines, schedule project plans with dependencies, assign resources to tasks, schedule work on tasks over a period of time, adjust the schedule as actual work is recorded, link master and subprojects and schedule resources across them, and conduct earned value analysis. Once the project plan is created, project managers can schedule tasks with assigned resources for completion. For large projects, scheduling can be an intricate process that balances task relationships, resource availability, and task duration. The powerful Auto Schedule feature in Open Workbench is designed to handle just this type of complexity. With the click of a button, the Auto Schedule feature uses an internal set of rules to create a schedule that takes into account task constraints, dependencies, priorities and resource constraints—automatically generating the best method for project completion. When the plan is approved, the project manager can create a baseline, which gives a snapshot of the project and allows revisions to be compared against the original plan.

Project managers have access to a library of project views in Open Workbench, allowing them to customize the information display to their needs. Multiple views are supported, including Gantt and Phase Level Gantt charts, as well as logical, PERT-style displays. Organizations can also define and distribute custom views as corporate standards.

Modifications are required when a project's scope changes, whether due to new requirements, lack of resources or time and budget constraints. Open Workbench identifies these potential problems and trends before they affect a project by performing the following analyses:

- Critical Path: analyzes isolated dependency networks and tasks with negative float.
- Estimated Time to Complete: calculates the estimated usage required to complete a task and ascertains if deadlines will be met.
- Earned Value: analyzes the true progress of a project, taking into account the effort expended as well as what has been achieved.

Managers can refine the project schedule based on these analyses and, using the project baseline, compare scope changes with the original plan for detailed analysis. Having the right information to quickly mitigate potential problems is crucial to the successful delivery of work.

OpenXchange

http://www.open-xchange.com/header/community_area.html

Open-Xchange Community Edition delivers Smart Collaboration. Smart Collaboration simplies everyday life, work and social interactions. It is based on AJAX, open source software and open standards and offers reliable and scalable messaging and advanced collaboration solutions. Specifically, Open-Xchange Community Edition offers email, calendar, contacts, tasks, documents, bookmarks and knowledge entries. Unique features of the Open-Xchange Server are:

- Infostore: a common repository of documents, bookmarks and knowledge entries;
- Documail: the integration of email and document sharing/version control;
- Smart Links between all collaboration objects;
- Smart Privacy that let's users define read and write access to all collaboration objects
- Universal Access: the ability to access the server from the widest variety of browsers, clients and mobile devices.

Organizations use Open-Xchange's web-based administration module to add, delete and change user roles and entitlements.

PHPgroupware

http://phpgroupware.org/

phpGroupWare is a fully featured, web based messaging, collaboration and enterprise management platform. phpGroupWare comes with over 50 applications that can be mixed and matched according to your needs. Some of the most powerful features we offer include:

- Contacts management
- Email
- Shared calendar
- Web content and document management and sharing
- Project management
- Issues tracking

PHProjekt

http://www.phprojekt.com/index.php?&newlang=eng

PHProjekt is a modular application for the coordination of group activities and to share informations and document via the web. Components of PHProjekt: Group calendar, project management, time card system, file management, contact manager, mail client and many other modules. PHProjekt supports many protocols like ldap, xml/soap and webdav and is available for 38 languages and 9 databases. It is SOX compliant by history tracking and soft delete - Supports mysql, postgres, sqlite, firebird, oracle, ms-sql, db2; project management, time cards, contact management, forum, chat, calendaring, files, voting management, todo and reminders.

TeamWork

http://www.twproject.com

Teamwork is a web based software solution for managing work and communication through projects in any field. Groupware and project management features are used in an integrated environment, from which you can coordinate and manage hundreds of open projects at once. Teamwork is easy to use, so that an extended team can contribute; it is also capable of

handling quite complex projects. Among the features:

- Groupware: use the shared agenda across the team, so Teamwork works as group calendar server, add meeting discussion points and establish a committee, synchronize Teamwork's agenda with Micorsoft Outlook's and ICalendar clients and vice-versa, configure holidays with a “days in year”, send and receive messages through multiple media (RSS included), evaluate required and current worklog and work load, prioritize the assignments, prepare meetings through shared boards, share files through the project/tasks entry points
- Project management: implicit team or workgroup definition, with its security settings (shared agenda, send messages, operator load, …), personal dashboard, active work log recording, and hence cost control, search forms, milestones, dependencies, issue tracking, diary, boards, audit, deliverables, project complexity/risk forms
- Document management: You can upload and download documents through the web interface as project attachments. Versioning, file locking, authoring and classification are all supported. Do you want to spare the hassle of upload/download of files already secured and classified on the server file system? No need to worry: you are free to choose whether to manage documents through secure upload/download from Teamwork’s repository, or to link projects to a set of folders and files on your file servers. In the latter case, the browser acts as a window on the file server, giving a comfortable remote access, emulating file system functions (create directories, open files) with the add-on of file zipping functionality.
- Smart features: Search anywhere from everywhere, Query by example (QBE), Search and saveable filters, Dynamic combos, Skins, languages, dates, currency, Compute in fields, Tree structure always surfable, Dynamic zooms and time bars, Custom forms and prints, discussion boards.

Thunderbird

http://www.mozilla.com/en-US/thunderbird/

Mozilla Thunderbird is an advanced email and collaboration client, with several advanced features:

- advanced folder views
- Message Tagging
- Message History Navigation
- Improved Search
- Saved searches
- Phishing Protection
- Robust Privacy
- Extensible through plugins and additional tools, including a calendar plugin (Lightning)

Twiki

http://www.twiki.org

With Wikis you can exchange knowledge fast, link information easily and make your business more efficient. TWiki with its flexible plugin architecture is one of the most comprehensive Wikis existing. The System is widely used for business purpose as it allows the development of tailor-made Wiki solutions and individual applications. Several functions of TWiki are made for collaboration within companies. Especially the integrated access management is needed in a business environment. Via intranet technology the system can be used across different locations, external partners like suppliers, service providers and customers can although get embedded into a common network. TWiki is used in companies like Yahoo, Motorola and SAP.

- Enterprises use Wikis for:
- specialized encyclopedia,
- corporate-glossary,
- knowledge bases,
- project and protocol management,
- personal and competence management,
- quality management documentation.

UGS- Univention Groupware Server

http://download.univention.de/download/ucs-cds/ucs2.0-0/

Univention Gropware Server improves the communication process in enterprises and public administrations. The complete solution makes planning and conversation in organizations and working groups easier. The application optimizes operational procedures and the exchange of information. Particularly the following tasks will be made easier by the application:

- administration of e-mails, calendar and address-book,
- creation of to-do-lists and notes,
- coordination of appointments with colleagues,
- access of shared addresses,
- flexible administration of e-mail traffic.

Zimbra

http://www.zimbra.com

Zimbra Collaboration Suite (ZCS) 4.5 is a truly modern, innovative messaging and collaboration application. Zimbra Server is the core of Zimbra Collaboration Suite; it is designed with an extremely stable and modular architecture using proven open source technologies. Zimbra Server provides tremendous flexibility because it contains all of the components necessary to run your Linux or Mac based email and calendar messaging infrastructure out of the box; it also connects to just about every popular end-user client through the many standard protocols it supports. Uses industry standard open

protocols - SMTP, LMTP, SOAP, XML, IMAP, POP, iCal, CalDAV; Zimbra Collaboration Suite features a state-of-the-art Ajax web client. Features:

- Conversation View hides redundant messages that clutter up your inbox
- Search Builder is a simple "WYSIWYG" tool to make advanced queries; save favorite searches as "virtual" message folders
- "Tagging" automatically highlights email from important people
- You can view attachments (like Word or Acrobat files) immediately as HTML instead of downloading and opening them in another applications
- Supports multiple Address Books (personal and server-side Global Address List)
- Easily share Address Books and contacts with peers
- Autocomplete from personal and/or Global Address List (GAL)
- Create personal distribution lists
- View multiple schedules as 'overlays' on your calendar, one click to toggle them on and off
- Complete resource and group scheduling, with delegated access
- Share and publish calendars with peers
- Subscribe to remote calendars as iCal feeds
- Create, share, and publish rich Documents online
- WYSIWYG editor makes it easy to add spreadsheets, images, etc.
- Turn Documents into collaborative Wiki pages
- Simple sharing model common to Address Book, Calendar, and Documents
- Share internally (read and/or write access) or publish externally with a simple URL (read only).

Recently a disconnected client was released, along with improved support of traditional email clients.

VoIP, conferencing and messaging

Asterisk

http://www.asterisk.org

Asterisk is the world's leading open source telephony engine and tool kit. Asterisk can be configured as the core of an IP or hybrid PBX, switching calls, managing routes, enabling features, and connecting callers with the outside world over IP, analog (POTS), and digital (T1/E1) connections. Asterisk runs on a wide variety of operating systems including Linux, Mac OS X, OpenBSD, FreeBSD and Sun Solaris; it can also be built out as the heart of a media gateway, bridging the legacy PSTN to the expanding world of IP telephony. Asterisk's modular architecture allows it to convert between a wide range of communications protocols and media codecs. Several projects add a web interface to provide simplified administration, for example FreePBX and TrixBox.

Among the features:

- ADSI On-Screen Menu System
- Alarm Receiver
- Append Message
- Authentication
- Automated Attendant
- Blacklists
- Blind Transfer
- Call Detail Records
- Call Forward on Busy
- Call Forward on No Answer
- Call Forward Variable
- Call Monitoring
- Call Parking
- Call Queuing
- Call Recording
- Call Retrieval
- Call Routing (DID & ANI)
- Call Snooping
- Call Transfer
- Call Waiting
- Caller ID

- Caller ID Blocking
- Caller ID on Call Waiting
- Calling Cards
- Conference Bridging
- Database Store / Retrieve
- Database Integration
- Dial by Name
- Direct Inward System Access
- Distinctive Ring
- Distributed Universal Number
- Predictive Dialer
- Privacy
- Open Settlement Protocol (OSP)
- Overhead Paging
- Protocol Conversion
- Remote Call Pickup
- Remote Office Support
- Roaming Extensions
- Route by Caller ID
- SMS Messaging
- Spell / Say
- Streaming Media Access
- Supervised Transfer
- Talk Detection
- Text-to-Speech (via Festival)
- Three-way Calling
- Time and Date
- Transcoding
- Trunking
- VoIP Gateways
- TDMoE (Time Division Multiplex over Ethernet)
- Allows for integration of physically separate installations
- Uses commonly deployed data connections

- Allows a unified dialplan across multiple offices
- supports FXS, FXO, MF and DTMF signalling, 4ESS and BRI.

Ekiga

http://www.ekiga.org/

Ekiga (formely known as GnomeMeeting) is an open source VoIP and video conferencing application for GNOME. Ekiga uses both the H.323 and SIP protocols. It supports many audio and video codecs, and is interoperable with other SIP compliant software and also with Microsoft NetMeeting. Among the features:

- SIP Compliant
- Registrar Support
- Possibility to Simultaneously Register to Several Accounts
- Proxy Support
- Outbound Proxy Support
- Call Hold
- Call Transfer
- Call Forwarding on No Answer, on Busy, Always
- Configurable Port Ranges
- Instant Messaging
- DTMFs Support
- Message Waiting Indications Support
- ENUM Support
- Transparent NAT Support, Assisted NAT Support (STUN, IP Translation)
- SIP re-INVITE support
- iLBC, GSM-06.10, MS-GSM, G.711-Alaw, G.711-uLaw, G.726, G.721 and Speex Audio Codecs
- H.261 QCIF Video Code
- Dynamic Jitter Buffer
- Dynamic Threshold Algorithm for Silence Detection
- Echo Cancellation
- Wideband Codec Support
- Automatic Video Bandwidth Limitation
- Video Transmission/Reception Control

OpenFire

http://www.jivesoftware.com/products/openfire/index.jsp

Openfire is an instant messaging (IM) and groupchat server that uses the XMPP protocol. It provides:

- Web-based administration panel
- Plugin interface
- Customizable
- SSL/TLS support
- User-friendly web interface and guided installation
- Database connectivity (i.e. embedded Apache Derby or other DBMS with JDBC 3 driver) for storing messages and user details
- LDAP connectivity
- Platform independent, pure Java
- Full integration with Spark Jabber client

The companion Spark client provides an easy and efficient interface to OpenFire, with drag&drop file transfer, VoIP, multi-protocol chat and IM.

OpenMeetings

http://code.google.com/p/openmeetings/

Multi-Language Customizable Video-Conferencing and Collaboration. It features:

- Video/Audio
- See Desktop of any participant
- Multi-Language and Customizable
- Whiteboard with drawing, write & edit, dragNDrop, Resizeing, Images (DragNDrop from Library), Symbol(s)
- Conference while drawing (4x4 or 1xn modus)
- Safe Drawings / whiteboard and load it next time, edit and resave
- ImportDocuments: .tga, .xcf, .wpg, .txt, .ico, .ttf, .pcd, .pcds, .ps, .psd, .tiff, .bmp, .svg, .dpx, .exr, .jpg, .jpeg, .gif, .jpg, .ppt, .odp, .odt, .sxw, .wpd, .doc, .rtf, .txt, .ods, .sxc, .xls, .sxi, .pdf
- Send invitation and direct Links into a meeting
- Moderating System
- User-/Organisation System
- Private and Public (Organisation only) Conference-Rooms

It works through a AJAX/Flash client that requires no client download in most situations.

SIPX

http://www.sipfoundry.org/

A complete SIP-based VoIP PBX system. It features:

- Transfer (consultative & blind)
- Call coverage
- Call hold / retrieve
- Consultation hold
- Music on Hold for IETF standards compliant phones
- Uploadable music file
- 3-way conference
- Call pickup (global and directed call pickup)
- Call park & retrieve
- Hunt groups
- SIP URI dialing
- CLID (Calling Line Identification)
- CNIP (Calling party Name Identification Presentation)
- CLIP (Call Line Identification Presentation)
- CLIR (Call Line Identification Restriction)
- Per gateway CLIP manipulation
- Call waiting / retrieve
- Do not Disturb (DnD)
- Forward on busy, no answer, do not disturb
- Multiple line appearances
- Multiple calls per line
- Multiple station appearance
- Outbound call blocking
- Click-to-dial (Windows XP)
- Redial
- Call history (dialed, received, missed)
- Auto off-hook / ring down
- Incoming only
- Peer-to-peer media routing for best quality (media not routed through the sipX server)
- Unmatched voice quality with lowest delay and jitter
- Support for any codec supported by the phone (including video)
- Support for Polycom HD Voice
- Codec negotiation (no transcoding required)

- Numeric or alpha-numeric User ID
- User PIN management (UI or TUI)
- Aliasing facility (numeric and alpha-numeric aliases)
- Extension and alias uniqueness assurance
- Granular per user permissions
- Call permissions
- Dial plans
- directory services
- softkeys
- speed dial
- PSTN trunking
- least-cost routing
- SIP trunking
- analog lines support
- unlimited numer of simultaneous calls
- fully redundant
- Call Detail Records collection and reporting
- Plug & Play Device Management
- voicemail
- presence features
- hunt groups
- call center server

DimDim

http://www.dimdim.com

DimDim is a web-based conferencing solution. Among the features:

- Presentation and Document sharing: Interactive realtime collaboration over documents and presentations allows enhanced expression and exchange of ideas.
- Audio and video sharing: High-quality multi-party video and audio sharing can be used to personalize meetings with a face-to-face approach.
- Application sharing: Full screen as well as specific application sharing from a Presenter’s computer can be used to show and educate even a novice audience.
- White board and Annotations: Realistic interactive collaboration which involves a lot of annotations, corrections, group drawing (and doodles in

the margin) is enabled through digital whiteboard and annotations feature of Dimdim.

- Chat: As in any real world meeting there will be sub-groups of people engaged in conversation and exchange of ideas (some serious ones others more like “kicks under the table”) within the larger assembly in a web conference. This is facilitated through the multi-user chat feature.
- Polls: Polls enable the presenter to gauge the mood of the participants and to take decisions considering the opinions of many.
- Question manager: Question manager which is like a moderated Q&A setup enables the presenter to better manage the interaction.
- Record and Archive: All the interaction is recorded and archived for sharing with non-attendees and to reach a broader audience.

Document management

Alfresco

http://www.alfresco.com

Alfresco is the leading open source alternative for enterprise content management. The open source model allows Alfresco to use best-of-breed open source technologies and contributions from the open source community to get higher quality software produced more quickly at much lower cost. Our goal is to not only provide an open source offering but to surpass commercial offerings in terms of features, functionality and benefits to the user community. Alfresco is built by a team of leading members from Documentum and Interwoven with 15 years experience in Enterprise Content Management (ECM), including the co-founder of Documentum. It features Enterprise Content Management (ECM), Document Management, Collaboration, Records Management, Knowledge Management, Web Content Management, Imaging.

Among the highlights:

- Alfresco Document Management: Simple Virtual File System Interface, Email-Like Rules Configuration, Google Search – Direct from FireFox or IE, Yahoo-like browsing, SmartSpaces – Best Practice Collaboration Spaces, Transparent Lifecycle Support
- Document Management Functionality: Simple Content Contribution, Automatic Meta-data Extraction and Content Categorization, Advanced Distributed Search, Transparent Format Transformation Services, Library Services, Smart Collaboration Spaces, Integrated Simple and Complex Workflow, Dashboard Access, Security
- Supported Interfaces: CIFS/SMB Microsoft File Share Protocol, JSR-168 Portlet Specification, JSR-127 Java Server Faces, FTP, WebDAV, Web Services, REST
- Designed to meet DOD 5015.2 Requirements
- Drag-and-Drop Records Management Capture from Desktop Tools - Support for Microsoft Office, Microsoft Exchange and Open Office desktop tools though a standard Windows Explorer interface
- Automatic Metadata Extraction and Classification
- Complete auditing and workflow integration - Service Oriented Audit of every service invocation to a database table with dashboard access
- Extensible Records Management Rules Support
- Automatic Long-Term Archival Format Conversion – Automatic conversion from proprietary office formats to long-term vendor neutral formats such as Open Document Format (ODF) and Portable Document Format (PDF)
- Simple Export for Archival
- Zero Footprint on the client in both web and client server environments
- The industry’s most scalable, standards based JSR-170 content

repository

- High-Availability, Fault Tolerance and Scalability – Any number of machines, auto failover and clustering
- Simple to install, use and rollout
- Fileplans - Automatically classify and schedule records based upon pre-existing plans and standardized structures
- Type-Base Plans - Automatically classify and schedule records based upon pre-existing types
- Automated Lifecycle Management – Schedule, content and meta-data change activation based upon simple rules
- Automatic Document Numbering
- Retention and Archival Policies
- Disposition – Controlled and scheduled handling of archiving, holds, transfers, accessions and destruction using rules and automated processing
- Pre-population of Meta-Data – Impact management and automatic updates
- Dashboards – Pre-defined reports and metadata type definitions to search and screen records due for handling and handling exceptional cases
- DOD 5015.2 Administrator Templates – To support US Department of Defense records and filing requirement for metadata definitions, fileplans and functionality
- Rapid eDiscovery – Simply search across full-text content, fileplan structures, records management categories and types

CuteFlow

http://www.cuteflow.org/

CuteFlow is a web-based open source document circulation and workflow system. Users are able to define "documents" which are send step by step to every station/user in a list.

It's an electronical way for doing (i.e. internal) document circulations. A document can be assembled from input fields of different types. The fields can be filled with values by the receiver of the document directly in the users E-Mail-Client. After a completed circulation you will have a completely filled document. Also attachments to the document are possible (i.e. for illustration material).

All operations like starting a workflow, tracking, workflow-definition or status observation can be done within a comfortable and easy to use webinterface.

KnowledgeTree

http://www.knowledgetree.com/

KnowledgeTree is document management made simple: easily secure, share,

track and manage the documents and records your organization depends on. KnowledgeTree is the leading commercial open source electronic document management software designed for the SMB and departmental user. Features:

- Easy to use web interface
- Persist Microsoft Outlook email messages and email attachments to the document repository
- Document storage on web-based intranet/extranet platform promotes collaboration
- Utilize Tagging and Tag Clouds to share documents with your Colleagues and let them know what other people are working on
- Publish document or folder changes via RSS and consume RSS feeds on the KnowledgeTree AJAX Dashboard
- Search document contents (Microsoft Office, OpenDocument, PDF, XML, HTML, RTF, text) and metadata using simple single string search or create complex boolean search criteria
- Sophisticated but easy to use document version management using well known "check-in" and "check-out" concepts
- Powerful group and role-based security model allows for document access and action control management
- Granular and detailed auditing of all document activities
- Ability to bulk load documents using ZIP files or from server file-system
- Supports international languages including iconographic languages such as Japanese, Korean, Simplified and Traditional Chinese
- Build sophisticated workflows that manage the generation of document and notify certain roles or groups when they are required to act
- Limit document access during the workflow process to only users who require it
- Assign automatic workflow triggers to specific document types or folders
- Link documents together allowing documents of similar concepts or subject to be easily managed as groups
- Discuss documents using built-in discussion forums
- Controlled emailing of documents held within the repository
- Document and folder subscription technology allows users to receive notifications when document actions are performed
- Save standard searches so that users of the system have access to them from the system dashboard and browse views
- Access RSS feeds of changes to folders and documents
- Convert documents to Adobe PDF format for easy distribution and storage

Nuxeo ECM

http://www.nuxeo.com/en/products/

Nuxeo EP is a robust, extensible, global Enterprise Content Management (ECM) server-side solution available as Open Source Software. Deployed on a Java EE 5 application server, it leverages the full potential of the Java EE 5 platform, including: clustering, high-availability, manageability, integration within your information system and development tools support. Nuxeo EP is designed to be used from a web browser such as MS-IE or Firefox, with a rich, Ajax-based interface, from an office suite such as MS-Office, or from a Nuxeo RCP application. The Nuxeo EP default configuration provides both collaborative work and publication through a functional separation between workspaces and sections:

- Workspaces: provide end-users with a toolset to achieve document management and collaboration (document sharing, versioning, relations, access rights, etc.). Workspaces offer an innovative approach to leverage teamwork and to manage documents in a collaborative way (from the creation to the archiving phase).
- Sections: provide hierarchical views to access the validated content produced in workspaces and can be used as a website hierarchy or as a file plan.
- Among the features:
- rights and permissions
- Dashboards
- Search engine
- Document and information structure
- Document creation process
- Document editing and revision
- Access rights for metadata
- Document relations
- Notification management
- Document workflow
- History and audit

The server can be accessed through the web interface or using the rich client, that adds XHTML editing, photo editing and manipulation and dedicated portlets.

OpenKM

http://www.openkm.com/

OpenKM is an open source electronic document management system; it allows to centralize all company's information in a single access point, guaranteeing the security of the data. In this way, only authorized users can have access to specific data. At the same time, it provides a complete audit service. OpenKM

is a Web 2.0 application that works with Internet Explorer, Firefox, Safari and Opera. In addition, periodic backups avoid information losses. Among the features:

- Web-based client: you can access your document from anywhere
- Fast and enhanced user experience using AJAX
- Works with most popular browsers: Firefox 1.5 or above, IExplorer 5.5 or above, Opera and Safari
- Translated into German, Catalan, Spanish, French, English, Dutch, Farsi, Portuguese, Galician, Italian, Chinese simplified, Chinese traditional, Swedish , Serbian, Turkish, Japanese, Romanian, Polish, Hungarian, Greek and Latvian.
- Preview of multimedia files
- Mass document upload using ZIP files
- Download folder as ZIP
- Support for document templates
- Document subscription: mail notifications when document is modified
- Send document link by email
- Notes on documents.
- versioning
- Custom property groups to the system to improve document metadata
- Plug-in authentication based on JAAS
- Support for LDAP, Active Directory, Database, etc.
- User / role based
- Search by document content, keywords, modification date, author and document type.
- Automatically index uploaded documents: Text, HTML, RTF, XML, PDF, OpenOffice.org, MS Office, MS Office 2007, JPEG EXIF, MP3 ID3
- Search by synonyms

Vertical business applications

Adaptive Planning

http://www.adaptiveplanning.com/products_open_source.shtml

Adaptive Planning Express Edition provides a full set of capabilities for collaborative budgeting, reporting and analysis. Features include an intuitive, spreadsheet-like user interface; standard sheets for planning expenses and revenues; a specialized personnel planning sheet; formula-based modeling; and management of organizational hierarchies and user access rights. It can be downloaded and installed for individual use, as well as configured to provide web-based support for departmental teams or entire companies.

Among the features:

- Complete Set of Planning Components and Financial Statements: Budget and forecast Personnel, Expenses, Sales, and Capital from the bottom up or the top down. Link these elements via formulas to create a complete set of dynamic financial statements, including Cash Flow, Balance Sheet, and Income Statement.
- Metrics: Extend your plan beyond your Chart of Accounts. Budget and forecast any data required for your model, including operational metrics.
- Automated Consolidation: Budget and forecast changes made at the department level automatically consolidate to the corporate plan. The hassles of broken links and cutting and pasting data are eliminated.
- Configurable, Spreadsheet-like Data Entry: Data entry for managers is easy and intuitive. Data entry sheets are customized to show only the data relevant to them, and the interface looks and feels just like a spreadsheet.
- Dynamic Formulas: Formulas can be created in any data cell, just like a spreadsheet, and can reference data and assumptions from other cells to create dynamic results. Formulas can be established centrally for easy modification across the model.
- Drill-Downs: Real-time drill-down capabilities allow users to see where data originated.
- Web-based Access: Budgeting, forecasting and reporting can be done from any web browser, anytime, anywhere. No applications to install, no IT staff required to support or maintain the application. New users can be added at anytime.

Apatar

http://www.apatar.com

An open source data integration and transformation system. It features:

- Connectivity to Oracle, MS SQL, MySQL, Sybase, DB2, MS Access, PostgreSQL, XML, InstantDB, Paradox, BorlandJDataStore, Csv, MS Excel, Qed, HSQL, Compiere ERP, SalesForce.Com, SugarCRM,

Goldmine, any JDBC data sources and more.

- Single interface to manage all your integration projects
- Flexible deployment options
- Bi-directional integration
- Platform-independent, runs from Windows, Linux, Mac; 100% Java-based
- Easy customization, Java source code included
- No coding! Visual job designer and mapping enable non-developers to design and perform transformations

CORGA

http://corga.sourceforge.net/

The corga web application widely supports the processes that occur when a scientific conference or a workshop is being organized, with the submission of working papers as a starting point. After that reviewers for the submitted papers are being assigned and these reviewers judge the quality of the assigned papers using an easily customizable evaluation form. Then a ranking of the papers is being performed by the system and, based on this information, the administrator decides which papers shall be accepted and informs them about the acceptance. Using that information, the administrator can then set up a conference programme which can be published directly to the web. Meanwhile registration will be opened for participants, which can be listeners or speakers (people who present their paper).

Coupa

http://www.coupa.com/

Coupa e-procurement solutions enable companies to automate their entire buying lifecycle—from requisition, approval, and purchase order creation to RFQs, quotations, receiving, inventory, and invoicing. With a user-friendly experience that encourages mass participation, employees actually find Coupa solutions easier to use than to avoid. Supports local catalogs, non-catalog requests and requisition history.

CRM-CTT

http://www.crm-ctt.com

CRM-CTT is designed to track and process "entities". One can attach files to such an "entity", own it, assign it, put alerts on it, prioritize it, publish it, invoice it, etcetera. The point is that the system doesn't decide what an entity is, you do! The tool is multi-lingual (currently available lots of languages) and is fully customizable. Besides that your webmaster will need about half an hour to get it up and running, after which it takes about another 30 minutes to import your data - and off you go. The advantage of CRM-CTT over similar software is the way it can be configured. Wether you want to register customer requests, computer assets, help desk tickets, or just your own to-do list (or all together in one database), it can be simply modified to act the way you like it to act. Virtually everything can be adjusted to your needs. For example, you could use CRM-CTT to process purchase orders, including the

approval process. But, you could also use it to administer your website. Maybe you need a system to deliver a front-end for financial transaction logs, or for your backup status. Or maybe you just need an allround tool to process your helpdesk tickets or your projects. Whatever it is, it can be handled by CRM-CTT.

DADOS-SURVEY

http://www.ceso.duke.edu/

The Internet has been increasingly utilized in biomedical research. From online searching for literature to data sharing, the Internet has emerged as a primary means of research for many physicians and scientists. As a result, Web-based surveys have been employed as an alternative to traditional, paper-based surveys. We describe DADOS-Survey, an open-source Web-survey application developed at our institution that, to the best of our knowledge, is the first to be compliant with the Checklist for Reporting Results of Internet E-Surveys (CHERRIES). DADOS-Survey was designed with usability as a priority, allowing investigators to design and execute their own studies with minimal technical difficulties in doing so. DADOS-Survey was designed to ensure total compliance with the CHERRIES guidelines for Web-surveys.

Funambol

https://www.forge.funambol.org/

Many people want quick and easy access to their email, contacts, calendars, tasks and notes, regardless of where that information is stored. Funambol syncs this data with 1.5 billion mobile devices and with thousands of applications and online services. It doesn't matter if you use Gmail, Yahoo!, AOL, Hotmail, Outlook or Thunderbird, with Funambol, you can sync your email & PIM on many mobile handsets. The Funambol project was started in 2001 by developers because of the lack of an open source Java implementation of the SyncML (OMA DS) standard. This original project was known as Sync4j. At the beginning of 2006, it changed its name to Funambol, to have the same name as the company that grew out of the original project and that now funds its development. Funambol is a mobile open source platform that can be used for many types of mobile applications, including push email, PIM data synchronization and device management. It provides C++ and Java client APIs and server side Java APIs. It facilitates the development, deployment and management of a wide range of mobile projects.

Jitterbit

http://www.jitterbit.com/

Jitterbit is an open source integration technology that allows organizations to quickly and easily integrate:

- Enterprise Apps – Peoplesoft, Oracle financials, Siebel, JD Edwards, Salesforce.com, SAP, Netsuite, SugarCRM, Compiere, Vtiger CRM, OpenMFG, sharepoint, Documentum...
- Oracle, SQL Server, DB2, mySQL, Microsoft Access, Visual Fox Pro, and several others
- Web Services, Simple and Complex Flat Files (e.g. csv, heirarchical) XML, Active Directory, LDAP, Bugzilla, FTP, LDAP, JMS...

- All integration operations run on the Jitterbit integration server. These operations are defined, configured, and monitored with the Jitterbit GUI application. This tool lets you point-and-click to configure all aspects of your integration:
- Define integration operations including source and target systems
- Create document definitions, from simple flat file structures (e.g. comma delimited) to complex hierarchic files structures.
- Use a drag-and-drop mapping tool to transform data between your various system interfaces.
- Set schedules, create success and failure events and track the results for your integration operations.
- Consume and Publish your integrations via Jitterpaks: Jitterpaks are pre-defined, reusable integration solutions for Jitterbit. Jitterpaks include all the details required for a specific integration (i.e. a CRM app to a Web Service.), including the document definitions, transformation rules, and source and target systems.

Jbilling

http://sourceforge.net/projects/jbilling/

jbilling is a web-based enterprise billing system for business of all sizes. It manages your subscribers with automatic invoicing (email and PDF) and payment processing (credit cards, checks, direct deposit). Robust, well documented, commercially supported.

Limesurvey

http://www.limesurvey.org/

A complete survey management software:

- Unlimited number of surveys at the same time
- Unlimited number of questions in a survey (only limited by your database)
- Unlimited number of participants to a survey
- Multi-Lingual Surveys
- User-Management
- 20 different question types with more to come
- Creation of a printable survey version
- Ability to set conditions for questions depending on earlier answers (branching the survey)
- Re-usable editable answer sets
- Ready-made importable questions
- Assessment surveys
- Anonymous and Not-Anonymous survey

- Open and closed group of participant surveys
- Optional public registration for surveys
- Sending of invitations, reminders and tokens by email
- Option for participants to buffer answers to continue survey at a later time
- Cookie or session based surveys
- Template editor for creating your own page layout
- Extended and user-friendly administration interface
- Back-office data entry possibility
- Survey expiry dates for automation
- Enhanced import and export functions to text, CSV and MS Excel format
- Basic statistical and graphical analysis with export facility

MatchMaker

http://www.sqlpower.ca/page/MatchMaker

The Power*MatchMaker will cleanse your data, validate and correct addresses, identify and remove duplicates, and build cross-references between source and target tables. This provides business users with complete and accurate data, and a single 360º view of each customer, product, sales rep and business unit. Whether you're building a Data Warehouse, Data Mart or CRM, the Power*MatchMaker goes a long way towards ensuring the data integrity of your decision support environment or CRM database.

Features:

•Transforms and cleanses Key Dimensions

•Validates and corrects address information

•Accepts user-defined data matching criteria

•User-friendly, highly-intuitive interface for Match Verification

•Allows for user confirmation of duplicates through the online verification facility

•Merges duplicate records and their related data

•Allows for Backup of impacted records prior to data merging

•Builds cross-reference tables to link source systems' identifiers (Primary Keys) to the target database identifiers

•Runs against the entire database to perform initial data cleanup, or incorporated into the data load process

Magento

http://www.magentocommerce.com/

A complete eCommerce system, with several advanced features:

search engine optimization (SEO), customer communication, ship to multiple

addresses, search, product comparison, layered navigation, product tagging, product reviews, wishlist, checkout, shopping cart, customer accounts, multi-tier pricing, coupons, price rules, tax rules, integral content management system, customer groups, multiple currencies and languages.

Marketcetera

http://trac.marketcetera.org/

Marketcetera is a new software platform committed to providing fast, flexible and reliable securities trading tools to financial services professionals. Our mission is to make world-class order-management and risk-management software available and affordable to individuals and to institutions of all sizes. Marketcetera focuses on building the key trading functions that are common to all organizations, thus freeing our clients to concentrate on proprietary trading algorithms and other specialized software that provide a competitive advantage. The components are:

- Photon: Photon is Marketcetera's visual order-entry application. It is based on the Eclipse Rich Client Platform and is exceptionally light-weight and extensible.
- The Order Management System is the heart of the Marketcetera platform. It receives commands from various entry points (such as Photon, Order Loader or Excel), and routes them to the appropriate destination. The OMS receives the reply from the counterparty (broker, exchange, etc) and forwards it to the client that issued the original order.
- Tradebase is a web-based reporting application for all of your trading activity. It can be used to view, create and modify positions, trades, accounts and equities. Tradebase can be accessed from a stand-alone web browser or directly from within the Photon order-entry application.
- OrderLoader is a utility for bulk-loading multiple of orders from a CSV file. The format of the file itself is data-driven, which means that the header row determines the fields that need to be present in the subsequent rows and which will be added to the message that is later sent to the OMS.

OpenPSA

http://www.openpsa.org/

OpenPSA is a Free, Web-based Management Software Package for Consultancies and Service organizations. OpenPSA includes the following modules:

- Projects - Project Management, Hour Reporting and Invoicing
- Sales - Contact Database and Sales Project Tracking
- Support - Help Desk and Issue Tracking
- Calendar - Group Calendar and Resource Reservations
- Documents - Document Management and Sharing

OrangeHRM

http://orangehrm.com

OrangeHRM is an Open Source HRM information system that will provide a vast range of features to manage the crucial organization asset – people. It provides several modules:

- Administration Module (Admin)
- Personal Information Manager Module (PIM)
- Employee Self Service Module (ESS)
- Reports Module
- Leave Module
- Time and Attendance Module (Time)

The software supports project definition and company customers and timesheet management.

PayMaster

http://www.treshna.com/paymaster/

A complete New-Zealand specific payroll and HRM application. Paymaster has been developed to match the needs of both small and large organisations. Utilising an easily customisable back-end, that calculates the results to help meet the diverse requirements of your specific payroll. Complex tax laws, leave, varying pay rates, allowances, superannuation are just some of the things the payroll system can handle. It can also handle cost accounting by analysing and reporting wage costs to multiple branches and departments, different pay rates, etc. Full reporting features are available.

PayThyme

http://clocksoft.co.uk/downloads/

A UK-specific HR and payroll solution.

Pentaho

http://www.pentaho.com/

The Pentaho BI Project provides enterprise-class reporting, analysis, dashboard, data mining and workflow capabilities that help organizations operate more efficiently and effectively. The software offers flexible deployment options that enable use as embeddable components, customized BI application solutions, and as a complete out-of-the-box, integrated BI platform. Ranked #1 in Open Source Business Intelligence. The project cover the following areas:

- Reporting
- Analysis
- Dashboards
- Data Mining
- Workflow
- BI Platform

phpESP

http://sourceforge.net/projects/phpesp/

PHP scripts to let non-technical users create surveys, administer surveys, gather results, view statistics. All managed online after database initialization. Large surveys (100 questions) and large respondent groups (4,000+) can be handled without a problem.

php-residence

http://www.digitaldruid.net/php-residence/en/

Php-residence is an open source program with a web interface for the management of weekly or daily rental of house apartments or residence and hotel rooms. Its main features are: configurable number and characteristics of apartments, periods, rates, etc., automatic assignment of the apartments with user defined rules, possibility to add weekly-daily or percentage extra costs to the rates, visualization of documents with inserted data for printing, creation of templates to check availability from an internet site, multi-user with privileges system.

ReOS

http://reos.elazos.com

ReOS is a Real Estate Web Site and Customer Relationship Manager. Allows for publishing properties in Internet & print them for the office window, task assignments, slaes agents, multilanguage with automated translation, buying requests and dispatching, multi-office.

SnapLogic

http://www.snaplogic.org/

SnapLogic is an Open Source Data Integration framework that uses the universal standards of the Web and applies them to the problem of data integration. Unlike commercial integration solutions that are designed for individual integration tasks, SnapLogic has the power and flexibility to address a wide range of data integration requirements without hand-coding. Data sources accessed by SnapLogic Resources present the data in a simplified record-oriented format that eliminates the complexity of application-specific data schemas. This enables Resources to interoperate more easily and facilitates reuse. Resources can be linked to other Resources through their REST interface. Linked Resources become transformation Pipelines. Pipelines can be assembled into hierarchies to implement complex logic and transform data for sophisticated integrations. SnapLogic has a built-in HTTP server which allows Resources to link across servers so that Pipelines can be partitioned to execute arbitrarily across data sources, intermediate transformation servers, or in any manner that is appropriate. SnapLogic uses an innovative record-streaming technique so that Resources can process individual records without waiting for entire data sets to become available.

Talend

http://www.talend.com/

Talend Open Studio’s Business Modeler leverages a top-down approach, allowing line-of-business stakeholders to get involved in the design of the

integration processes. The Business Modeler provides an easy-to-understand, non-technical view of a business workflow. It typically includes both the systems and processes already operating in the organization, and the ones that will be needed in the future. Systems, connections, steps and requirements are all designed using standardized workflow notation through an intuitive graphical toolbox. Talend Open Studio's Job Designer provides both a graphical and a functional view of the actual integration processes; the Job Designer features the Component Library – a graphical palette of components and connectors. Integration processes are built by simply drag and dropping components and connectors to the diagram, drawing connections and relationships between them, and setting their properties. Most of these properties are already inherited from the metadata.

The Component Library includes over 80 out-of-the-box components and connectors, providing basic functions such as mappings, transformations, and lookups; specialized functions such as data filtering, data multiplexing, or ELT; and support for all major RDBMS, file formats, LDAP directories, etc. The Component Library can easily be extended using industry-standard languages such as Perl, Java, or SQL.

Talend Open Studio is a metadata-driven solution, in which all metadata is stored and managed in a centralized Metadata Repository, shared by all the modules. The Metadata Repository centralizes all project information and ensures the consistency of all integration processes. Beyond source and target systems metadata, the Metadata Repository also stores business models, integration jobs, and results of their execution – making it the unique repository of information on all integration processes. Unlike many integration solutions, which are based on a centralized integration server or can only use RDBMS engines to process data, Talend Open Studio dynamically distributes the processing across a grid of systems – based on their available capacity. As a result, these systems do not need to be dedicated to executing integration processes. Instead, Talend Open Studio leverages available resources, regardless of their nature. This architectural approach enables data to be processed at a location which is the closest to its source (thus decreasing data transfers).

TenderSystem

http://www.tendersystem.com

TenderSystem is an Internet based electronic tendering system to source, award and manage the total procurement process. This tried and tested technology leverages the age-old principle of supply and demand, through reverse auction, ensuring that products are purchased at the best possible price, at a lower administration and management cost, than any other method. It covers all the activities needed for the electronic tender, included source, purchase, payment and management.

TimeTrex

http://www.timetrex.com

TimeTrex is a complete web-based payroll and time management suite which offers employee scheduling, attendance (timeclock, timesheet), job costing, invoicing and payroll all in tightly integrated package.

ZoneMinder

http://www.zoneminder.com/

ZoneMinder is intended for use in single or multi-camera video security applications, including commercial or home CCTV, theft prevention and child, family member or home monitoring and other domestic care scenarios such as nanny cam installations. It supports capture, analysis, recording, and monitoring of video data coming from one or more video or network cameras attached to a Linux system. ZoneMinder also support web and semi-automatic control of Pan/Tilt/Zoom cameras using a variety of protocols. It is suitable for use as a DIY home video security system and for commercial or professional video security and surveillance. It can also be integrated into a home automation system via X.10 or other protocols.

Content management systems

Drupal

http://drupal.org

Drupal is a free software package that allows an individual or a community of users to easily publish, manage and organize a wide variety of content on a website. Among the features:

- Collaborative Book - Our unique collaborative book feature lets you setup a "book" and then authorize other individuals to contribute content.
- Friendly URLs - Drupal uses Apache's mod_rewrite to enable customizable URLs that are both user and search engine friendly.
- Modules - The Drupal community has contributed many modules which provide functionality that extend Drupal core.
- Online help - Like many Open Source projects, we can't say that our online help is perfect but have built a robust online help system built into the core help text. Available to you on your own site.
- Open source - The source code of Drupal is freely available under the terms of the GNU General Public License 2 (GPL). Unlike proprietary blogging or content management systems, Drupal's feature set is fully available to extend or customize as needed.
- Personalization - A robust personalization environment is at the core of Drupal. Both the content and the presentation can be individualized based on user-defined preferences.
- Role based permission system - Drupal administrators don't have to tediously setup permissions for each user. Instead, they assign permissions to roles and then group like users into a role group.
- Searching - All content in Drupal is fully indexed and searchable at all times if you take advantage of the built in search module.
- User authentication - Users can register and authenticate locally or using an external authentication source like Jabber, Blogger, LiveJournal or another Drupal website. For use on an intranet, Drupal can integrate with an LDAP server.
- Polls - Drupal comes with a poll module which enables admins and/or users to create polls and show them on various pages.
- Templating - Drupal's theme system separates content from presentation allowing you to control the look and feel of your Drupal site. Templates are created from standard HTML and PHP coding meaning that you don't have to learn a proprietary templating language.
- Threaded comments - Drupal provides a powerful threaded comment model for enabling discussion on published content. Comments are hierarchical as in a newsgroup or forum.

- Version control - Drupal's version control system tracks the details of content updates including who changed it, what was changed, the date and time of changes made to your content and more. Version control features provide an option to keep a comment log and enables you to roll-back content to an earlier version.
- Blogger API support - The Blogger API allows your Drupal site to be updated by many different tools. This includes non-web browser based tools that provide a richer editing environment.
- Content syndication - Drupal exports your site's content in RDF/RSS format for others to gather. This lets anyone with a News Aggregator browse your Drupal sites feeds.
- News aggregator - Drupal has a powerful built-in News Aggregator for reading and blogging news from other sites. The News Aggregator caches articles to your MySQL database and its caching time is user configurable.
- Permalinks - All content created in Drupal has a permanent link or "perma link" associated with it so people can link to it freely without fear of broken links.
- Multi-language - Drupal is designed to meet the requirements of an international audience and provides a full framework to create a multi-lingual website, blog, content management system or community application. All text can be translated using a graphical user interface, by importing existing translations, or by integrating with other translation tools such as the GNU gettext.
- Analysis, Tracking and Statistics - Drupal can print browser-based reports with information about referrals, content popularity and how visitors navigate your site.
- Logging and Reporting - All important activities and system events are captured in an event log to be reviewed by an administrator at a later time.
- Web based administration - Drupal can be administered entirely using a web browser, making it possible to access it from around the world and requires no additional software to be installed on your computer.
- Discussion forums - Full discussion forum features are built into Drupal to create lively, dynamic community sites.
- Caching - The caching mechanism eliminates database queries increasing performance and reducing the server's load. Not only can the caching be tuned in real time, while your site is under load, but it has been successfully tested under a "slashdotting" and performed extremely well.

Joomla!

http://www.joomla.org

Joomla! is an award-winning Content Management System (CMS) that will help you build websites and other powerful online applications. The basic Joomla! package is designed to be easy to install, even for non-programmers.

Most people have no trouble getting our software up and running, and there is plenty of support available for newbies. We have a growing, active community of more than 40,000 friendly users and developers on our forums eager to help. Once Joomla! is installed and running, it is simple for even non-technical users to add or edit content, update images, and to manage the critical data that makes your company or organization go. Anybody with basic word processing skills can easily learn to manage a Joomla! site. Via a simple, browser-based interface you will be able to easily add new press releases or news items, manage staff pages, job listings, product images, and create an unlimited amount of sections or content pages on your site. ut of the box, Joomla! does a great job of managing the content needed to make your website sing. But for many people, the true power of Joomla! lies in the application framework that makes it possible for thousands of developers around the world to create powerful add-ons and extensions. Here are just some examples of the hundreds of available extensions:

- Dynamic form builders
- Business or organizational directories
- Document management
- image and multimedia galleries
- E-commerce and shopping cart engines
- Forums and chat software
- Calendars
- Blogging software
- Directory services
- Email newsletters
- Data collection and reporting tools
- Banner advertising systems
- Subscription services

Plone

http://plone.org/

Plone is a ready-to-run content management system that is built on the powerful and free Zope application server. Plone is easy to set up, extremely flexible, and provides you with a system for managing web content that is ideal for project groups, communities, web sites, extranets and intranets.

- Plone is easy to install. You can install Plone with a a click and run installer, and have a content management system running on your computer in just a few minutes.
- Plone is easy to use. The Plone Team includes usability experts who have made Plone easy and attractive for content managers to add, update, and mantain content.
- Plone is international. The Plone interface has more than 35

translations, and tools exist for managing multilingual content.

- Plone is standard. Plone carefully follows standards for usability and accessibility. Plone pages are compliant with US Section 508, and the W3C's AAA rating for accessibility.
- Plone is Open Source. Plone is licensed under the GNU General Public License, the same license used by Linux. This gives you the right to use Plone without a license fee, and to improve upon the product.
- Plone is supported. There are close to a hundred developers in the Plone Development Team around the world, and a multitude of companies that specialize in Plone development and support.
- Plone is extensible. There is a multitude of add-on products for Plone to add new features and content types. In addition, Plone can be scripted using web standard solutions and Open Source languages.
- Plone is technology neutral. Plone can interoperate with most relational database systems, open source and commercial, and runs on a vast array of platforms, including Linux, Windows, Mac OS X, Solaris and BSD.

Plone is a content management framework that works hand-in-hand and sits on top of Zope, a widely-used Open Source web application server and development system. To use Plone, you don't need to learn anything about Zope; to develop new Plone content types, a small amount of Zope knowledge is helpful, and it is covered in the documentation. Zope itself is written in Python, an easy-to-learn, widely-used and supported Open Source programming language. Python can be used to add new features to Plone, and used to understand or make changes to the way that Zope and Plone work. By default, Plone stores its contents in Zope's built in transactional object database, the ZODB. There are products and techniques, however, to share information with other sources, such as relational databases, LDAP, filesystem files, etc. Plone runs on Windows, Linux, BSD, Mac OS X, and many other platforms; double-click installers are available for Windows and Mac OS X, and RPM packages are available for Linux.

Typo3

http://typo3.com/

TYPO3 is a free Open Source content management system for enterprise purposes on the web and in intranets. It offers full flexibility and extendability while featuring an accomplished set of ready-made interfaces, functions and modules. Among the features:

- Rich Text Editor (RTE)
- Intuitive UI
- Spell Checker
- Configurable UI Levels
- Undo / History
- Frontend or Backend Editing

- Internal Shortcuts
- "Live" Search & Replace
- Wizards
- Internal Search Engine
- Flexform Configuration
- TypoScript Language
- Template Management
- Designer-friendly Templating System
- CSS Styled Content
- Dynamic graphical menus
- Audit Trail
- Content Approval
- Pluggable Authentication
- Simultaneous Editing Warning
- Versioning
- Content Syndication
- Accessibility/WAI Compliant
- Multiple Page Editing

Elearning applications

CLAROLINE

http://www.claroline.net/

Claroline is an Open Source eLearning and eWorking platform allowing teachers to build effective online courses and to manage learning and collaborative activities on the web. Translated into 35 languages, Claroline has a large worldwide users' and developers' community. Released under Open Source license, the Claroline platform allows hundreds of organizations from 86 countries to create and administer courses and collaboration spaces online. Each course space provides a list of tools enabling the teacher to :

- Publish documents in any format (text, PDF, HTML, video...)
- Administer public and private forums
- Develop learning paths
- Create groups of students
- Prepare online exercises
- Manage an agenda with tasks and deadlines
- Publish announcements (also by e-mail)
- Propose assignments to be handed in online
- See the statistics of the users activity
- Use the wiki to write collaborative documents

ILIAS

http://www.ilias.de/index.html

ILIAS is a powerful web-based learning management system that allows you to easily manage learning resources in an integrated system.

- Individual Personal Desktop
- Course Management
- Group Management
- Repository with Role Based Access Control
- Learning Content (XML, SCORM, AICC)
- Standards Compliance (LOM, SCORM 1.2, IMS-QTI, AICC)
- SCORM 1.2 RTE Level 3 Certified
- Learning Progress Management
- Test & Assessment
- Survey
- Chat

- Forums
- Exercises
- RSS Support
- Podasting
- Google Maps Support
- Authentication (LDAP, Shibboleth, CAS, Radius, SOAP)
- Web Service Interface (SOAP)

iTALC

http://italc.sourceforge.net/home.php

iTALC is a use- and powerful didactic tool for teachers. It lets you view and control other computers in your network in several ways. It supports Linux and Windows 2000/XP/Vista and it even can be used transparently in mixed environments! iTALC has been designed for usage in school. Therefore it offers a lot of possibilities to teachers, such as:

- see what's going on in computer-labs by using overview mode and make snapshots
- remote-control computers to support and help other people
- show a demo (either in fullscreen or in a window) - the teacher's screen is shown on all student's computers in realtime
- lock workstations for moving undivided attention to teacher
- send text-messages to students
- powering on/off and rebooting computers per remote
- remote logon and logoff and remote execution of arbitrary commands/scripts
- home-schooling - iTALC's network-technology is not restricted to a subnet and therefore students at home can join lessons via VPN-connections just by installing iTALC client

Mahara

http://www.mahara.org/

Established in 2006, Mahara is the result of a collaborative venture funded by New Zealand's Tertiary Education Commission's e-learning Collaborative Development Fund (eCDF), involving Massey University, Auckland University of Technology, The Open Polytechnic of New Zealand and Victoria University of Wellington. Mahara is a fully featured open source electronic portfolio, weblog, resume builder and social networking system, connecting users and creating online communities. Mahara is designed to provide users with the tools to demonstrate their life-long learning, skills and development over time to selected audiences.

MOODLE

http://moodle.org/

Moodle is a course management system (CMS) - a free, Open Source software package designed using sound pedagogical principles, to help educators create effective online learning communities. You can download and use it on any computer you have handy (including webhosts), yet it can scale from a single-teacher site to a University with 200,000 students.

Sakai

http://sakaiproject.org

Sakai is an online Collaboration and Learning Environment. Many users of Sakai deploy it to support teaching and learning, ad hoc group collaboration, support for portfolios and research collaboration. Sakai is a free and open source product that is built and maintained by the Sakai community. Sakai's development model is called "Community Source" because many of the developers creating Sakai are drawn from the "community" of organizations that have adopted and are using Sakai. Among the features:

- Announcements Tool
- Assignments Tool
- Chat Room Tool
- Discussion Tool
- Drop Box Tool
- Email Archive Tool
- Gradebook
- Help Tool
- Membership Tool
- Message Center
- My Workspace
- News Tool
- Permissions and Roles
- Post'Em
- Preferences
- Resources Tool
- Schedule Tool
- Site Info Tool
- Syllabus Tool
- Synoptic Tool
- Tests and Quizzes
- WebDAV
- Wiki Tool

- Website Information Tool Website Setup Tool

Graphics Video and CAD

AviDemux

http://avidemux.berlios.de/index.html

Avidemux is a free video editor designed for simple cutting, filtering and encoding tasks. It supports many file types, including AVI, DVD compatible MPEG files, MP4 and ASF, using a variety of codecs. Tasks can be automated using projects, job queue and powerful scripting capabilities. Avidemux is available for Linux, BSD, Mac OS X and Microsoft Windows under the GNU GPL license.

Blender

http://www.blender.org/

Blender is the free open source 3D content creation suite, available for all major operating systems under the GNU General Public License. It provides a complete system for 3D, video production, compositing and rendering. Among the features:

- Windows for animation curves/keys, outliner, schematic scene diagram, generic node editing system, non-linear video sequence editing, character animation action editor, non-linear animation mixer, image/UV editing, file/image selection and file management; Built-in text editor for annotations and editing Python scripts, Graphical user interface for Python scripts, Custom themes, Consistent interface across all platforms
- Rigging: Fast skeleton creation mode, Interactive 3D paint for vertex weighting, Fast envelope based skinning, Mirror editing (bone creation and weight painting), Constraint stack for IK solver setup and other constraints
- Animation: Armature (skeleton) deformation with forward/inverse kinematics, Auto IK allows posing FK chains easily, Non-linear animation editor for mixing individual actions created in Action editor, Automated walkcycles along paths, Animated constraint system, Vertex key framing for morphing, with controlling sliders, Edit and create new blendshapes from existing targets, Character animation pose editor, Animated deformers (Lattice, Curve), 'Ipo' system integrates both motion curve and traditional key-frame editing, Audio playback, mixing and editing support for sound synchronisation, Timeline offers fast acces to many playback functions, autokey, help markers
- UV Unwrapping: Conformal and Angle Based unwrapping methods, Interactive transform of UV maps by vertex pinning, Proportional falloff editing of UV maps for smooth transformations, Seam based unwrapping, Cube, Cylinder, Sphere, View projections
- Physics and particles: Particle system can be atached to any mesh object. Control methods include weight painting, textures, curve guides, wind and vortex effects. Particles can be deflected by moving geometry, Hair strands can be created by a static particle system, supporting all

particle control methods, Fluid simulator with fully animated inflow, outflow, obstacle and fluid objects. Gravity and viscosity settings can also be animated. Supports vector blur and is integrated with the particle system, Realtime soft body solver integrated in mesh, lattice, curve and text objects. Supports collision detection and particle field effects like Wind or Vortex, soft bodys can also be baked for faster playback/rendering

- Modeling: A range of 3D object types including polygon meshes, NURBS surfaces, bezier and B-spline curves, metaballs, vector fonts (TrueType, PostScript, OpenType), Very fast Catmull-Clark subdivision surfaces with optimal iso-lines display and sharpness editing, Full multiresolution sculpting capabilities with 2D bitmap/3D procedural brushes (Paint, Smooth, Pinch, Inflate, Grab) supporting symmetry, Modifier stack deformers such as Lattice, Curve, Armature or Displace, Mirror modifier with middle vertices clipping and automatic deletion of inner faces, Non destructive real time Boolean and Array modifiers, Mesh modeling based on vertex, edge and/or face selection, Smooth soft selection editing tools for organic modeling
- Rendering: Render layers and passes, Render baking to UV maps (full render, ambient occlusion, normals, textures), Render engine tightly integrated with the node compositor, Halo, lens flares and fog effects, Vector motion-blur post-process effect (using node compositor), Realistic defocus (DOF), post-process effect (using node compositor), Edge rendering for toon shading, Interactive preview rendering panel in any 3d view, Ambient Occlusion, Radiosity solver, Integral support for the Yafray render engine, Export scripts available for external renderers such as Renderman (RIB), Mental Ray, Povray, Virtualight, Indigo
- Shading: Node editor for creating and mixing complex materials, Material previews rendered by main render engine, Fast, realistic subsurface scattering, Tangent shading to give any shader an anisotropic effect, Versatile procedural textures system, Reflection maps, Normal, displacement and bump maps
- Compositing: Compositor tightly integrated and aligned with the rendering pipeline, MultiLayer OpenEXR files allow to store and reuse raw renderlayer and passes data, Complete list of composite node filters, convertors, color and vector operators and mixers including Chroma Key, Blur, RGB Curves, Z Combine, Color Ramp, Preview panel to define the portion of interest. A composite then only happens on this part, Threaded and memory efficient (up to 8 processors), Near realtime sequencer can edit hours of video, Waveform and U/V scatter plots, Open and write many audio & video file formats using ffmpeg (linux only at the moment, FFMPEG for Windows/OS X is scheduled for next release), Can render using frameserver-support directly into foreign applications, Supports float images as well as regular 32 bits images, Curves tool allows you to create a mapping from the float range to a displayable result (for HDR images)

Customizations and extensions are available for use in architecture and building rendering at http://blender-archi.tuxfamily.org/Main_Page

Cademia

http://www.cademia.org

Existing software tools for the planning process have severe limitations: They are restricted in openness, they are dependent on the platform, they are complex to use and to program and the users have a limited exertion of influence on the further development. As a solution, a new platform for geometry-oriented AEC applications has been developed at Bauhaus University Weimar: CADEMIA. While CADEMIA was originally written for teaching and research purposes it is now available as open source software. A long time experience in the development of these systems in the building industry forms the base on which CADEMIA is built. CADEMIA is a modular constructed software and offers lots of possibilities to integrate other functionalities. Due to this flexibility CADEMIA can easily be custom-modeled to fit individual needs. CADEMIA is programmed in JAVA and therefore platform independent.

celtx

http://www.celtx.com

Celtx is the world's first open source all-in-one media pre-production software. It has everything you need to take your story from concept to production. Celtx replaces 'paper, pen & binder' pre-production with a digital approach that's more complete, simpler to work with, and easier to share. Celtx includes the essential features that writers need to keep their fingers moving - like intuitive formatting, text auto-complete, page breaks, dual column dialog, scene management, scratchpad, embedded notes, title page generation, pagination, printing, spellchecker, keyboard shortcuts, find and replace, script importing and exporting, PDF and HTML script reports, and collaboration. Celtx includes reversible, colour coded Index Cards that are intelligently tied to your script and auto populate with the Scene Headers and first 40 words or so of the scene. You can flip the cards to type notes on the back, colour code them to track plot lines, and drag and drop them to reorder scenes.You can add sound files, video clips, digital photos and scanned documents to your project to create a media intensive breakdown. You can then associate the media with any one of the 36 production categories, including wardrobe, props, and locations. The user can add a storyboard based on your script and adding individual or batch images in to the storyboard. Each storyboard image is accompanied with a shot description to help you communicate your creative vision. Rearrange images and sequences within the project to construct your visual narrative. Then when you're ready, use the slideshow feature to play the images to help pre-visualize your media project.

Cenon

http://www.cenon.info/

A vector graphics editor, with specialized import filters for many vector formats. It can be used for desktop publishing, vector graphics conversion, and through commercial modules it performs the role of a CAM workstation. It supports vector editing, blending, color separation, PDF and PostScript direct editing, importing of 2D DXF, Gerber files, HPGL, DIN and derivatives like Sieb&Meyer, Wessel and Excellon. It supports vectorization, layers, paths and text along paths.

CineLerra

http://cinelerra.org

Cinelerra is an advanced non-linear video editor and compositor for Linux. Cinelerra includes support for very high-fidelity audio and video: it processes audio using 64 bits of precision, and can work in both RGBA and YUVA color spaces, using floating-point and 16-bit integer representations, respectively. It is resolution and frame rate-independent, meaning that it can support video of any speed and size.

CinePaint

http://www.cinepaint.org/

CinePaint is a collection of free open source software tools for deep paint manipulation and image processing. CinePaint is used for motion picture frame-by-frame retouching, dirt removal, wire rig removal, render repair, background plates, and 3d model textures. It's been used on many feature films, among them "League of Extraordinary Gentlemen", "Harry Potter", "The Last Samurai", "SpiderMan". It's also being used by pro photographers who need greater color fidelity than is available in other tools. CinePaint is fundamentally different from other painting tools because it handles high fidelity image formats such as Kodak Cineon, SMPTE DPX, and ILM-NVIDIA OpenEXR. CinePaint has vast dynamic range: 16-bits per channel (64-bit RGBA). That's more range than can be displayed on a computer monitor (24-bit RGB), but can make a visible difference when working with film. Film scanners have more range than monitors, and can capture a superior image from film. Even with images that started in 8-bit, conversion to 16-bit can preserve color information that can otherwise be lost during the editing process. Such loss of fidelity can be visible as banding when an image is eventually printed back to film or blown up to higher magnification for a still print. The extended dynamic range of CinePaint appeals not just to 35mm cinematographers, but to 35mm still photographers as well. Still photographers can think of CinePaint as having many more F-stops of range, of being capable of capturing much more subtle nuances of color in a vast blue sky for instance. CinePaint handles 8-bit, 16-bit linear, and 16-bit float images.

GIMP

http://www.gimp.org/

GIMP is the GNU Image Manipulation Program. It is a freely distributed piece of software for such tasks as photo retouching, image composition and image authoring. It works on many operating systems, in many languages. It is a raster editor, which means that it performs operations directly on the pixels that make up the image, and not a vector editor. Other (proprietary) raster editors include Adobe Photoshop or Jasc Paintshop Pro. Among the features:

- Painting: Full suite of painting tools including Brush, Pencil, Airbrush, Clone, etc.; Sub-pixel sampling for all paint tools for high quality anti-aliasing, Extremely powerful gradient editor and blend tool, Supports custom brushes and patterns
- System: Tile based memory management so image size is limited only by available disk space, Virtually unlimited number of images open at one

time

- Advanced Manipulation: Full alpha channel support, Layers and channels, Multiple Undo/Redo (limited only by diskspace), Editable text layers, Transformation tools including rotate, scale, shear and flip, Selection tools including rectangle, ellipse, free, fuzzy and intelligent, Advanced path tool doing bezier and polygonal selections, Transformable paths, transformable selections, Quickmask to paint a selection.
- Over 100 plug-ins already available

It supports most Windows native Adobe Photoshop plugins in the Linux environment through an extension called PSPI (available at http://www.gimp.org/~tml/gimp/win32/pspi.html).

GRASS GIS

http://grass.itc.it/

GRASS (Geographic Resources Analysis Support System) is a raster/vector GIS, image processing system, and graphics production system. GRASS contains over 350 programs and tools to render maps and images on monitor and paper; manipulate raster, vector, and sites data; process multi spectral image data; and create, manage, and store spatial data. GRASS uses both an intuitive windows interface as well as command line syntax for ease of operations. GRASS can interface with commercial printers, plotters, digitizers, and databases to develop new data as well as manage existing data. Among the features:

- Raster: Automatic rasterline and area to vector conversion, Buffering of line structures, Cell and profile dataquery, Colortable modifications, Conversion to vector and point data format, Correlation / covariance analysis, Expert system analysis, Map algebra (map calculator), Interpolation for missing values, Neighbourhood matrix analysis, Raster overlay with or without weight, Reclassification of cell labels, Resampling (resolution), Rescaling of cell values, Statistical cell analysis, Surface generation from vector lines
- 3D (voxel): 3D data import (intuitive ASCII: x y z Format), 3D masks, 3D map algebra (r3.mapcalc), 3D interpolation (IDW, Regularised Splines with Tension), 3D Visualization (isosurfaces), Interface to Vis5D visualization tool
- Vector analysis: Contour generation from raster surfaces (IDW, Spline algorithm), Conversion to raster and point data format, Digitizing with board or on screen (scanned raster image) with mouse, Reclassification of vector labels, Superpositioning of vector layers
- Point data analysis: Delaunay triangulation, Surface interpolation from spot heights, Thiessen polygons, Topographic analysis (curvature, slope, aspect)
- Image processing: Canonical component analysis (CCA), Color composite generation, Edge detection, Frequency filtering (Fourier, convolution matrices), Fourier and inverse fourier transformation, Histogram stretching, IHS transformation to RGB, Image rectification

(affine and polynomial transformations on raster and vector targets), Ortho photo rectification, Principal component analysis (PCA), Radiometric corrections (Fourier), Resampling, Resolution enhancement (with RGB/IHS), RGB to IHS transformation, Texture oriented classification (sequential maximum a posteriori classification), Shape detection, Supervised classification (training areas, maximum likelihood classification), Unsupervised classification (minimum distance clustering, maximum likelihood classification)

- DTM-Analysis: Contour generation, Cost / path analysis, Slope / aspect analysis, Surface generation from spot heigths or contours
- Several external modules, among them: Erosion modelling (AGNPS 5, ANSWERS, TOPMODEL), Landscape structure analysis, Solution transport, Watershed analysis
- Interfaces for the R statistical system

Gscan2PDF

http://gscan2pdf.sourceforge.net/

A tool designed to simplify the scanning process of books or other compound material. It provides additional features by integrating a tool called "unpaper". Unpaper is a post-processing tool for scanned sheets of paper, especially for book pages that have been scanned from previously created photocopies. The main purpose is to make scanned book pages better readable on screen after conversion to PDF. Additionally, unpaper might be useful to enhance the quality of scanned pages before performing optical character recognition (OCR). unpaper tries to clean scanned images by removing dark edges that appeared through scanning or copying on areas outside the actual page content (e.g. dark areas between the left-hand-side and the right-hand-side of a double- sided book-page scan). The program also tries to detect disaligned centering and rotation of pages and will automatically straighten each page by rotating it to the correct angle. This process is called "deskewing".

gvSIG

http://www.gvsig.gva.es/index.php?id=que-es-gvsig&L=0explotan&L=2

gvSIG is a tool oriented to manage geographic information. It is characterized by a user-friendly interface, with a quick access to the most usual raster and vector formats. In the same view it includes local as well as remote data through a WMS, WCS or WFS source. It is aimed at users of geographic information, whether professionals or civil servants (city councils, councils, regional councils or ministries) from any part of the world (at the moment its interface is in Spanish, Valencian, English, Basque, Gallego, Czech, Chinese, French, German, Italian and Portuguese), in addition to being free. The SEXTANTE extensions adds additional functionalities.

InkScape

http://www.inkscape.org/

Inkscape is an Open Source vector graphics editor, with capabilities similar to Illustrator, CorelDraw, or Xara X, using the W3C standard Scalable Vector Graphics (SVG) file format. Inkscape supports many advanced SVG features (markers, clones, alpha blending, etc.) and great care is taken in designing a

streamlined interface. It is very easy to edit nodes, perform complex path operations, trace bitmaps and much more.

LuxRender

http://www.luxrender2.org/

LuxRender is a new, open-source, free software rendering system for physically correct, unbiased image synthesis. Rendering with LuxRender means simulating light according to physical equations, this produces realistic photographic quality images. It provides a FLTK based Graphical User Interface with interactive rendering controls, tonemapping controls and a progressive/linear viewport, realtime engine control with Adding & Removing of rendering threads and start/pause/restart controls; realistic sunsky (physically based Sunlight & Daylight model Preetham/Shirley/Smits as used in most modern unbiased renderers with support for Exit Portals. BRDFs, and integrated materials:

- matte (Lambertian or Oren-Nayar 'matte paint' diffuse reflection)
- plastic (Glossy Dielectric Diffuse/Specular using a Blinn Microfacet distribution)
- shinymetal (Glossy Conductor Diffuse/Specular using a Blinn Microfacet distribution)
- substrate (Glossy Frensel Blended Diffuse substrate/Specular superstrate using an Iso/Anisotropic Ashikmin/Shirley Microfacet distribution)
- glass (Fresnel Dielectric with perfect specular reflection and transmission)
- translucent (Fresnel Dielectric with glossy specular reflection and transmission using a Blinn Microfacet distribution)
- mirror (Perfect specular reflection)
- uber (Flexible base material with control over all reflection/transmission BRDFs)
- bluepaint (measured)
- brushedmetal (measured)
- clay (measured)
- felt (measured)
- primer (measured)
- skin (measured)

The engine supports image textures (including HDR), internal color handling in Spectra and CIE XYZ, OpenEXR, tonemapping kernels, additional pipeline stages and pixel reconstruction filters.

Panda

http://pandastream.com/

Panda is an open source solution for video uploading, encoding and streaming.

Unlike other video platforms, Panda is not just a service for encoding your videos for the web; Panda handles the whole process. From the upload form to streaming, Panda takes control. Support for the encoding profiles which FFmpeg supports. They include FLV for flash and H264 for iPhone; Panda run's completely in the cloud computing environment provided by Amazon's array of web services. The application runs on a customised EC2 instance with everything pre-installed, including FFmpeg and an plethora of codecs. SimpleDB is used to store all of data for video, encoding, accounts and encoding profiles. Uploaded and encoded video files are then stored on S3.

PDFEdit

http://pdfedit.petricek.net/pdfedit.index_e

Free editor for PDF documents. Complete editing of PDF documents is possible with PDFedit. You can change raw pdf objects (for advanced users) or use many gui functions. Functionality can be easily extended using a scripting language (ECMAScript).

QuantumGIS

http://qgis.org/

Quantum GIS (QGIS) is a user friendly Open Source Geographic Information System (GIS) that runs on Linux, Unix, Mac OSX, and Windows. QGIS supports vector, raster, and database formats. QGIS is licensed under the GNU General Public License. QGIS lets you browse and create map data on your computer. It supports many common spatial data formats (e.g. ESRI ShapeFile, geotiff). QGIS supports plugins to do things like display tracks from your GPS. It supports raster and vector types, integration with GRASS, digitizing tools, print composer, OGC support, spatial bookmarks, feature labeling, graticule builder, raster georeferencing.

Scribus

http://www.scribus.net/

Scribus is an open-source program that brings award-winning professional page layout to Linux/Unix, MacOS X, OS/2 and Windows desktops with a combination of "press-ready" output and new approaches to page layout. Underneath the modern and user friendly interface, Scribus supports professional publishing features, such as CMYK color, separations, ICC color management and versatile PDF creation.

SynFig

http://www.synfig.com/

Synfig is a powerful, industrial-strength vector-based 2D animation software package, designed from the ground-up for producing feature-film quality animation with fewer people and resources. Our animation technology eliminates the task of manual tweening, producing smooth, fluid motion without the animator having to draw out each frame individually. This allows you to produce 2D animation with fewer people while producing a product of a higher quality. Among the features:

- Spacial Resolution-independence
- Temporal Resolution-independence

- High Dynamic Range Imaging.
- Layers: Region, Outline, Polygon, Circle Rectangle, Star, Checker board, Gradient Layers, Linear gradient, Radial gradient, Conical gradient, Curve gradient, Spiral gradient, Noise
- Filters: Bevel, Blur, Motion Blur, Clamp, Colorcorrect, Halftone, Luma key, Radial blur, Shade, Plant, Super sample, Text, Import,Timeloop
- Distortion: Inside-out, Noise distort, Rotate, Spherize, Stretch, Translate, Twirl, Warp, Zoom

uDIG

http://udig.refractions.net/confluence/display/UDIG/Home

The User-friendly Desktop Internet GIS (uDig) is both a GeoSpatial application and a platform through which developers can create new, derived applications. uDig is a core element in an internet aware Geographic Information System, and provides an infrastructure for the creation of complete GIS environments. For example, the GRASS GIS system is integrated in uDIG through the JGrass module (Primarily dedicated to hydrological and geomorphological analyses).

UFRaw

http://ufraw.sourceforge.net/

The Unidentified Flying Raw (UFRaw) is a utility to read and manipulate raw images from digital cameras. It can be used on its own or as a Gimp plug-in. It reads raw images using Dave Coffin's raw conversion utility - DCRaw. UFRaw supports color management workflow based on Little CMS, allowing the user to apply ICC color profiles. Color manipulation is performed at 16 bit per channel, preserving detail.

YaFray

http://www.yafray.org/

YafRay is a powerful raytracer, under the LGPL license. It enables you to create fantastic images and animations of a photorealistic quality. It features full global illumination, skydomes, HDRI, caustics, real DOF, blurry reflections and a modular framework.

Previous Software Index Next

Desktop applications

Firefox

http://www.mozilla.com/en-US/firefox/

Firefox is the most widely used open source web browser, managed by the Mozilla Foundation. Features included with Firefox are tabbed browsing, spell checker, incremental find, an integrated download manager, and a search system that supports multiple search engines. A third party developer network has created add-ons which provide specialist functionality. There are thousands of add-ons, covering aspects like security, ad blocking, themes, enhanced functionality, scripting and debugging. Firefox is cross-platform,

providing support for Microsoft Windows, Mac OS X and Linux.

FreeMind

http://freemind.sourceforge.net/wiki/index.php/Main_Page

FreeMind is a premier free mind-mapping software written in Java. Mind mapping software is used to create diagrams of relationships between ideas or other pieces of information.

FreeSignature

http://savannah.nongnu.org/projects/freesignature/

FreeSignature is an free project for the digital signature of documents. It works with all cards supported by OpenSC and focuses on adding support for cards from accredited Italian CAs. The goal of the project is to provide a first single product capable of supporting cards from multiple vendors/countries. This contrasts the approach taken by card vendors/providers whose software follows an exclusive single-vendor approach. FreeSignature thus attempts to make a major contribution to interoperability in the digital signature domain and aims to greatly facilitate the setup of public access points that are currently the objective of several projects in Italy. Moreover, we hope that the peer-review of the free software approach will allow us to at least match the security level of competing single-card software.

Gnome desktop environment

http://www.gnome.org

The GNOME project provides two things: The GNOME desktop environment, an intuitive and attractive desktop for users, and the GNOME development platform, an extensive framework for building applications that integrate into the rest of the desktop. GNOME is Free Software and part of the GNU project, dedicated to giving users and developers the ultimate level of control over their desktops, their software, and their data. GNOME understands that usability is about creating software that is easy for everyone to use, not about piling on features. GNOME's community of professional and volunteer usability experts have created Free Software's first and only Human Interface Guidelines, and all core GNOME software is adopting these principles.

K3B

http://k3b.plainblack.com/

K3b was created to be a feature-rich and easy to handle CD burning application. It supports data and audio cd, DVD creation and burning.

KDE desktop environment

http://www.kde.org

KDE or the K Desktop Environment, is a network transparent contemporary desktop environment for UNIX workstations. KDE seeks to fulfill the need for an easy to use desktop for UNIX workstations, similar to desktop environments found on Macintosh and Microsoft Windows operating systems. KDE also brings to the forefront many innovations for application developers. An entire infrastructure has been designed and implemented to help programmers create robust and comprehensive applications in the most

efficient manner, eliminating the complexity and tediousness of general UNIX application development. KDE recognizes the fact that a computing platform is only as good as the first class applications available to users. KDE's application framework, implements the latest advances in framework technology positioning it in direct competition with popular development frameworks like Microsoft's MFC/COM/ActiveX technology etc. KDE's innovative KParts compound document technology enables developers to quickly create first rate applications using cutting edge technology.

KVPnc

http://home.gna.org/kvpnc/en/index.html

KVpnc is a KDE Desktop Environment frontend for various vpn clients. It supports Cisco VPN (vpnc), IPSec (FreeS/WAN , Openswan, strongSwan, racoon), PPTP (pptpclient), OpenVPN, L2TP (FreeS/WAN, Openswan, strongSwan, racoon) and smartcardcard support (OpenVPN, strongSwan).

OpenOffice.Org

http://www.openoffice.org/

OpenOffice.org is the name of a complete personal productivity suite, comprised of a word processor program (Writer), a spreadsheet (Calc), a presentation program (Impress), a vector drawing program (Draw) and a database system (Base). The suite, originally developed by StarDivision, has been acquired by Sun Microsystems and released as an open source project in 2000. The suite supports most commonly used document formats, including substantial support for Microsoft Office formats (in various releases) and the beginning of support of Excel VBA macro language. The suite is roughly comparable in terms of functionality with the proprietary alternatives, and features native support of the ISO ODF document format.

OpenSUSE

http://www.opensuse.org/

The openSUSE project is a community program sponsored by Novell; as part of this collaborative effort, OpenSUSE is a desktop linux distribution, aimed at novices and experts alike, with many significant features oriented towards interoperability with proprietary infrastructure and easy maintenance.

Rdesktop

http://www.rdesktop.org/

rdesktop is an open source client for Windows NT Terminal Server and Windows 2000/2003 Terminal Services, capable of natively speaking Remote Desktop Protocol (RDP) in order to present the user's NT desktop. Unlike Citrix ICA, no server extensions are required. Several enhancements were provided by third parties, including better support for cut&paste between the local desktop and the remote clipboard, session sharing and seamless windows.

tn5250j

http://tn5250j.sourceforge.net/index.html

The tn5250j is a 5250 terminal emulator for the AS/400 written in Java. There

are 3 modes provided: Basic, Enhanced, GUI Enhanced; Basic mode provides normal screen presentation. No extras are provided. This describes most of the emulators that I have used or downloaded and tried. Also; the tn5250 for linux falls in this category as well (Please; this is no slight on this emulator just an example for me to use without naming names. I used it until I started this project). Enhanced mode provides other functions like cursor progression, windows, continued edit fields, edit masked fields, etc... This is where Client Access falls in (and more). The GUI part comes in by manipulating the 5250 stream and painting the fields like gui constructs in windowing systems, gui looking popup windows in place of windows, painting the PF keys on the screen as buttons (hot spots) so when clicked it will send the appropriate aid key, as well as the enhanced functions described above. Among the features:

- Support for non displayable characters
- Hot spots for the function keys
- Message Wait Notification
- Attribute settings for screen/session
- File transfer from host - You can export files from the host in different formats
- Scripting - you can write scripts using the python language.
- Spool file export - you can export spool files from the host into PDF or Text format.

Ubuntu Linux

http://www.ubuntu.com/

Ubuntu is a community developed, linux-based operating system that is perfect for laptops, desktops and servers. It contains all the applications you need - a web browser, presentation, document and spreadsheet software, instant messaging and much more. It features an extremely simple and integrated desktop environment, improved hardware support and plug&play functionality.

VirtualBox

http://www.virtualbox.org/

innotek VirtualBox is a family of powerful x86 virtualization products for enterprise as well as home use. Not only is VirtualBox an extremely feature rich, high performance product for enterprise customers, it is also the only professional solution that is freely available as Open Source Software under the terms of the GNU General Public License (GPL). Presently, VirtualBox runs on Windows, Linux and Macintosh hosts and supports a large number of guest operating systems including but not limited to Windows (NT 4.0, 2000, XP, Server 2003, Vista), DOS/Windows 3.x, Linux (2.4 and 2.6), and OpenBSD.

WINE

http://www.winehq.org/

Windows programs. Wine does not require Microsoft Windows, as it is a completely free alternative implementation of the Windows API consisting of 100% non-Microsoft code, however Wine can optionally use native Windows DLLs if they are available. Wine provides both a development toolkit for porting Windows source code to Unix as well as a program loader, allowing many unmodified Windows programs to run on x86-based Unixes, including Linux, FreeBSD, Mac OS X, and Solaris. It supports many native Windows applications, like Microsoft Office and DreamWeaver.

Engineering and manufacturing

ASCEND

http://ascend.cheme.cmu.edu/

ASCEND is a flexible modelling environment for solving hard engineering and science problems. It offers an object-oriented model description language for describing your system, an interactive user interface that allows you to solve your model and explore the effect of changing the model parameters, and a scripting environment that allows you to automate your more complex simulation problems. ASCEND was originally written at Carnegie Mellon University in the 1980s and includes powerful and reliable solver routines that analyse the structure of your model and can solve thousands of simultaneous nonlinear equations in a few seconds on everyday computer hardware. It is under active development and is licensed under the GNU General Public License ensuring that it is free software and will remain free.

The included solvers are LA (linear algebraic), NLA (non linear algebraic), ODE, DAE and NLP (non-linear programming).

Axiom

http://wiki.axiom-developer.org/FrontPage

Axiom is a general purpose system for doing mathematics by computer. It is especially useful for symbolic calculations, mathematical research and for the development of new mathematical algorithms. Axiom has a strongly-typed high-level programming language for expressing abstract mathematical concepts. Over 1,000 mathematical domains and categories are collected in the Axiom Library.

AXIS

http://axis.unpythonic.net/index.cgi/about

Axis is a graphical interface on the EMC2 CNC (Computerized Numerical Control) system. AXIS provides interactive preview and backplot. It is implemented primarily in Python, with the user interface rendered by Tk and OpenGL. It is mostly keystroke-compatible with tkemc and mini, and runs well on machines without hardware OpenGL acceleration.

CalemEAM

http://www.calemeam.com/

A complete Enterprise Asset management and maintenance management

system. It provides modules for work orders, assets, inventory, requisition and purchase, administration and scheduling, RCM, associate document and training, inspection and budget.

CODE*ASTER

http://www.code-aster.org/

Code_Aster offers a full range of multiphysical analysis and modelling methods that go well beyond the standard functions of a thermomechanical calculation code : from seismic analysis to porous environments via acoustics, fatigue, stochastic dynamics, etc. Its modelling, algorithms and solvers are constantly undergoing work to improve them and add to them (1,200,000 lines of code, 200 operators). Resolutely open, it is chained, coupled and encapsulated in numerous ways. The domains:

- Mechanical: Static, quasi-static, linear or otherwise; Dynamic, linear or otherwise, on a physical or modal basis, Fracture, damage and fatigue, Soil-Structure, Fluid-Structure and Soil-Fluid-Structure interactions
- Thermal: Stationary, transient, linear or otherwise, Fixed or moving reference coordinate system
- Associated phenomena: Acoustics, Metallurgy, Hydration and drying
- Multiphysical: Internal chainings with thermics, Hydration, drying, Metallurgy
- Internal chainings with mechanics: Thermal, Metallurgy, Hydration and drying
- Internal coupling: thermo-hydro mechanical, fluid-structure

It is used internally by EDF, and is also available in a certified version.

Screenshot Screenshot

ELMER

http://www.csc.fi/elmer

Elmer is an open source multiphysical simulation software developed by CSC. Elmer development was started 1995 in collaboration with Finnish Universities, research institutes and industry. Elmer includes physical models of fluid dynamics, structural mechanics, electromagnetics, heat transfer and acoustics, for example. These are described by partial differential equations which Elmer solves by the Finite Element Method (FEM).

EMC

http://www.linuxcnc.org

EMC (the Enhanced Machine Control) is a software system for computer control of machine tools such as milling machines and lathes. EMC is free software with open source code. Current versions of EMC are entirely licensed under the GNU General Public License, (GPL and LGPL,) and older versions of the software are available in the public domain. EMC provides:

- a graphical user interface (actually several interfaces to chose from)
- an interpreter for "G-code " (the RS-274 machine tool programming

language)

- a realtime motion planning system with look-ahead
- operation of low-level machine electronics such as sensors and motor drives
- an easy to use "breadboard" layer for quickly creating a unique configuration for your machine
- a software PLC programmable with ladder diagrams
- It can simultaneously move up to 6 axes and supports a variety of interfaces.
- The control can operate true servos (analog or PWM) with the feedback loop closed by the EMC software at the computer, or open loop with "step-servos" or stepper motors.
- Motion control features include: cutter radius and length compensation, path deviation limited to a specified tolerance, lathe threading, synchronized axis motion, adaptive feedrate, operator feed override, and constant velocity control.
- Support for non-Cartesian motion systems is provided via custom kinematics modules. Available architectures include hexapods (Stewart platforms and similar concepts) and systems with rotary joints to provide motion such as PUMA or SCARA robots.

EMC runs on Linux using real time extensions. Support currently exists for version 2.4 and 2.6 Linux kernels with real time extensions applied by RT-Linux or RTAI patches.

Extrema

http://exsitewebware.com/extrema

Extrema is a mature and robust data analysis application, originally developed in the fields of nuclear and particle physics. The demanding nature of these disciplines ensures that Extrema is capable of handling diverse analysis and graphing challenges from practically any field. With its roots at a particle physics laboratory (TRIUMF), Extrema was designed first and foremost to be of the greatest practical use to researchers. The legacy of this design approach is a data analysis and visualization package that is both extremely powerful and easy-to-use. The average user can be doing productive work within one hour of first starting the program, yet it's features and functionality are nearly inexhaustible! Earlier versions of Extrema have also been released under the product name Physica. The switch from Physica to Extrema is effortless, and there are many new features to be gained.

KRATOS

http://www.cimne.com/kratos/

Kratos is a Methodology and Computing Structure to Built Finite Element Programs: an open source framework with object-oriented structure intended to provide the tools for finite element programmers in different fields and connect them in term of solving coupled multi-physics problems. Kratos is a environment to work at Different Implementation Levels. It consist in a set of

classes and methods for programmers to provide the ability to handle multiphysic, adaptive meshing and optimisation problems. Kratos should help to built a numerical application in C++ from the easiest formulation (conduction problem) to the most complex ones (optimisation techniques). The approach can be from the user-developer point of view, considering their contribution as requirements of the Kratos system as well as plug in extensions, but also from the user-application interests, using the already existing finite element programs as calculation engine. ratos is MULTI-PHYSIC. One of the main topics in engineering nowadays is the combination of different analysis (thermal, fluid dynamic, structural) with optimising methods in one global software package with just one user interface and, even more, the possibility to extend the implemented solution to new problems. Kratos is FINITE ELEMENT METHOD (FEM) based. Many problems in engineering and applied science are governed by Partial Differential Equations (PDE), easily handled by computer thanks to numerical methods. The FEM is one of the most powerful, flexible and versatile existing methods.

Maxima

http://maxima.sourceforge.net/

Maxima is a system for the manipulation of symbolic and numerical expressions, including differentiation, integration, Taylor series, Laplace transforms, ordinary differential equations, systems of linear equations, and vectors, matrices, and tensors. Maxima produces high precision results by using exact fractions and arbitrarily long floating point representations, and can plot functions and data in two and three dimensions. Maxima is a descendant of Macsyma, the legendary computer algebra system developed in the late 1960s at the Massachusetts Institute of Technology. It is the only system based on that effort still publicly available and with an active user community, thanks to its open source nature. Macsyma was revolutionary in its day, and many later systems, such as Maple and Mathematica, were inspired by it.

OpenCascade

http://www.opencascade.org/

Open CASCADE Technology is software development platform freely available in open source. It includes components for 3D surface and solid modeling, visualization, data exchange and rapid application development. Open CASCADE Technology can be best applied in development of numerical simulation software including CAD/CAM/CAE, AEC and GIS, as well as PDM applications. It is composed of several modules:

- Foundation classes
- Modeling data
- Modeling algorithms
- Mesh
- Visualization
- Data Exchange (standardized)
- Application framework (OCAF)

- GUI framework
- Development tools

It provides read/write support for 3D data as IGES format (5.3) and STEP format (AP203, AP214 and AP209) , for 3D geometry and topology, Colors and Names, Assembly structures, Layers, Validation Properties. OpenCascade has shape healing, complex 3D kernel functionalities,

OpenFoam

http://www.opencfd.co.uk/openfoam/

The OpenFOAM (Open Field Operation and Manipulation) CFD Toolbox can simulate anything from complex fluid flows involving chemical reactions, turbulence and heat transfer, to solid dynamics, electromagnetics and the pricing of financial options. OpenFOAM is produced by OpenCFD Ltd, is freely available and open source, licensed under the GNU General Public Licence. The core technology of OpenFOAM is a flexible set of efficient C++ modules. These are used to build a wealth of: solvers, to simulate specific problems in engineering mechanics; utilities, to perform pre- and post-processing tasks ranging from simple data manipulations to visualisation and mesh processing; libraries, to create toolboxes that are accessible to the solvers/utilities, such as libraries of physical models. OpenFOAM is supplied with numerous pre-configured solvers, utilities and libraries and so can be used like any typical simulation package. However, it is open, not only in terms of source code, but also in its structure and hierarchical design, so that its solvers, utilities and libraries are fully extensible. OpenFOAM uses finite volume numerics to solve systems of partial differential equations ascribed on any 3D unstructured mesh of polyhedral cells. The fluid flow solvers are developed within a robust, implicit, pressure-velocity, iterative solution framework, although alternative techniques are applied to other continuum mechanics solvers. Domain decomposition parallelism is fundamental to the design of OpenFOAM and integrated at a low level so that solvers can generally be developed without the need for any ’parallel-specific’ coding. Among the standard solvers:

- “Basic” CFD
- Incompressible flows
- Compressible flows
- Multiphase flows
- DNS and LES
- Combustion
- Heat transfer
- Electromagnetics
- Solid dynamics
- Finance

Additional models are available for Turbulence, Large-eddy simulation (LES), Transport models, Thermophysical models, Lagrangian particle tracking, Chemical kinetics. It is a product used in production environments like Audi,

Airbus, Bayer, Danone, Daimler, Delphi, Honda, Mitsubishi, Obayashi, SKF, Shell, Toyota, Tokyo Gas, Volkswagen; and many academic institutions like Imperial College London, King's College London, Chalmers University, University of Exeter, University of Strathclyde, Utah State University, University of Guelph, Tohoku Universty, Hirosaki Universty, Tokyo Institute of Technology.

OpenModelica

http://www.ida.liu.se/~pelab/modelica/OpenModelica.html

The goal of the project is to create a complete Modelica modeling, compilation and simulation environment; Modelica is a language for modeling and simulation of physical processes. Modelica is an object-oriented, domain-specific modeling language designed to allow convenient, component-oriented modeling of complex systems, e.g., systems containing mechanical, electrical, electronic, hydraulic, thermal, control, electric power or process-oriented subcomponents. The project provides a Modelica compiler, runner and a development environment extension for the Eclipse IDE.

myCMMS2

http://www.mycmms.org/

myCMMS is a Web-Based Computerized Maintenance Management System. myCMMS is intended to be used by smaller maintenance organization that cannot invest in a bigger commercial package and that need a low learning curve. It is entirely web-based, meaning that no software needs to be loaded on your computer. The myCMMS Base System contains the following functionality:

- Workorders : creating, editing, planning, feedback ...
- WebCalendar has moved to the Options
- Tasks : repetitive jobs
- Spare parts : managing of a spare part warehouse
- Purchasing : managing the purchase of external parts or services

The available extensions are fault follow-up (in development), RCM, criticality and webcalendar.

Norfello

http://www1.norfello.com/

NorfelloCMMS is a powerful CMMS application. It enables organizations to easily manage labor, equipment and service requests via web based interface. NorfelloCMMS OS is targeted to any organization that handles maintenance tasks or has equipment to track. From heavy industry maintenance management to managing computer network equipment, NorfelloCMMS can be customized to meet the requirements of various different domains. It features:

- Access control: NorfelloCMMS enables administrators to manage the users right from it's web based interface. Every action and every piece of information can be denied for some users or group of users. Access control in NorfelloCMMS is based on keys and keyrings. For each

function in NorfelloCMMS there is a key associated to it. Keyrings are collections of keys, which can be handed to users. A user has all keys, which belong to keyrings the user ownes. NorfelloCMMS's access control policy is restrictive by default. This means that access to a function is denied unless user has the key associated to the function. Asset permissions provide access control for asset data saved in the NorfelloCMMS database. Asset permissions define which assets users can view and edit, and what kind of data users can create to assets.

- Reports: NorfelloCMMS offers a possibility for the end users to customize collected information by themselves. Creating report templates is really easy, just use Openoffice.org to make the report look like you want it to look, add couple of variables and you are ready to use it in the software. NorfelloCMMS reads variables from ODT-files and creates database tables for collected information. This means that all of the content is separated from presentation. Therefore it is possible to search information easily and to present it in various formats.
- Assets: Almost everything in NorfelloCMMS is associated to an asset. Assets are concrete things - for example in IT system administration - servers, switches and UPSes. In some other domain like facility maintenance assets can be things air conditioning units, elevators and so on. The common denominator is that maintenance tasks and information are associated to assets. This information however differs a lot depending on which domain we are operating in. Therefore all of the information can be customized.
- Work orders: Work order is like a piece of paper with a task on it. Only one can user have the same task at time. If many people are working on the same task one of them is the owner and the rest are workers. As a piece of paper also the work order can be handed over from one user to another. Every time the status of a work order changes, it can be seen on the work order view. When the task is completed the work order closes. It will be archived in the system but it's not active anymore.

Octave

http://www.gnu.org/software/octave/

GNU Octave is a high-level language, primarily intended for numerical computations. It provides a convenient command line interface for solving linear and nonlinear problems numerically, and for performing other numerical experiments using a language that is mostly compatible with Matlab. It may also be used as a batch-oriented language. Octave has extensive tools for solving common numerical linear algebra problems, finding the roots of nonlinear equations, integrating ordinary functions, manipulating polynomials, and integrating ordinary differential and differential-algebraic equations. It is easily extensible and customizable via user-defined functions written in Octave's own language, or using dynamically loaded modules written in C++, C, Fortran, or other languages.

ProView

http://www.proview.se/

Proview is probably the first Open Source system for process control in the

world. Originally developed in Sweden by Mandator and SSAB Oxelosund as a process control system based on standard computers, the system has become a fully-fledged, integrated and low-cost solution that is running on standard PC's with Linux as operating system. PROVIEW/R is a modern, powerful and general process control system. It contains all functions normally required for successful sequential control, adjustment, data acquisition, communication, supervision, etc. The configuration of a PROVIEW/R system is done graphically, making the application adaptation simple, reliable, and flexible. PROVIEW/R is a distributed system, which means that the system consists of several computers, connected via a network . Via the network computers exchange data with each other. In this way, for instance, the measuring signals will be known on all the process - and operator stations of a PROVIEW/R system. Programming is possible both with a graphical PLC-editor and with high level programming languages (such as C, Java or FORTRAN). The concept of Proview is based on a soft-PLC solution which runs on standard computers with Linux as operating system.

Ptolemy

http://ptolemy.eecs.berkeley.edu/ptolemyII/index.htm

Ptolemy II is a software framework developed as part of the Ptolemy Project. It is a Java-based component assembly framework with a graphical user interface called Vergil. Vergil itself is a component assembly defined in Ptolemy II. The Ptolemy project studies modeling, simulation, and design of concurrent, real-time, embedded systems. The focus is on assembly of concurrent components. The key underlying principle in the project is the use of well-defined models of computation that govern the interactions between components. A major problem area being addressed is the use of heterogeneous mixtures of models of computation.

Ptolemy II includes a growing suite of domains, each of which realizes a model of computation. It also includes a component library, in which most components are domain polymorphic, in that they can operate in several of the domains. Most are also data polymorphic, in that they operate on several data types. The domains that have been implemented are listed below. Domains that are reasonably mature:

- CT: continuous-time modeling
- DDF: dynamic dataflow
- DE: discrete-event modeling
- FSM: finite state machines and modal model
- PN: process networks with asynchronous message passing
- Rendezvous: process networks with synchronous message passing
- SDF: synchronous dataflow
- SR: synchronous reactive
- Wireless: wireless
- Domains that are still experimental:
- CI: component interaction (push/pull)

- CSP: communicating sequential processes
- DDE: distributed discrete events
- DT: discrete time
- Giotto: periodic time-driven
- GR: 3-D graphics
- HDF: heterochronous dataflow
- PSDF: parameterized synchronous dataflow
- TM: timed multitasking

Ptolemy II includes a number of support packages, such as graph, providing graph-theoretic manipulations, math, providing matrix and vector math and signal processing functions, plot, providing visual display of data, data, providing a type system, data encapsulation and an expression parser, etc.

R project

http://www.r-project.org/

R is a language and environment for statistical computing and graphics. It is a GNU project which is similar to the S language and environment which was developed at Bell Laboratories (formerly AT&T, now Lucent Technologies) by John Chambers and colleagues. R can be considered as a different implementation of S. There are some important differences, but much code written for S runs unaltered under R. R provides a wide variety of statistical (linear and nonlinear modelling, classical statistical tests, time-series analysis, classification, clustering, ...) and graphical techniques, and is highly extensible. The S language is often the vehicle of choice for research in statistical methodology, and R provides an Open Source route to participation in that activity. One of R's strengths is the ease with which well-designed publication-quality plots can be produced, including mathematical symbols and formulae where needed. Great care has been taken over the defaults for the minor design choices in graphics, but the user retains full control. R is available as Free Software under the terms of the Free Software Foundation's GNU General Public License in source code form. It compiles and runs on a wide variety of UNIX platforms and similar systems (including FreeBSD and Linux), Windows and MacOS. Several graphical interfaces are available to simplify the user interaction, like Rkward (http://rkward.sourceforge.net)

Salome

http://www.salome-platform.org

SALOME is a free software that provides a generic platform for Pre and Post-Processing for numerical simulation. It is based on an open and flexible architecture made of reusable components available as free software. Based on OpenCascade, salome allows for:

- Create/modify, import/export (IGES, STEP), repair/clean CAD models
- Mesh CAD elements, check mesh quality, import/export mesh (MED, UNV, ASCII)
- Handle physical properties and quantities attached to geometrical items

- Perform computation using one or more external solvers (coupling)
- Display computation results (scalar, vectorial)
- Manage studies (creation, save, reload)
- The geometry module allows for:
- Visualization of models in 3D viewers: shading, Wireframe modes, Pre-highlighting (detection), Selection, Changing the color of a model, Display/Erase a model
- Import/Export CAD models in the following formats: IGES 5.3, STEP AP203/214 schemas, BREP (Open CASCADE internal format)
- Creation of basic geometrical objects: Point, Line, Circle, Ellipse, Arc, Vector, Plane
- Creation of 3D primitives: Box, Cylinder, Sphere, Torus, Cone
- Modeling operations: Extrusion, Revolution, Filling, Pipe creation, Offset
- Basic Sketcher
- Creation of topological objects: Vertex, Edge, Wire, Face, Shell, Solid/CompSolid, Compound
- Explode topological objects
- Boolean operations: Fuse, Common, Cut, Section
- Transformation operations with objects: Translation, Rotation, Mirror, Scaling, Multi-translation, Multi-rotation
- Advanced partition/gluing algorithm with support of material assignment
- Creation of planes using the Archimedean law
- Local operations: Fillets, Chamfer
- Shape healing functions: Sewing, Change face orientation, Suppress a hole, Suppress a face
- Topological information and dimensions: Basic properties (length, surface area, volume), Center of gravity , Axis of inertia, Bounding box, Minimal distance, Tolerance of the shape, Validity of the shape, Topological information

SALOME integrates also a MESH module, a pre/post processor with MED import, 3D map generation, dataflow support, coupling between different computing modules.

SCILAB

http://www.scilab.org/

Scilab is a scientific software package for numerical computations providing a powerful open computing environment for engineering and scientific applications. Scilab is an open source software. Since 1994 it has been distributed freely along with the source code via the Internet. It is currently used in educational and industrial environments around the world. Scilab is

now the responsibility of the Scilab Consortium, launched in May 2003. There are currently 25 members in Scilab Consortium. Scilab includes hundreds of mathematical functions with the possibility to add interactively programs from various languages (C, C++, Fortran...). It has sophisticated data structures (including lists, polynomials, rational functions, linear systems...), an interpreter and a high level programming language. A number of toolboxes are available with the system:

- 2-D and 3-D graphics, animation
- Linear algebra, sparse matrices
- Polynomials and rational functions
- Interpolation, approximation
- Simulation: ODE solver and DAE solver
- Scicos: a hybrid dynamic systems modeler and simulator
- Classic and robust control, LMI optimization
- Differentiable and non-differentiable optimization
- Signal processing
- Metanet: graphs and networks
- Parallel Scilab
- Statistics
- Interface with Computer Algebra: Maple package for Scilab code generation
- Interface with Fortran, Tcl/Tk, C, C++, Java, LabVIEW
- And a large number of contributions for various domains.

Taverna

http://taverna.sourceforge.net/

The Taverna workbench is a free software tool for designing and executing workflows, created by the myGrid project, and funded through OMII-UK. The Taverna Workbench provides a desktop authoring environment and enactment engine for scientific workflows expressed in Scufl (Simple Conceptual Unified Flow language). The Taverna enactment engine is also available separately, and other Scufl enactors are available including Moteur. The myExperiment social web site supports finding and sharing of workflows and has special support for Scufl workflows. The Taverna workbench, myExperiment and associated components are developed and maintained by the myGrid team, in collaboration with the open source community.

Health Care

Apelon

http://apelon-dts.sourceforge.net/

The Apelon DTS (Distributed Terminology System) is an integrated set of open source components that provides comprehensive terminology services in distributed application environments. DTS supports national and international data standards, which are a necessary foundation for comparable and interoperable health information, as well as local vocabularies. Typical applications for DTS include clinical data entry, administrative review, problem-list and code-set management, guideline creation, decision support and information retrieval. Among the features:

- DATA NORMALIZATION, matching of text input to standardized terms and concepts via word order analysis, word stemming, spelling correction and term completion
- CODE TRANSLATION, mapping of clinical data to standard coding systems such as ICD-9 and CPT
- CLASS QUERIES, hierarchy interrogation for decision support and outcomes analysis
- SEMANTIC NAVIGATION, browsing of a rich set of hierarchical and non-hierarchical relationships between concepts for improved quality in data entry and information retrieval
- SEMANTIC CLASSIFICATION, creation, management, and comparison of concept extensions which are consistent with formal semantic models such as that used in SNOMED CT
- SUBSETTING, creation of individualized subsets of terminologies using advanced Boolean logic techniques
- WORKFLOW, management and tracking of modeling efforts in large, distributed projects
- LOCALIZATION, addition of local concepts, synonyms, codes, and inter-concept associations to connect local content to standard terminologies

Argus

http://argus.healthopenware.org.au/

Argus is a suite of programs that provides a secure mail-exchange system for the dissemination of documents between health service providers. Argus provides health service providers access to pathology and imaging results, admission and discharge summaries, emergency department notifications and other healthcare related documents in electronic format. Three specific differences exist between Argus and other commercial email applications: argus implements security using PKI, allowing items of a sensitive nature to be transmitted electronically without fear of compromise, argus facilitates the exchange of clinical data by attaching HL7 data to an email message. The raw HL7 data is hidden from the user, being presented instead in a neatly formatted way and it can be configured to automatically trigger pre-defined

events when receiving particular types of messages. One such event is the export of attachments in such a way that the clinical data can be imported by pathology software.

Bika

http://www.bikalabs.com/softwarecenter/bika

A LIMS is computer software that is used in the laboratory for the management of samples, laboratory users, instruments, standards and other laboratory functions such as invoicing, plate management, and work flow automation. Bika is built in Plone and Zope, leading web content management combination, enabling laboratories to manage and publish documents such as promotional prices and information on lab procedures, news and events, safety, regulation, HR and training material on-line; the LIMS' authorisation hierarchy applies and information can be directed at its intended audience. Additional project groups can be created to prepare and discuss material in private depositories shared with team members, individuals or bigger groups such as Clients and Research departments. BIKA is ISO 17025 accreditation ready.

caAERS

https://cabig.nci.nih.gov/tools/caAERS

The Cancer Adverse Event Reporting System (caAERS) is an open source software tool that is used to collect, process and report adverse events that occur during clinical trials. This tool supports regulatory compliance and allows local collection, management, and querying of adverse event data, whether routine or serious. Features:Adverse event (AE) tracking and classification using accepted standards (e.g. CTC 2.0/3.0 and MedDRA 9.0), import of protocol and protocol participant, information and import and export of AE data in common/required formats, automated, rules-based assessment of seriousness and reporting requirements (sponsor-level, institution-level and protocol-level rules), ability to submit electronically to the Adverse Event Expedited Reporting System (AdEERS) of the NCI Cancer Therapy Evaluation Program, maps to vocabularies and coding systems, generates customizable reports and submits to external agencies, including generation of NCI and FDA compliant reports.

Caisis

http://www.caisis.org/

Caisis is an open-source Web application designed to bridge the gap between clinical research and clinical practice by addressing numerous issues in documentation of patient data. The application was originally designed to track data pertaining to urologic cancer, but now has expanded to track data of other cancers. The project was initiated with the goal of improving data quality and accuracy, while reducing time and effort for clinicians and support staff. Caisis addresses documentation issues by storing key patient data in chronological order. These data are stored in a carefully designed relational database, so that data can be collected once, reviewed at each clinic for modifications or additions, and updated before the patient’s next visit. This avoids the time-consuming and error-prone process of collecting and reentering patient therapies, medications, comorbidities, and histories at each

visit. Once in the database, patient histories are summarized by computer algorithms and then printed on clinic forms. Forms that have been approved by the clinic's billing and compliance group can be used in lieu of a dictation, reducing the time and money spent dictating and transcribing. Of course, the physician still retains the option of dictating, if desired.

Care2X

http://www.care2x.org/

Care2x integrates data, functions and workflows in a healthcare environment. It is currently composed of four major components. Each of these components can also function individually.

- HIS - Hospital/Healthservice Information System
- PM - Practice (GP) management
- CDS - Central Data Server
- HXP - Health Xchange Protocol

CHITS

http://chits.mudfish.info/HomePage

The Community Health Information Tracking System or CHITS (www.chits.info) is an extensible, modular, open source information system for rural health units (initially for the Philippines). It collects existing routine health data from vertical programs in the Field Health Service Information System (FHSIS) and integrates them into a unified, comprehensive computerized information system. Through CHITS, community-based health information is made available not only to public health agencies requiring community level information but also to the community itself which generates the information. It enables the community to use this information for local decision-making and health planning. In addition to software, CHITS also includes structured capability-building programs designed to improve the health information systems within local health centers, regardless of the level of automation. CHITS began in Pasay City and is now in four municipalities around the country with requests for installation from many more.

ClearCanvas

http://www.clearcanvas.ca/dnn/

ClearCanvas is a powerful and simple to use combination of a PACS image server and an image workstation. Among the functionalities: DICOM C-STORE (SCP/SCU) for most currently approved DICOM SOP Classes, DICOM C-STORE (SCP/SCU) support for JPEG Baseline, JPEG Extended, JPEG Lossless, RLE, and JPEG 2000 transfer syntaxes (32-bit OS's only), # DICOM C-FIND and C-MOVE (SCP) for Patient Root and Study Root query models (all IHE related query fields are supported to the image level), configurable policies for dealing with duplicate images sent to the server, DICOM device management for limiting features remote DICOM devices can access, logical partitioning with shared system resources (i.e. each partition can have its own AE Title and data sent to a partition can only be queried through that partition), powerful rules engine, support for multiple filesystems for online storage including NAS devices, rules based Autorouting, watermark based

disk management.

ePostRx

http://www.anshealth.com/solutions.htm

ePostRx is the industry's first and only open source, enterprise pharmacy solution which allows customers to create unique dispensing work flows for Electronic Scripts, Retail, Chain Retail, Long Term Care, High Volume Mail-Order and Central Fill business models.

FreeB

http://www.freeb.org/

FreeB is a GPL Medical Bill formating module. It is designed to be used with any EHR system that tracks basic demographics, procedure codes and diagnosis codes. An EHR sends the basic billing data to FreeB using a simple XML-based interface (XML-RPC or SOAP as needed). FreeB then handles the bill formating and bill revision. FreeB has standard templates for X12 837, HFCA 1500 (now the NPI modified CMS-1500) and UB-92 series formats. FreeB is designed so that it can send bills to a printer, to a payers web interface, or to a clearinghouse. FreeB also performs bill revision, as you modify the claim data in order to meet the payor requirements, FreeB keeps track of those changes over time so that you can easily see the progression of the claim over time.

Indivo

http://www.indivohealth.org/

Indivo is a personally controlled health record system that enables patients to own complete, secure copies of their medical records. Indivo integrates health information across sites of care and over time. Indivo is built to public standards as an open-source application platform and is actively deployed in real-life settings. Indivo places a strict emphasis on patient control and ownership of medical information and offers the detailed technical infrastructure to provide this control. Indivo stores fully detailed clinical encounter records, taken from either electronic systems, paper reports or patient entry. Indivo's XML-based storage allows for a flexible data model and Indivo developers are working closely with the HITSP process to ensure broad interoperability; also, indivo's multi-level security model provides strong data security. Each record is encrypted, protecting against unauthorized access to servers or backup tapes.

LabKey

https://www.labkey.org/project/home/begin.view

LabKey Server is open source software that helps scientists integrate, analyze, and share large, complex datasets. The base platform provides secure, web-based query, reporting, and collaboration services over a wide variety of data sources including relational and file-based. Specific scientific applications are layered on top of these services to meet the data integration challenges of individual labs. It is in use in several labs and universities, like the Fred Hutchinson Cancer Research Center, the center for HIV-AIDS Vaccine Immunology at Duke University, Cedars-Sinai Medical Center, Harvard Partners, University of Washington, University of Michigan and the

University of Kentucky. It provides functionality for collaboration, observational studies, proteomics (CPAS), flow cytometry and assays.

MIRTH

http://www.mirthproject.org/

Mirth is an open source cross-platform HL7 interface engine that enables bi-directional sending of HL7 messages between systems and applications over multiple transports. By utilizing an enterprise service bus framework and a channel-based architecture, Mirth allows messages to be filtered, transformed, and routed based on user-defined rules. Creating HL7 interfaces for existing systems becomes easy using the web-based interface and channel creation wizard which associates applications with Mirth engine components. HL7 has established itself as the lingua franca of healthcare information exchange, and in order to integrate your existing services with HL7 systems you must implement an adapter layer to transform messages between your domain and the HL7 world. Mirth makes this step easy by providing the framework for connecting disparate systems with the required protocol adapters and message transformation tools. Mirth uses a channel-based architecture to connect your systems with other HL7 systems. Channels consist of endpoints (both inbound and outbound), filters, and transformers. Multiple filters and a chain of transformers can be associated with a channel. The Mirth web interface allows for reuse of filters and transformers on multiple channels. Endpoints are used to configure connections and their protocol details. Inbound endpoints are used to designate the type of listener to use for incoming messages, such as TCP/IP or a web service. Outbound endpoints are used to designate the destination of outgoing messages, such as an application server, a JMS queue, or a database.

O3

http://www.o3consortium.eu/

The goal of the Open Three (O3) Consortium is to promote an Integrated Healthcare Environment for archiving, transmission, exchange, retrieval and visualization of data, signals, images and reports, in which the three dimensions of the Health Policies - Hospitals, Territory / RHIOs and Home Care / Ambient Assisting Living (AAL)) are linked together. It includes a Data and Picture Archiving and Communication System (DPACS), MARiS (an IHE compliant Department System Scheduler/Order Filler for scheduling and workflow management in radiology department), a radiology workstation, and a data exchange application.

OpenClinica

http://www.openclinica.org

OpenClinica is a free, open source clinical trial software platform for Electronic Data Capture (EDC) clinical data management in clinical research. The software is web-based and designed to support all types of clinical studies in diverse research settings. From the ground up, OpenClinica is built on leading, independent standards to achieve high levels of interoperability. Its modular architecture and transparent, collaborative development model offer outstanding flexibility while supporting a robust, enterprise-quality solution. The OpenClinica software platform supports:

- Management of numerous, diverse clinical studies through a unified interface
- Clinical data submission, validation, and annotation
- Data filtering and extraction
- Study oversight, auditing, and reporting

It is designed to be HIPAA compliant, and has been used in large scale EDC trials across the world.

OpenMRS

http://openmrs.org

OpenMRS is an application which enables design of a customized medical records system with no programming knowledge (although medical and systems analysis knowledge is required). It is a common framework upon which medical informatics efforts in developing countries can be built. The system is based on a conceptual table structure which is not dependent on the actual types of medical information required to be collected or on particular data collection forms and so can be customized for different uses. OpenMRS is currently implemented in Kenya, Rwanda, South Africa, Uganda, Tanzania, Zimbabwe, Lesotho, Malawi, Peru, and Haiti. Further implementations are underway in multiple other locations throughout Africa through the work of such groups as the Millenium Villages Project and FACES. Nearly twelve million discrete observations have been collected for nearly 50,000 HIV patients with over 550,000 encounters within the AMPATH implementation in Kenya. The MRC team in South Africa is leading the effort to form an implementers group to aid in further implementations.

Tolven

http://www.tolven.org/index.html

The tolven software environment is composed of the following components: an electronic Personal Health Record solution (ePHR) that will enable consumers to record and selectively share healthcare information about themselves and their loved ones in a secure manner; an electronic Clinician Health Record solution (eCHR) that enables physicians and other healthcare providers to securely access healthcare information collated from any number of trusted sources relating to an individual patient in a structured and easily accessible way, and an healthcare informatics platform that enables all healthcare data to be stored and accessed via the ePHR and eCHR solutions. The platform is based on industry standard technologies and data models.

TrialDB

http://ycmi.med.yale.edu/trialdb/index.shtm

TrialDB is a customizable Web-based clinical trials database system used for the storage and management of clinical data. It relies on a rich data library that contains information about individual data elements (parameters, typically clinical facts about patients) and their higher-order grouping. The library is used to generate case report forms (CRF) as Web pages, and records both information used to interactively validate the contents of the CRF as well as specify how individual elements in the CRF are presented to the user. The

forms support validation of individual elements based on data type, range, and non-empty checks, as well as arbitrarily complex validation across the elements in a form (or across more than one form). They support skip logic, where certain elements are dynamically enabled or disabled based upon the values of previously entered elements. Access to a number of controlled vocabularies (e.g., ICD-10, DSM-IV, the Cerner/Multum Drug Lexicon, the NCI Common Toxicity Criteria) during data entry is also supported. It can manage an arbitrary number of studies, with no limits on the number of patients per study or the number of parameters that are tracked in each study. It does all of this without the need to modify the database structure repeatedly each time you capture parameters for a new clinical domain.

Vista

http://www.vistasoftware.org/

VistA is a trusted, proven, and economical electronic health record system. VistA is an enterprise-wide, fully integrated, fully functional information system built around an electronic health record. It is easily customizable and can be configured to fit any type of healthcare organization, from clinics and medical practices to nursing homes and large hospitals. VistA has been named one of the best healthcare information systems in the nation by the Institute of Medicine. Developed by the Department of Veterans Affairs, the VistA healthcare information system has been field-tested for more than twenty years in approximately 1,300 VA sites of care, including more than 160 medical centers and 850 related clinics. The sistem allows for integrated and complete management of all aspects of a modern hospital or care center.


Free/Libre and Open
Source Software Metrics


Information Society
Technologies


European Commission