Breaking Barriers

The Potential of Free and Open Source Software for Sustainable Human Development

A Compilation of Case Studies from Across the World

Nah Soo Hoe

UNDP-APDIP ICT4D Series

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IDRC CRDI

For more information please contact:
UNDP ASIA-PACIFIC DEVELOPMENT INFORMATION PROGRAMME
Regional Centre in Bangkok
3rd Floor, United Nations Service Building
Rajdamnern Nok Avenue
Bangkok 10200, Thailand
Tel: +66 2 288 1234
Fax: +66 2 280 0556
Email: info@apdip.net
Website: http://www.apdip.net

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List of Abbreviations

ACP	African, Caribbean and Pacific Group of States
ActionApps	Action Applications
ADM	Active Dynamic Mirroring
APC	Ambiente Pedagógico Colaborativo
APC	Association for Progressive Communications
APDIP	Asia-Pacific Development Information Programme
ASEAN	Association of Southeast Asian Nations
AVOIR	African Virtual Open Initiatives and Resources
CD	Compact Disc
CMS	Content Management System
CNO	Centre of National Operations
CSIR	Council for Scientific and Industrial Research
DOC	Department of Communications
DST	Department of Science and Technology
EC	European Commission
EU	European Union
FAQ	Frequently Asked Question
FOSS	Free and Open Source Software
FOSSFA	Free/Open Source Software Foundation for Africa
FSF	Free Software Foundation
GeoCMS	Geospatial Content Management System
GIMP	GNU Image Manipulation Program
GIS	Geographical Information System
GNOME	GNU Network Object Model Environment
GNU	GNU's Not Unix
GOSSIP	Global Open Source Software Initiatives and Projects
GPL	General Public License
GPS	Global Positioning System
GUI	Graphical User Interface
HTML	Hypertext Markup Language
ICT	Information and Communications Technology
IDRC	International Development Research Centre
IFP	French Institute of Pondicherry
IGP	Indo-Gangetic Plains
IOSN	International Open Source Network
IS	Information System
ISLD	Interspace Linux Distribution

ISM	Island System Management
ISOC	Internet Society
ISP	Internet Service Provider
IT	Information Technology
ITV	Technical Inspection of Vehicle
KDE	K Desktop Environment
KEWL	Knowledge Environment for Web-based Learning
LAN	Local Area Network
LSF	Lanka Software Foundation
MIMOS	Malaysian Institute of Microelectronics Systems
MVC	Model-View-Controller
NADRA	National Database and Registration Authority
NEPAD	New Partnership for Africa's Development
NGO	Non-Governmental Organization
OS	Operating System
OSC	Open Source Centre
OSCAR	Open Source Simple Computer for Agriculture in Rural Areas
OSI	Open Source Initiative
OSS	Open Source Software
PC	Personal Computer
PDA	Personal Digital Assistant
PDF	Portable Document Format
PEAR	PHP Extension and Application Repository
PRD	Paraná Digital
RAM	Random Access Memory
RDF	Resource Description Framework
RSS	Really Simple Syndication
SCM	Supply Chain Management
SDK	Software Development Kit
SME	Small- and Medium-Sized Enterprise
SOPAC	South Pacific Applied Geoscience Commission
TV	Television
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
USA	United States of America
UWC	University of the Western Cape
WAN	Wide Area Network
XML	Extensible Markup Language

Foreword

Free and Open Source Software (FOSS) is now firmly established as an alternative to commercial, proprietary software in many areas of software utilization. The fundamental freedom of being able to use, distribute, modify and redistribute the modifications made to a software released as FOSS, as well as the availability of FOSS without licensing fees and with source code, has been responsible for its widespread acceptance and adoption. The FOSS community-driven model of software development and maintenance has been recognized even by established proprietary software companies as having its own merit and advantages.

The benefits offered by FOSS have been particularly useful for poor developing countries around the world. In particular, the ability to obtain FOSS without licensing fees has proven to be very beneficial to the users in these regions as this makes information and communications technology (ICT) more affordable to them. The localization of software applications is also facilitated on a FOSS platform and this will further help towards bridging the digital divide.

Over the last few years, as FOSS has matured and become more widely accepted, many projects or initiatives have been carried out that attempt to make use of FOSS to help bring about economic development and empower the people in developing countries or regions. Some of these projects are highlighted in this compilation of FOSS case studies. These case studies can be an inspiration to the organizations and people involved in helping poor communities embrace ICT as they demonstrate that FOSS can play an important part in empowering a community to bring it into the information and Internet age.

At the end of this book, the reader will find a DVD containing a 40-minute version of a documentary on FOSS, entitled *The Codebreakers*. This was aired as a BBC World TV documentary in May 2006 and it contains footage of a number of the projects described in this book.

This compilation of FOSS case studies is a joint initiative of UNDP Asia-Pacific Development Information Programme (UNDP-APDIP), the International Open Source Network, the International Development Research Centre (IDRC) of Canada and the United Nations Educational, Scientific and Cultural Organization (UNESCO). We hope that you find these case studies useful and beneficial in your day-to-day work.

Shahid Akhtar
Programme Coordinator
UNDP-APDIP

Laurent Elder
Team Leader
PAN Asia
IDRC

Abdul Waheed Khan
Assistant Director-General for
Communication and Information
UNESCO

Preface

This compilation of Free and Open Source Software (FOSS) case studies is a selection of the submissions received as a result of an invitation by the UNDP Asia-Pacific Development Information Programme (UNDP-APDIP) and its International Open Source Network (IOSN) to capture, document and promote FOSS initiatives from around the world. These initiatives were asked to submit case studies of their projects for consideration as "success stories" and 14 have been selected for inclusion in this book. Each case study highlighted here provides a summary of the project; background of the organization; project's objectives; FOSS applications developed and/or deployed, and their impact; lessons learned; current status of the project; and benefits and challenges in using FOSS; as well as contact information and references.

FOSS has a key role to play in building information and communications technology capacity and bridging the digital divide, especially in poor communities. This has been amply borne out by most of the case studies featured here. The availability of free-of-charge FOSS applications and the ability to localize it by any interested party are important reasons for FOSS being generally preferred in these environments, even though FOSS desktop applications are relatively less mature than their proprietary equivalents. However, this is rapidly changing and as more and more high-quality FOSS applications become available for mainstream desktop usage, the situation will improve further.

With the publication of this compilation, it is hoped that there will be greater awareness of the ability of FOSS to empower and help poorer and less developed communities, especially in developing countries. The experiences gained from these projects should also be useful for new FOSS initiatives in this area.

Nah Soo Hoe

Photos: Colnodo, Derek Keats, Rusmanto Maryanto, Paballo Thekiso.

OVERVIEW

Overview: Why FOSS, for What and the Challenges Ahead

Introduction

Over the last few years, Free and Open Source Software (FOSS) has established itself as a viable alternative to proprietary software in many areas of information and communications technology (ICT) deployment. The availability of FOSS without licence fees and its inherent characteristic of being open to modification and adaptation make it an attractive proposition to poorer communities. As a result, many projects that make use of FOSS to empower and help the people have been initiated all over the world especially in poor and developing regions.

This book contains a compilation of the case studies of several of these projects that have been considered as successful. The main focus of most of the projects chosen is not on the actual development of a particular FOSS application *per se* but in using FOSS applications (these may be new, enhanced or existing ones), as a means to fulfil the primary objectives of the project.

Case Studies Overview

The Free and Open Source Software initiatives and/or projects highlighted in this book are:

Africa

- Creating Educational and Business Opportunities – AVOIR, South Africa
- Making Legal Information Freely Available – JuriBurkina, Burkina Faso
- Promoting Free and Open Source Software in Africa – Meraka, South Africa
- Localizing Free and Open Source Software – Translate.org.za, South Africa

Asia-Pacific

- Connecting Farmers and Buyers – AgriBazaar, Malaysia
- Building an Indonesian GNU/Linux – BlankOn Linux, Indonesia
- Identifying and Controlling Weeds – OSCAR, India
- Managing Disasters – Sahana, Sri Lanka
- Reducing Vulnerabilities in the Pacific – Tikiwiki GeoCMS, Fiji

Europe

- Improving Government-Citizen Interaction – eGov Balkan, Bulgaria
- Inculcating ICT Usage in Educational, Social and Economic Activities – Extremadura, Spain

Latin America

- Empowering Local Communities – Colnodo, Colombia
- Managing the Environment – Galápagos, Ecuador
- Enabling Public Schools – Paraná, Brazil

As can be seen from this list, the projects come from the four corners of the globe. This is a clear indication that FOSS is being taken up worldwide, particularly in the developing countries of Africa, Asia and Latin America. The projects cover a wide range of domains ranging from specialized applications to web portals and services for e-government to full-fledged projects on the development of FOSS packages. They are initiated mainly by local organizations and, in some cases, funding is provided by international aid and development agencies.

What is Free and Open Source Software?

FOSS refers to software that is distributed under a license that is recognized either as free software[i] by the Free Software Foundation (FSF) or Open Source Software (OSS)[ii] by the Open Source Initiative (OSI). OSS has its roots in free software. Since the early days of the computer, software has been freely exchanged along with source code by researchers and academics. These users also freely modify the source code and pass along the modified software for others to use. This model of sharing and developing the software inspired the free software movement. FSF defines free software[iii] as software distributed under a license that possesses four fundamental characteristics – freedom to run the software, freedom to study and adapt the software, freedom to redistribute the software, and freedom to improve it and release the improvements for others to use. It is important to note that the term free software refers to the freedom associated with it and not the price. However, as the source code has to be freely available for use and redistribution, free software usually can be obtained at no or very little cost.

The technologies that gave rise to the Internet were created largely by the free software movement. Even with this success, business and corporate users did not trust free software as they had become accustomed to paying for commercial, proprietary software. In addition to this, as the FSF viewed proprietary software as restricting the rights of users and took on an uncompromising stand towards it, many corporations regarded FSF as anti-business and this strengthened their scepticism regarding free software. To overcome these issues and to maintain a more pragmatic and friendly approach towards business users, several free software advocates got together and came up with an alternative definition and name - OSS. The Open Source definition is similar to free software in many respects and it also embraces the four fundamental freedoms. Many of the major Open Source licenses are accepted as free software licenses as well by FSF. While there are philosophical differences between the two movements, in everyday usage, the two terms are usually used interchangeably by many people.

[i] Free Software Foundation, "Software Licenses" http://www.fsf.org/licensing/licenses/index_html#SoftwareLicenses
[ii] Open Source Initiative, "Open Source Licenses" http://www.opensource.org/licenses/
[iii] Free Software Foundation, "The Free Software Definition" http://www.fsf.org/licensing/essays/free-sw.html

Reasons for Using FOSS

Affordable and High Quality

All projects discussed in this publication state that one of the main reasons for choosing FOSS over proprietary software is that there is no need to pay any licensing fees for FOSS. This is hardly surprising as these projects are all from the non-profit sector and are based in poor countries or regions. This factor becomes critical for projects like eGov Balkan, Extremadura, and Paraná in which very many desktop personal computers (PCs) have to be deployed.

However, this does not mean that the quality and functionality of the software developed and/or used have been compromised. In all cases, since these projects are generally successful, it is not unreasonable to assume that the FOSS used or developed is satisfactory in terms of quality and functionality. In specific cases, the FOSS application certainly is on par or even exceeds the quality and functionality of the equivalent commercial proprietary application. Examples of these are Action Applications (ActionApps – the content management system (CMS) used in Colnodo), KEWL.NextGen e-learning platform (used in AVOIR), the Sahana Disaster Management System and Tikiwiki GeoCMS. In addition to these FOSS-specialized applications, most projects also make use of well-known and proven mainstream FOSS such as Apache, GNOME and KDE desktop systems, GNU/Linux, the Mozilla suite of Internet applications, MySQL, OpenOffice.org, PHP and Perl.

Free as in Freedom

FOSS guarantees four fundamental freedoms: to run, study, redistribute and improve the software. All projects reviewed here cite one or more of these four freedoms as the main or an important reason for choosing to use FOSS. The ability to use and freely copy any software used is important to communities that are poor and can ill-afford, in most cases, to spend scarce financial resources on a seemingly luxury item like software.

The freedom to access source code and study it is important for capacity building and helps to improve the ICT skills of the local people. The possibility of being able to improve on a piece of software freely and redistribute the improved version enables developing communities to learn and improve on the work done by others. This contributes significantly towards capacity building in the local population, helping them to understand and deploy new technologies successfully.

The Sahana software is a good example of how important the freedom associated with FOSS is to the project. To be effective and practically useful, it is imperative that a disaster management software can be freely used and distributed without any condition. Additionally, it should be customizable easily by the local people to reflect the local environment under which it is operating.

The freedom in FOSS facilitates localization of FOSS to cultures and languages that are not well known. The majority of people in developing economies do not understand English while most proprietary software is available in English only. To be able to tackle the digital divide, it is vital to be able to translate and localize software to meet the cultural and linguistic needs of the target community. FOSS facilitates this process as long as there are some people willing to take up the task. They have the freedom to do this without going through the sometimes time-consuming

task of obtaining permission from the owners of the software. As much of this localization is voluntary work, interested parties can proceed with the localization without being concerned with business issues such as the commercial potential of the intended market in relation to the size of the investment. This ability to localize is critical to projects like Extremadura, OSCAR, Sahana and Translate.org.za and, indeed, all projects concerned with getting non-English speaking communities to use computers.

Similarly, the freedom to adapt and modify that is guaranteed by FOSS enables the Tikiwiki GeoCMS application to be developed in a relatively short time without incurring too much expense.

Development of Local ICT Industry

The deployment of FOSS in a region or country can contribute to the growth of the local ICT industry since support and maintenance of the software can be provided by local players. This is seen in the eGov Balkans and the Extremadura projects where the local ICT industry has benefited from the business generated by the support services needed.

Using FOSS may also stimulate the growth of a local software development industry as software professionals are needed to create, customize and enhance the source code. This will bring along business and education opportunities and contribute towards the economic development of the region. The AVOIR project attempts to do this for the continent of Africa through a collaborative effort among several African higher education institutions. In this project an improved version of an existing FOSS application has been built with participation by developers from African universities and other organizations.

FOSS Software Development Model

Most FOSS embraces a community-style software development model which is based on collaborative development of the software amongst interested parties, usually over the Internet. While there is usually a core group of developers who oversee and steer the software development effort, anyone who has an interest and the necessary skills can contribute towards the software. This opportunity, along with the source code availability and freedoms guaranteed by FOSS licenses, encourages the sharing of FOSS and associated technologies amongst less developed and/or poor communities, and lowers the entry barrier for participation in ICT development.

Scope of Projects by Type

While all projects reviewed here aim to empower the target group or community through FOSS or FOSS-based solutions to help them perform their work better and/or improve their economic status or living conditions, they can be classified into the following categories based on their primary objectives.

ICT Awareness and Bridging the Digital Divide

All projects, directly or indirectly, use FOSS to bring about ICT awareness and education to their target audiences and help bridge the digital divide. Many, such as AgriBazaar, BlankOn Linux, Colnodo, eGov Balkan, Extremadura, Meraka, OSCAR, Tikiwiki GeoCMS and Translate.org.za, involve economically-disadvantaged communities where illegal copying of software is rampant. It makes sense to encourage these communities to use FOSS instead of proprietary software as it is more affordable and will benefit the local economy since local entrepreneurs can support the FOSS applications being used. Additionally, the fundamental philosophy of FOSS – of sharing the software freely – fits in well with the community spirit of the rural users, and its usage will reduce the illegal distribution of commercial proprietary software in these regions.

Most users addressed by these projects are not English-literate and therefore, it is easier for them to operate computers if the software supports their own language or dialect and uses elements from their culture in the user interface. The localization of proprietary software in these places is rare as users are totally dependent on software-owning companies that often do not see enough financial returns to justify investment in localization efforts. FOSS is better placed when it comes to the localization of software. It is a natural choice in projects where the ability to easily localize and/or make modifications is required such as AgriBazaar, BlankOn Linux, Extremadura, OSCAR and Translate.org.za.

FOSS Advocacy and Capacity Building

All the projects featured here engage the target communities in one way or another in the advocacy of FOSS and in building ICT skills and capacity. However, projects such as AVOIR, BlankOn Linux, Extremadura and Meraka explicitly cite FOSS advocacy and/or capacity building as their stated objective.

AVOIR is an initiative that is concerned with the creation of a FOSS-based sustainable software ecosystem. With this, it hopes to be able to build ICT capacity and develop business opportunities for economic development in Africa.

The BlankOn Linux project has built a distribution of GNU/Linux with support for the Indonesian national language, Bahasa Indonesia, so as to enable the people of Indonesia, most of whom are not English-literate, to be exposed to FOSS and GNU/Linux. It advocates using FOSS in Indonesia to build ICT capacity and help bridge the digital divide there.

The Extremadura project is carrying out a series of programmes to introduce ICT to the people of the Extremadura region of Spain and inculcate ICT usage in educational, social and economical activities, using FOSS as the vehicle of deployment.

The Meraka project is directly involved with ongoing initiatives to promote FOSS in South Africa. FOSS is seen as a public resource that can be harnessed to contribute to economic development and improve the quality of life of the people.

Better Government-Citizen Communication and Interaction

ICT and Internet technologies are leading to a shrinking world and propelling news and information into prominent positions. Citizens in many nations are now clamouring for more transparency in their governments and are demanding for real dialogue and exchange of information with them. There is a trend to address this and projects such as Colnodo, eGov Balkan and JuriBurkina attempt to bring about better government-citizen interaction and communication.

Colnodo is involved in the "Internet for Accountability" initiative in Colombia by developing and supporting information systems that will allow municipalities to publish information for their communities online. This will enhance transparency in each municipality and introduce accountability practices into the management of municipal offices.

The e-government initiatives in the Balkan states have resulted in the initiation of various e-government services for better and easier access to the authorities in local municipalities. Consequently, there will be greater transparency and encouragement for people to increase their participation in local affairs, thereby strengthening the democratic process in the region.

By making legal information freely available to law practitioners in Burkina Faso, JuriBurkina is expected to have a wide range of positive effects such as strengthening democracy and the rule of law, helping to consolidate the national legal system, helping local people develop skills and expertise in FOSS development and fostering economic development by helping to establish a consistent legal system. JuriBurkina will improve the efficiency of the Burkina Faso legal system by making legal research much faster and more effective, and by giving law students easy access to critical legal resources.

Assisting Specific Communities

FOSS is widely recognized now as a very useful, enabling vehicle for less privileged economies and communities as it allows governments and activists to deploy solutions that are both affordable and appropriate for the target groups.

The Paraná project, apart from enabling public school teachers in the state of Paraná, Brazil, to collaborate and develop course content, also aims to contribute towards increasing the Portuguese content on the Internet.

The OSCAR project targets the farming community of the Indo-Gangetic Plains (IGP) by deploying the application software for weed identification and control, in rice and wheat crop systems, on computing devices running GNU/Linux. This will make the equipment affordable and practical in the targeted region. Another project that targets rural farmers is AgriBazaar from Malaysia, which helps farmers to conduct daily trading of their agricultural produce.

Colnodo is a non-profit Internet Service Provider (ISP) that mainly services non-governmental organizations (NGOs) and other non-profit organizations. It targets organizations that make strategic use of the Internet for development, empowering local communities and promoting the peace process.

The JuriBurkina website makes the jurisprudence and legislation of Burkina Faso freely available over the Internet and, thus, is of value to the legal community both in Burkina Faso as well outside the country. This deployment represents the initial effort in the creation of a regional legal information network. JuriBurkina was developed using FOSS technologies that can be re-used in other West African countries to create similar online legal repositories at a low cost, leading ultimately to free online access to legal information throughout the region.

Solving Specific Problems

There are projects that attempt to use FOSS to solve specific problems. One of the most well-publicized FOSS applications that has been developed recently is the Sahana Disaster Management System. This project was started in 2004, in the aftermath of the Asian tsunami disaster, to help track families and coordinate work among relief organizations. FOSS offers key benefits in situations and environments related to a disaster, as it can be readily distributed, localized and customized according to the requirements of the region or community using it; and poor countries can also afford to use it. There is also the added advantage that FOSS does not require a lengthy procurement or purchasing process which makes it easier for government and civil society organizations to respond technically within a very short time frame. Sahana has been successfully deployed in several other countries besides its country of origin, Sri Lanka.

The Galápagos project makes use of FOSS development tools to create five software applications to assist in the management of the environment of the Galápagos Archipelago. These applications, running on FOSS platforms connected over a wide area network (WAN) linking the main islands of the Archipelago, have increased the ability of the Galápagos National Park to collect data and manage information with regard to the activities of fisheries and tourism, manage land resources, and provide support for planning tasks and surveillance within the Archipelago.

As part of the effort to address vulnerability reduction in the Pacific Island Countries, an integrated planning and management system is utilized. The use of ICT and, in particular, a Geospatial Content Management System (GeoCMS) that organizes new and existing geographical information, is very important to this system. As there was no suitable software available at the time the project started, a new application, Tikiwiki GeoCMS, was developed by utilizing two existing FOSS applications. The freedom to modify and redistribute the modified software granted by the FOSS licenses allowed the developers in this project to easily build on the two established software to create a new GeoCMS application. This will be very difficult, if not impossible, to achieve with proprietary software.

The AgriBazaar web portal catering to the rural farmers in Malaysia acts as the gateway that connects the agriculture producers and buyers to a Supply Chain Management (SCM) system back-end application via the web browser. The SCM system, developed with FOSS tools, contains several modules to address specific problems peculiar to the local agriculture industry, which deals with perishable products.

The OSCAR project has come up with a prototype FOSS application as the primary outcome. This application, with a weed identification system at its core, contains information on 50 of the most common weed species for the rice and wheat crop systems of the IGP.

A summary of the primary objectives and scope of the projects is given in Table 1.

Table 1. *Key Objectives of Projects by Type*

Project	ICT Awareness and Bridging the Digital Divide	FOSS Advocacy and Capacity Building	Better Government-Citizen Communi-cation and Interaction	Assisting Specific Communities	Solving Specific Problems
AVOIR		x			
JuriBurkina			x	x	
Meraka	x	x			
Translate.org.za	x				
AgriBazaar	x			x	x
BlankOn Linux	x	x			
OSCAR	x			x	x
Sahana					x
TikiWiki GeoCMS	x				x
eGov Balkan	x		x		
Extremadura	x	x			
Colnodo	x		x	x	
Galápagos					x
Paraná				x	

FOSS Applications

Common mainstream FOSS applications that are used by all of the projects include:

- GNU/Linux operating system;
- GNOME and/or KDE desktop environment;
- Mozilla suite of Internet applications; and
- OpenOffice.org office suite

The popular Apache web server is used in projects that needed a web presence while the MySQL database is used in those applications that require a database system. In addition, the LAMP (Linux/Apache/MySQL/PHP) software stack is mainly utilized for projects that delivered web and interactive services.

Some Common FOSS Applications used in the Projects

GNU/Linux

The GNU/Linux operating system consists of the Linux kernel[iv] itself and the rest of the system software and tools/utilities which, working together, make up the operating system. Most of the system software is from the GNU Project.[v] This operating system is commonly referred to as Linux.

The GNU/Linux operating system is commonly distributed bundled together with other application software for use by end users and this is known as a Linux distribution or distro. Different Linux distros may have different applications bundled with them but they all have the same Linux kernel and core GNU utilities. Popular Linux distros include Debian, Red Hat, SuSe and Ubuntu.

GNOME and KDE[vi]

The two most popular FOSS desktop environments are GNOME and KDE. These are software that present a graphical desktop environment and interface to the user. Using the facilities offered by the desktop environment, the user can interact with the system and run applications.

OpenOffice.org[vii]

OpenOffice.org is an office application suite consisting of a word processor, spreadsheet, presentation software, graphics editor and a database program. It is compatible with the popular Microsoft Office suite, being able to read and write Microsoft Office data file formats.

The Mozilla Internet Applications[viii]

The Mozilla Internet applications include the popular Firefox web browser, Thunderbird e-mail client and the Mozilla All-in-one Internet Application suite.

Apache[ix]

The Apache web server is the most widely used web server on the Internet.

[iv] The Linux kernel archives, http://www.kernel.org
[v] The GNU Operating System, http://www.gnu.org
[vi] The GNOME project, http://www.gnome.org
The KDE project, http://www.kde.org
[vii] OpenOffice.org, http://www.openoffice.org
[viii] Mozilla projects, http://www.mozilla.org
[ix] The Apache web server, http://httpd.apache.org

MySQL[x]

MySQL is a full-fledged relational database system and is widely used as the back-end database in web-based applications and services.

PHP, Perl, Python[xi]

These are scripting languages commonly used in programming interactive web applications.

[x] MySQL Database, http://www.mysql.com
[xi] The PHP programming language, http://www.php.net
The Perl programming language, http://www.perl.com
The Python programming language, http://www.python.org

Apart from the usage of FOSS listed above, some projects make use of FOSS development tools to create new applications or enhance existing ones in order to accomplish the objectives of the project. These applications are highlighted below.

New or Improved FOSS Applications

For the Galápagos project, a series of software applications for environmental management within the Galápagos National Park was developed. The applications built were:

- The Galápagos Marine Reserve management system;
- The Tourism Management system;
- Application for managing extraction of natural resources;
- Legal process database;
- Application for Giant Tortoise Breeding Centres; and
- Monitoring database for visitor's sites.

Initially in the AVOIR project, an existing e-learning platform application that was built using proprietary tools to run only on a proprietary operating system was converted to run on a FOSS platform. This new version of the software, called KEWL.NextGen, has been successfully deployed in several regions in Africa.

The OSCAR project has developed a prototype application software for weed identification and control of the rice and wheat crop systems of the IGP. This software was developed to run on both desktop computers and Simputers.[1]

For the Sahana project, a disaster management system was originally developed to coordinate disaster relief work after the 2004 Asian tsunami disaster in Sri Lanka. This system has since been enhanced to be more flexible and adaptable so that it can be used for other types of disaster management as well.

[1] The Simputer is a low cost portable alternative to PCs running on GNU/Linux. http://www.simputer.org

The Tikiwiki GeoCMS is a new GeoCMS application that was developed from two existing FOSS applications. It is one of the first of its kind in the world and allows a country or region to easily publish its geographical data for access and sharing over the Internet.

Enhancements to Mainstream FOSS

Localized distributions of the GNU/Linux operating system - BlankOn Linux and gnuLinEx - have been created as a result of the BlankOn and Extremadura projects, respectively. The Translate.org.za project has localized several common desktop FOSS packages including OpenOffice.org, Mozilla Firefox, Mozilla Thunderbird, KDE and GNOME into the official languages of South Africa. In addition it has developed several software translation tools to aid in the translation and localization of FOSS.

Portals and Web Applications

AgriBazaar is a web portal for agricultural trading with an SCM system back-end application. The project also involves the supply of front-end software and hardware infrastructure to enable farmers to access AgriBazaar to trade their agriculture produce and access market information, including the latest prices in different markets.

Colnodo offers a wide range of Internet services such as messaging services, discussion forums, online databases, web hosting, audio/video broadcast and search engines to over 500 organizations (mainly NGOs) in Colombia. The FOSS CMS and collaborative web publishing tool, ActionApps, is used to enable the organizations served by Colnodo to easily manage the content of their websites as well as to exchange information with other sites without requiring internal technical expertise.

The eGov Balkan initiative involves the development and deployment of e-government web portal services and applications to provide effective interactive communications between local governments and citizens in the south-eastern part of Europe (the Balkans).

The JuriBurkina website is the first online legal information centre in West Africa. Specialized FOSS process automation tools for the portal's publishing operations are also in use.

The Paraná web portal enables the public school teachers in the state of Paraná, Brazil, to collaborate and develop course contents in various subject areas, as well as other teaching resources.

Major Challenges

One challenge that almost all of the projects faced is the resistance to change amongst people who had already been exposed to ICT and computers through proprietary software, e.g. ICT professionals, technical support staff, office workers, etc. The deployment of FOSS may require some amount of retraining to make users productive since it may not work in the same manner as proprietary software. The workers' unwillingness to substitute proprietary applications with FOSS could jeopardize the success of the project. Therefore, this change needs to be managed

properly. In addition, there are financial and time costs associated with the training/ retraining process which have to be taken into consideration.

The fear of interoperability problems with legacy proprietary software may cause reluctance on the part of some users and organizations to use FOSS. This can be a major issue as proprietary software is well entrenched in most establishments and organizations. Again this has to be handled properly from the start so that all potential interoperability issues are well understood and addressed or worked around.

In some cases, e.g. AgriBazaar, software developers in the project were not familiar with the FOSS development environment and using FOSS tools. A familiarization period may be required before the developers can become productive and efficient.

The culture of FOSS relies heavily on community collaboration and involvement and, to be successful, a project that involves FOSS should at least identify, build this community and get the members to work together. The Tikiwiki GeoCMS project experienced difficulties in building the local FOSS community while the Paraná project had to train its community of teachers in skills required for collaboration.

For projects in the less developed regions, challenges in the physical deployment of ICT infrastructure, such as the availability of adequate Internet access, may have to be overcome and applications designed appropriately to reduce or avoid dependence on an advanced ICT infrastructure.

Sustainability remains a huge challenge for some projects as they either rely on sponsorships, grants or donations, or are required to be self-sustaining after initial funding ends. For AgriBazaar and OSCAR, while the pilot deployments have been successful, sustainability is an issue as they try to scale up into the production phase. The BlankOn Linux project depends almost entirely on volunteer efforts and faces serious concerns in terms of the availability of resources to continue maintaining the BlankOn GNU/Linux distribution. Even the often-cited Sahana project constantly needs to ensure that it receives adequate funding to be able to continue supporting the core development team.

Lessons Learned

The success of the projects covered in this book shows that FOSS can be a viable alternative to proprietary software. In many cases reviewed here, e.g. Colnodo, eGov Balkan, Extremadura, Galápagos, Paraná, Sahana and Tikiwiki GeoCMS, project implementation would not have been viable had proprietary software been used because of cost implications. In addition to cost benefits, FOSS can provide opportunities for developing countries to contribute towards technology development rather than just remain mere users of technology produced by others.

The four fundamental freedoms inherent in FOSS make it an ideal choice to bridge the digital divide and promote digital literacy to all people, irrespective of their geographical, economic or cultural situations.

The Translate.org.za project has indicated that localization has become a social requirement and can no longer be considered an optional feature. With increased competition from good localized FOSS applications, proprietary vendors will seriously consider the localization of their software in order not to lose market share to FOSS.

Many projects deal with communities that are not technology savvy, which slows down the adoption of new technology. Changes take time and non-technical/technology issues such as social and cultural problems may impede the adoption of the projects. It should be remembered that users are usually reluctant to try out and use new things and/or features if their benefits are not obvious or realized immediately.

It is important to partner with a good local organization for projects that are not developed by local people. To provide sustainability, local institutions and businesses that are actively committed to the project are needed to collaborate with technology providers. It should be remembered that volunteerism can only get a project so far; to ensure that the project can go to completion, it has to be properly funded and the people working on it paid realistically. Similarly, donor funding can take projects only so far. For projects to turn into proper, ongoing programmes and services, their initial design must take sustainability into account as a key design factor.

Projects that involve a rural agrarian population have to consider the prevalent basic issues in agricultural practices and infrastructural constraints. Acceptance by the target group and methods to integrate participation from local communities are essential for any ICT intervention at the grass-roots level to be successful.

For the success of government-based initiatives and projects like e-governments, it is important that adequate policy and legislation be developed as lack of political support can slow down the processes and adoption rate.

Conclusion

FOSS has been used successfully to implement the projects featured in this book. All these projects are located in countries or regions that are economically disadvantaged and the very low or no cost of FOSS has been cited as the main reason for choosing FOSS. Many projects also cite the ability to make modifications freely in FOSS as a key reason for their choice.

That FOSS can be used and distributed without paying license fees makes its use ideal for meeting the goal of bridging the digital divide, an objective of almost all projects. Related to this is the comprehensive support for localization available in many of the mainstream FOSS desktop packages and this facilitates their use in cultures that are not English-literate. Empowerment of the people and capacity building are also two other objectives that are widely listed. Again, FOSS is seen as a key enabler for these objectives to be met. For projects that involve government initiatives to provide services and improve its interactions with citizens, FOSS is a natural choice as it is readily available for all citizens and it does not discriminate against anyone.

The case studies involve projects carried out in Africa, the Asia-Pacific, Europe and Latin America and this bears testimony to the global reach of FOSS. The success of these projects demonstrates that FOSS is able to provide an affordable alternative to poor communities without compromising quality and functionality.

Photos: Franck Martin, Go-Open Campaign, Ministry of Infrastructures and Technological Development of the Regional Government of Extremadura, OSCAR team.

CASE STUDIES

Creating Educational and Business Opportunities

AVOIR, South Africa

Summary

The African Virtual Open Initiatives and Resources (AVOIR) project, initiated by the University of the Western Cape (UWC), is a collaborative effort among several African higher education institutions. It attempts to create educational and business opportunities that contribute towards the development of Africa through FOSS development activities. It has taken an existing e-learning platform application, Knowledge Environment for Web-based Learning (KEWL) that was developed at UWC, and rebuilt it to run on a FOSS platform. The new version of the software, KEWL.NextGen, is based entirely on FOSS. It has an innovative modular architecture that is implemented using a model-view-controller (MVC) design pattern and offers great flexibility to adapt the framework for any purpose. It also has unique features such as the support of offline authoring of content, active mirroring, and instructional design capabilities.

The FOSS collaborative development model utilized by the AVOIR project allows many institutions, organizations and individuals all over Africa to volunteer or contribute to the project. With the choice of using FOSS and its related technologies, the core AVOIR team has been able to benefit from FOSS and offer FOSS-related services to the local government, education and business sectors. All this has contributed towards capacity building and, as the project management is based at UWC, the project has resulted in a broad knowledge of FOSS being developed there as well. This has enabled UWC to successfully implement an enterprise architecture strategy in which FOSS technologies and solutions are preferred.

The first phase of the KEWL.NextGen e-learning platform development has been largely completed successfully. As a result, alliances have been established between AVOIR and initiatives for other projects utilizing FOSS. Some desired shorter-term outcomes of the AVOIR project, such as the use of higher educational institutions to drive the production of innovative software and to provide advice, accessibility and enhanced local support for FOSS have been realized with the KEWL.NextGen project. However, it is still too early to determine whether the desired long-term outcome, in which FOSS is to contribute significantly towards sustainable growth and development within Africa, can be realized.

Background of Organization

The AVOIR project is a collaboration by several African higher education institutions to build a group of core FOSS developers in Africa who are able, through software development activities, to create educational and business opportunities that contribute to development on the continent.

AVOIR is not primarily a software development project; it is a project about human development, capacity building and creating opportunities for people through the formation of transnational alliances both within and outside Africa. Core developers from African universities and other organizations participate in most software development activities, particularly the first software project from AVOIR, KEWL.NextGen. After the first working code had been released, other institutions and individuals have been encouraged to volunteer their contributions to the project in true FOSS community fashion.

The AVOIR project is governed by a board consisting of volunteers within partner institutions. Each formal partner institution receives a salary for one developer funded by AVOIR and there is a partially-funded project manager and funded researcher based at UWC. Participating institutions are encouraged to seek their own funding for extended participation, this being the only mechanism currently available to bring new partners into AVOIR.

The project was initiated by UWC, and at present UWC employs 13 full-time developers, graphic artists, usability testers and a project manager. There is also a very strong internship programme, and at any one time there are at least three interns working on the project. AVOIR's partner network consists of 15 developers and development teams scattered throughout Africa, all of whom are actively involved in developing and contributing to the initiatives that AVOIR is involved in.

Objectives of Project

The main goal of the AVOIR project is to ascertain whether concepts of knowledge ecology can be used to build a sustainable and expanding system of free software creation that contributes to economic development in Africa. The knowledge ecology can be viewed as having three core components: people, processes and technology. These are seen against the background of the higher education and broader socio-political landscape in much the same way that energy, nutrients and trophic relationships interplay with the broader physical environment in natural ecosystems.

Some of the desired outcomes of AVOIR are:

- Higher education institutions in Africa to drive the production of new and innovative software for use in the higher education, education, business and government sectors;
- The availability of better advice, accessibility and enhanced local support for FOSS in education, business and government;
- An increase in the number of graduates trained in the application of FOSS principles and enhanced employment opportunities for graduates of higher education institutions; and
- Enhanced relationships between higher education and business built around the development and support of FOSS.

Apart from these medium-term outcomes, the long-term outcome aims at contributing towards sustainable growth and development within Africa.

The target audience of AVOIR includes public higher education institutions and software developers in Africa, working in collaboration with one another and with software developers in other parts of the world. Side benefits of the tools being developed will also accrue to other educational institutions, including schools, private education and training organizations, and businesses.

The African higher education institutions involved in the project are: UWC, University of Jos, Catholic University of Mozambique, University of Dar es Salaam, University of Nairobi, Jomo Kenyatta University of Agriculture and Technology, Universite Cheikh Anta Diop de Dakar, Makerere University, Uganda Martyrs University, National University of Rwanda, University of Ghana, and the University of Eduardo Mondlane. In addition, Nelson Mandela Metropole University, University of Namibia, Sokoine University (Tanzania), Polytechnic in Blantyre (Malawi) and Monash University (Johannesburg campus) have found their own means to participate. Outside of Africa, Washington State University, Colgate University and Kabul University are involved in various ways.

FOSS Application

Description

The first FOSS application that is being developed under AVOIR is KEWL.NextGen. This is a part of the original KEWL learning management system that was developed to run on the proprietary Microsoft Windows platform. KEWL.NextGen is based on a PHP[2] framework called KINKY (a recursive acronym for KINKY Is Not KEWL Yet). KINKY is implemented using an MVC design pattern, with a front controller web implementation, and has a fully modular architecture. Where possible, it uses PHP PEAR[3] heavily, including the database abstraction. Apart from a web platform, the application also has offline authoring and active dynamic mirroring (ADM) capabilities to allow improved wide-area collaboration activities.

Choice of FOSS

AVOIR is aimed at capacity building and the creation of opportunities for the people of Africa through ICT. The idea is to build a sustainable software ecosystem that contributes to economic development in Africa. FOSS is used as the enabler for this to take place. As a first project, an existing application – KEWL – is implemented in the FOSS scripting language, PHP, and this is used as the basis for building an improved next-generation FOSS learning management system – KEWL.NextGen. A FOSS collaborative development model allows many institutions, organizations as well as individuals to volunteer or contribute to the project. Using FOSS and the FOSS development model and environment, AVOIR is able to bring together cutting edge educational research and state-of-the-art computer science to produce an advanced application development framework and a learning management system based on it. With this project, the core AVOIR team has been able to offer services on e-learning as well as the development and use of FOSS to the government, education and business sectors.

Development and Implementation

The KINKY application framework and KEWL.NextGen were developed following good design principles, resulting in a framework that will cater to the requirements of other new applications across many application domains. The application framework used is an implementation of the MVC design pattern as it is generally interpreted for web applications. This has been implemented using the Front Controller web design pattern, thus providing all modules with access to core functionality, and enabling the core framework classes to respond consistently across modules. The view part of the MVC architecture is implemented using templates. Currently, only PHP templates are used, although a template engine can easily be incorporated into the architecture if it becomes necessary.

By using this architecture, a modular system is implemented, making it easy to add new modules on an ongoing basis without needing to alter any code other than that of the module being implemented. In addition, most of the key terminology used to describe functionality is abstracted. This has enabled the developers to use the framework to build applications as diverse as group collaborations, CMSs, portal applications, clinical tracking, hospital pharmacy management, labour relations management and others by enabling specialized and unspecialized modules to be mixed in ways that would not be possible without abstraction.

[2] PHP is a widely-used general purpose computer language that is especially suited for web development and can be embedded as part of the hypertext markup language (HTML) present in web pages. http://www.php.net

[3] The PHP Extension and Application Repository (PEAR) – a framework and distribution system for reusable PHP components. http://pear.php.net

KEWL.NextGen makes use of the following FOSS software: Apache web server, MySQL database, PHP with the PEAR Library and a number of PHP extensions. While the AVOIR project recommends implementing KEWL.NextGen on the GNU/Linux operating system, it is also possible to use it on Microsoft Windows (2000, XP, 2003) and Sun Solaris platforms.

A guide for planning implementation is available. For the lowest and least costly implementation, the guidelines provide for implementation using a single entry-level server capable of supporting a few hundred simultaneous users. In such a case, the database and web server are on the same machine. With a dual processor server, and a large amount of RAM,[4] such a system can support a few thousand users, but has no redundancy. At the other end of the scale, KEWL.NextGen and other KINKY-based applications can scale up to support even millions of users through load balancing, clustering and other techniques.

KEWL.NextGen and all KINKY applications can implement an innovative technique known as ADM. ADM allows a set of KEWL.NextGen servers to actively mirror all data and file system objects among one another within a realistic time frame according to the limitations of available bandwidth. Servers among which such objects are mirrored are participants in an ADM virtual cluster and are known to one another. If the state of data or file system objects change on any server in the system, the changes are propagated to all other servers in the ADM virtual cluster. This means that learning content, interactive discussions, uploaded assignments, etc., are accessible across servers in the ADM virtual cluster. This should happen even in bandwidth-constrained environments to the extent possible. Advanced data compression techniques will play a role in facilitating this process.

Deployment

KEWL.NextGen has been deployed in each of the partner institution, and many of them have established or are establishing e-learning support teams to support academics wishing to use the system. In partnership with the NetTel@Africa[5] project, the system is being used to deliver e-learning for the Master's Degree programme on ICT Policy and Regulation that is offered collaboratively by 21 universities. Outside Africa, the system is also in use at Kabul University in Afghanistan. Various other implementations are in early stages of development.

Deployments of KEWL.NextGen in projects centred at UWC include:

- Alumni Portal (keeping track of Alumni and their activities);
- Brawaamsisswam Community Outreach (mentoring system for high school children);
- Electronic Theses and Dissertations;
- kPostgraduate (post-graduate mentoring system);
- Student Enrolment Management System;
- Clinical tracking of nurses;
- HIV/AIDS training for teachers;
- kGroups group-based collaboration;
- Thetha Community Bulletin Board; and
- UWC Portal.

There have also been deployments of KEWL.NextGen in other projects outside of UWC and these include:

- Namibian e-learning programme;
- Commonwealth of Learning in Namibia and SchoolNet Namibia;

[4] Random Access Memory (RAM) is a type of computer storage whose contents can be accessed in any order. http://en.wikipedia.org/wiki/RAM

[5] NetTel@Africa is a comprehensive capacity building strategy focused on improving the use of ICT to achieve socio-economic development goals in Africa. http://www.nettelafrica.org

- National Information Society Learnership (Ecological Informatics); and
- NetTom in Malawi.

Impact

The AVOIR project has had a tremendous impact on UWC and most partner institutions. Partly, this is a result of the institutionalization of KEWL.NextGen, but also a result of having developed a broad base of knowledge and skills through AVOIR and projects with which it has synergy.

KEWL.NextGen has been fully institutionalized at UWC. This included the creation of an e-learning strategy and an e-learning support unit with appropriate support procedures and training. The staff at UWC has begun to use KEWL.NextGen and the older version of KEWL will be phased out soon.

UWC is currently implementing a Free Content and Free Open Courseware strategy, which will require all courses to have a representation on KEWL.NextGen, and that content be made available with a preference for a Creative Commons[6] Attribution-ShareAlike license. However, it must be noted that while import of all MIT Open Courseware[7] into KEWL.NextGen is now possible, actual deployment is hindered by its restrictive license. Other, less restrictive alternatives to MIT OpenCourseware, for example the Rice University Connections project, are being explored.

The impact on partner institutions is only just beginning to be explored, but for many, KEWL.NextGen and other KINKY applications have already become part of their institutional strategy. For some, business opportunities are being created from the software.

Lessons Learned

Some key lessons that have evolved are worth reporting:

- Nodes should grow through their own processes (for example, by creating opportunities for student projects);
- Nodes should be able to replicate (for example, by providing training and support to institutions wishing to establish new nodes);
- Agility must win over politics;
- The project must be inclusive not exclusive; and
- The ecosystem as a whole should work towards sustainability beyond research funding.

Current Status of Project

The first phase of the KEWL.NextGen e-learning platform development has been completed and the software is currently in version 1.3. Apart from this, the following applications have been released as part of the AVOIR project:

- kGroups – a system for online, group-based collaboration;
- kForums – a system to run the community board at UWC; and
- kPortal – a system to run the UWC main portal.

Other applications like kClinicalTrack for tracking nursing students in clinical placements and kSurvey for running web and paper-based surveys have been released in June and July of

[6] The Creative Commons licenses are licensing and contract schemes that enable copyright holders to grant some of their rights to the public while retaining others. http://creativecommons.org/
[7] MIT OpenCourseWare makes the course materials used in the teaching of almost all undergraduate and graduate subjects of MIT available on the web, free of charge. http://ocw.mit.edu/

2006, respectively. Several other applications are also in the release stream for 2006, including version 2 of the KINKY framework with full support for services implementation.

Two developer workshops have been conducted, and developers in each partner institution are now fully trained in all aspects of the methodology of the project. Several conference presentations have been made and peer-reviewed conference papers have been published. Alliances have been established between AVOIR and a number of other projects and initiatives, including the NetTel@Africa programme, Kabul University and the Afghan E-Quality Alliance, Philippines E-Quality Alliance, New Partnership for Africa's Development (NEPAD), and the Department of Science and Technology in South Africa.

Benefits and Challenges

A major problem in African and other developing countries is one of access to expensive licensed propriety software. AVOIR encourages the use of FOSS and, under it, projects like the KINKY framework and KEWL.NextGen, make the software and content freely available and accessible to anyone with access to a computer. Having access to the source code and given the modular nature and database abstraction, the framework and its applications move beyond a learning management system and can be applied to other areas such as business and government. The modularity of KEWL.NextGen and its underlying KINKY architecture makes it flexible and relatively easy to incorporate new features and functionalities.

The general benefits that the AVOIR KEWL.NextGen project has brought to its participants are capacity building and expertise in FOSS development work. Being based at UWC, the project has resulted in a broad knowledge of FOSS being developed at UWC. This has enabled the institution to embark on an enterprise architecture strategy that stipulates that any new technology at UWC must be implemented using FOSS unless it can be proven that it cannot be implemented that way. This strategy has resulted in savings for the institution where FOSS solutions are used over proprietary ones, and more importantly, it has allowed the institution to integrate systems to a level not possible with proprietary software and within its budget.

Other Information

One of the principles of AVOIR is that it should work towards sustainability. It is too early in the project to have made much progress in this matter, particularly in those institutions that are still new to the collaborative development of FOSS. However, at UWC, several options for sustainability are being explored and these can serve as models for other AVOIR partners. In addition, the business world is exploring how to create business opportunities for the work done at UWC and is beginning to establish partnerships with UWC in a number of countries in Africa.

Conclusion

The AVOIR project has successfully completed the first phase of the KEWL.NextGen e-learning platform by migrating an earlier implementation of KEWL to FOSS. As a result of this success, alliances have been established between AVOIR and initiatives for other projects utilizing FOSS. All of this will go towards helping achieve the objective of the AVOIR project: using the knowledge ecology, comprising people, processes and technology, to build a sustainable and expanding system of FOSS creation that contributes to economic development in Africa. In the meantime, some desired shorter-term outcomes of the AVOIR project, such as the use of higher educational institutions to drive the production of innovative software and the availability of improved skills, accessibility and enhanced

innovative software and the availability of improved skills, accessibility and enhanced local support for FOSS, have been realized with the KEWL.NextGen project.

Contact Information

Project: African Virtual Open Initiatives and Resources
Organization: University of the Western Cape
Contact Persons: Paul Scott / Derek Keats
Street/Postal Address: Modderdam Road, Bellville, Western Cape, South Africa
E-mail: pscott@uwc.ac.za, dkeats@uwc.ac.za
Tel: +27 21 959 3759
Fax: +27 21 959 1234

Websites

AVOIR project website
http://avoir.uwc.ac.za

KEWL.NextGen project website
http://avoir.uwc.ac.za/projects/nextgen

Making Legal Information Freely Available

JuriBurkina, Burkina Faso

Summary

Building on expertise and software developed by LexUM at the University of Montréal, JuriBurkina is a searchable French-language database that makes available a repository of Burkina Faso's jurisprudence and legislation to anyone with Internet access. This project involves the support, collaboration and partnership of the Burkina Faso Bar Association, the General Secretariat of the Government of Burkina Faso and the ICT company ZCP Informatique. JuriBurkina is the first Internet-based legal information centre in West Africa.

A FOSS operating system, a web server and database software are deployed for the infrastructure set-up. Specialized FOSS process automation tools for JuriBurkina's day-to-day publishing operations are provided by LexUM; these include LexEDO, a legal publishing platform; Polyglotte, an automated document converter; and NOME, an anonymization tool for court decisions. FOSS was chosen for development and deployment as costs had to be kept affordable and source code availability was needed to ensure that local ICT experts could take over and fully maintain and support the system once it became operational.

The deployment of JuriBurkina gives the local people easy and ready access to legal documents as well as the technology and tools for legal publishing. This will, in turn, promote greater transparency of the local judicial system and lead to better governance in the public institutions of Burkina Faso.

JuriBurkina has been fully operational since 2004 and is managed, operated and supported by the local Bar Association. This deployment represents the initial effort in the creation of a regional legal information network comprising Burkina Faso and two other countries, Niger and Senegal.

Background of Organization

LexUM is the University of Montréal's justice system technologies laboratory. The team consists of over 20 legal and computer science professionals who are assisted by as many university students. It is involved in the use of technology to improve access to law and justice and has collaborated with a large number of courts, governmental organizations, legal professional associations, universities and international organizations in Canada and internationally. LexUM's expertise covers various aspects of the application of ICT to law:

- Developing technologies for free access to law;
- Designing judiciary information management systems;
- Conceiving technical and documentary standards for the legal community;
- Assisting international development with the use of legal information technologies; and
- Developing strategies for mastering technologies in the legal domain.

Being a strong promoter of free access to law at an international level, LexUM works mainly in countries that are looking at utilizing legal information technologies to uphold democracy and ensure better governance of their institutions. LexUM has conceived and currently manages many international development projects involving the use of legal information technologies.

Objectives of Project

The main objectives of the JuriBurkina project are to:

- Create a free and open Internet resource giving access to the jurisprudence and legislation in Burkina Faso;
- Improve access to legal information in Burkina Faso for the benefit of the legal profession and the public;
- Promote greater transparency of the judicial system;
- Create an educational resource for the legal profession and a self-sustainable local legal publishing organization;
- Transfer knowledge and build local capacity in legal technologies and legal web content publishing and management;
- Help Burkina Faso join the global network of legal information institutes;
- Pave the way for the expansion of the project from a local resource to a regional network; and
- Create and test a FOSS publishing platform.

The main outcome of this project is the availability of a free and open Internet website housing the jurisprudence and legislation of the country.

The primary groups in Burkina Faso targeted by this project are the legal profession, the judiciary, local authorities, academics and the public. Other groups like businesses and organizations abroad interested in understanding the legal system of Burkina Faso will also find JuriBurkina useful.

Support and assistance from the government, the judiciary, the legal profession and the private sector of Burkina Faso have made JuriBurkina possible. Key partners involved in this project are LexUM, the Burkina Faso Bar Association, the General Secretariat of the Government of Burkina Faso and the local ICT company ZCP Informatique.

FOSS Application

Description

FOSS is deployed for the infrastructure as well as for publishing activities. The software used for the infrastructure include Red Hat Linux Enterprise Server for the server operating environment, and Apache web server and PostgreSQL for the database.

Specialized process automation tools for JuriBurkina's day-to-day publishing operations to increase their efficiency were provided by LexUM. These include:

- LexEDO – a web legal publishing platform designed to create and support websites for the dissemination of legal documents;
- Polyglotte – a client-server document conversion system based around common word processors, meant to be used by people who have large distributed document repositories and need to be able to convert those documents to HTML[8] and PDF;[9] and
- NOME – a software application that assists editors in the anonymization process of court decisions, which consists of removing personal data from documents in order to protect privacy.

Choice of FOSS

Burkina Faso does not have an advanced telecommunications and ICT infrastructure.

[8] The Hypertext Markup Language (HTML) is an international open standard used to specify the structure and presentation of the content of a web page.
[9] The Portable Document Format (PDF) file format is developed by Adobe Systems Inc. and is widely used for the display and exchange of documents containing text and images.

Therefore, a fairly lightweight software implementation was sought. Towards this end, a FOSS solution was found to be ideal as FOSS Internet and web solutions do not require extensive hardware and Internet resources.

In addition, with FOSS, development and ongoing operations costs could be kept affordable. The availability of the source code for legal publishing and management tools from LexUM meant that the local ICT professionals could learn to operate and adapt the entire system. This allowed local experts to take over, fully maintain and support the system once it became operational. A FOSS solution also allows easy customization, better security, avoidance of lock-ins and ease of use.

Development and Implementation

LexUM provided the technology and software, as well as its expertise in legal publishing and guided local partners accordingly during the implementation.

The JuriBurkina website makes use of LexEDO as its content management platform which allows for distant content management through secure web interfaces. With this, a decentralized team of editors may remotely add, remove or modify content according to their respective access rights. LexEDO combines centrally-hosted documents and decentralized processes. The platform also uses syndication mechanisms based on RDF[10] technologies to synchronize relevant data and documents between the websites of distant partners.

LexEDO supports internationalization for its database and interface. This is achieved by separating the computer code from displayed information, which allows for the rapid addition of any language version.

On the website, documents are published in HTML and PDF file formats, and are accessible by alphabetical and chronological order. A search engine allowing for fast and efficient information retrieval is also provided.

Deployment

The JuriBurkina web portal is deployed on a dual Intel Xeon processor machine with hard disks redundancy facilities. Two systems are used, the first providing an environment for the publication of jurisprudence by the Bar of Burkina Faso and the other for the publication of statutes from the Secretariat General of the Government of Burkina Faso.

There are basically two types of users who need access to the system, the editors in charge of the creation and operation of the online legal information resource and public users who need to access information. Editors access the system through a secure web interface and are entitled to full control over the resource configuration and content. Public users access the resulting legal information resource openly and freely on the web.

JuriBurkina is deployed externally and independently of LexUM. It is fully supported by its recipients – local judicial institutions, the Burkina Faso Bar Association and ZCP Informatique. This deployment represents the initial effort in the creation of a multinational legal information resource grouping comprising Burkina Faso, Niger and Senegal. Similar systems are in the process to be deployed for these other countries.

Impact

Until recently, legal publishing was a field of activity dominated almost entirely by

[10] The Resource Description Framework (RDF) integrates a variety of applications from library catalogues and worldwide directories to syndication and aggregation of news, software, and content to personal collections of music, photos, and events using the eXtended Markup Language (XML) as an interchange syntax.

commercial concerns. In many economically-advanced countries, and increasingly more so in developing ones, legal texts are only available for a fee. Consequently, not all interested groups can have easy access to these legal documents. The technology and tools for legal publishing are also not readily available. The deployment of JuriBurkina changed all this. The local people have been trained to use and maintain legal publishing and management tools from LexUM and the local legal community now has access to free and open publications of jurisprudence and legislation. All this will, in turn, promote greater transparency of the local judicial system, leading to better governance in the public institutions of Burkina Faso.

JuriBurkina is the first electronic legal information centre in West Africa and the project has, to a certain point, enhanced the visibility of the country at the international level.

Lessons Learned

It is important to team up with the best local partners in a project that involves deployment in a foreign environment. To provide sustainability, local institutions and businesses that are committed to the project need to actively collaborate with the technology providers.

Current Status of Project

The project has been fully operational since 2004 and is managed, operated and supported by the local Bar Association. Due to the success of this project, an international legal information network is being set up together with two other countries, Niger and Senegal.

Benefits and Challenges

The JuriBurkina project benefits the local legal community and people by making the jurisprudence and legislation of Burkina Faso freely available and accessible, thereby facilitating access to judicial decisions. This will help ensure greater transparency of the judicial system and promote better governance in the government and public institutions of Burkina Faso.

The use of FOSS has benefited the project due to its low cost, availability, collaborative development environment, stability and the freedom to learn from, modify and distribute the software used.

From the LexUM standpoint, the biggest challenge of JuriBurkina was to set up a self-sustaining legal publishing project outside of Canada, beyond the control of its technical team, and to transfer the required know-how and technology in a way that permits completely autonomous publication by the local recipients. This has been done successfully.

The project also found that some local ICT professionals were better equipped and had been trained to use proprietary software. This challenge had to be overcome as FOSS is used extensively throughout the project.

Conclusion

The JuriBurkina project has allowed Burkina Faso to put its jurisprudence and legislation online and improve access to legal information for the benefit of the legal profession and the public at large by making information freely available on the Internet. The use of FOSS to develop and implement this website is important as the local people have benefited from the affordability and availability of source code made possible by FOSS. This has led to local capacity building in ICT as well as forging local expertise in legal technology. The access to the legal information of the country will result in greater transparency of the local judicial system and lead to better governance in the public institutions of Burkina Faso.

Contact Information

Project: JuriBurkina
Organization: LexUM
Contact Person: Pierre-Paul Lemyre
Street Address: Université de Montréal, 3525, Chemin Queen Mary, Montréal (Quebec), Canada H3V 1H9
Postal Address: LexUM, Faculty of Law, Université de Montréal, P.O. Box 6128, Station Centre-Ville, Montréal (Quebec) Canada H3C 3J7
E-mail: lemyrep@lexum.umontreal.ca
Tel: +1 514 343 2140
Fax: +1 514 343 7359

Organization: Order des Avocats du Burkina Faso
Contact Person: Hermann Sorgho
Street / Postal Address: Maison de l'Avocat, 01 B.P. 4091, Ouagadougou, Burkina Faso
Tel/Fax: +226 50 30 22 90

Websites

JuriBurkina website
http://www.juriburkina.org

LexUM website
http://www.lexum.umontreal.ca

Promoting Free and Open Source Software in Africa

Meraka, South Africa

Summary

The Meraka Open Source Centre (OSC) of South Africa is charged with the mission of promoting the adoption of FOSS on the African continent and harnessing FOSS to empower the people of the South to contribute to economic development and improvement in the quality of life. Towards this end, it has embarked on a series of projects and activities to advocate FOSS, facilitate project work on various FOSS initiatives and help empower users and producers of FOSS with access to courseware and certification.

Some projects and activities of OSC have attracted national and worldwide attention. The "Go-Open Source" campaign of OSC that has been successfully completed was spread over two years and it involved creating awareness about FOSS by making use of the electronic and Internet media. This campaign had several novel projects under it, notably the popular *Go Open* TV series, a world-first for FOSS, and the Geek Freedom League Project that signed up volunteers and provided them with materials to help them introduce FOSS to friends and colleagues. OSC is responsible for the development and maintenance of the government website that houses the documents and other resources pertaining to the South African Government's FOSS strategy and policy that has attracted considerable worldwide interest. Other important government-related FOSS activities carried out by the OSC include the setting up of a web-accessible registry of initiatives, projects and parties associated with FOSS – the Global Open Source Software Initiatives and Projects (GOSSIP) project – and the formulation of project plans and strategies to assist government agencies and bodies to migrate to FOSS. OSC is also assisting the Translate.org.za project, which is involved in the localization of several widely-used FOSS desktop packages in South African official languages.

OSC is now an entity within the Meraka Institute (African Advanced Institute for Information and Communications Technology) with an expanded research and development programme. It also carries out activities to engage and forge links with other countries. The projects and activities of OSC have brought about an increase in awareness of FOSS and the benefits that it may bring to developing economies such as South Africa; impacting both the public and private sectors as well as the general public.

Background of Organization

The Meraka OSC was established by the Council for Scientific and Industrial Research (CSIR) and the Department of Science and Technology (DST) of South Africa. It is part of the Meraka Institute and plays a key role in the implementation and realization of the FOSS strategy of South Africa.

The vision of OSC is to promote the empowerment of the people through appropriate FOSS interventions. It sees its mission as playing an enabling role aimed at stimulating the adoption of FOSS on the African continent and beyond, and harnessing FOSS to empower the people of the South to contribute to economic development and improvement in the quality of life. With this mission, the Centre works together with other organizations to achieve these aims.

OSC has eight full-time employees and a number of interns, while the Meraka Institute has about 65 staff members.

Objectives of Project

OSC aims to significantly amplify the beneficial impact of FOSS and seeks to align FOSS with South Africa's national objectives. These objectives include increasing investment in the country; creating a more competitive economy, taking into account the speed and extent of globalization brought about by developments in ICT; broadening participation in the economy, particularly amongst the poorest of the poor; building a better world; and improving the capacity of the State to deliver on its mandate. The Centre works towards utilizing FOSS and its ideology to help realize these national objectives.

OSC seeks to make an impact in South Africa and Africa as a whole, while contributing to similar efforts in other parts of the world. It is therefore targeting all sectors of society through various programmes aimed at making an impact on specific stakeholder groupings.

To fulfil its mission, OSC works with various organizations both within South Africa and Africa as well as throughout the world. These include South African government bodies like the CSIR, local and national government agencies, and international NGOs like the Open Society Initiative and the Shuttleworth Foundation. It has also formed international partnerships with countries like Brazil, China, European Union, Finland, India, as well as organizations like the Free/Open Source Software Foundation for Africa (FOSSFA), the Wikimedia Foundation, United Nations Development Programme (UNDP) and various other United Nations agencies.

FOSS Application

Description

The role of OSC is to promote FOSS. As such it does not promote a particular FOSS application but rather it makes use of various FOSS applications itself (the Meraka Institute and CSIR also use FOSS). Within the OSC office, stable and established desktop and web FOSS applications are used on a daily basis and the testing of newly developed ones is carried out as well. The FOSS desktop used includes various distributions of GNU/Linux such as Impi/Ubuntu, Suse and Mandrake. Office application suites used include OpenOffice.org and some KOffice. On the server side, applications built using GNU/Linux, Apache, MySQL, PHP/Perl (the LAMP stack) are used.

The projects and initiatives of OSC can be classified under three main categories:

- OpenSpeak – concerned with advocacy and establishing a network of FOSS players in the public, private and civil society sectors;
- OpenProject – concerned with enabling access to FOSS applications, and encouraging and providing the catalyst and environment to facilitate project work on various FOSS initiatives; and
- OpenMentor – concerned with empowering users and producers of FOSS with knowledge addressing skills gaps, facilitating access to courseware and lowering barriers to certification.

A listing of some of the projects carried out by the OSC is given under the *Implementation and Deployment* section of this case study.

Choice of FOSS

FOSS is used by OSC and the organizations that it serves as it is a body set up to encourage and promote the adoption and usage of FOSS in the country and Africa in general. FOSS is seen as a means to empower the people of developing

countries so that economic development and a better quality of life can be achieved.

Implementation and Deployment

Given the nature of OSC and the network it is serving, the systems deployed cannot be quantified. The efforts of OSC to promote and help other organizations use FOSS are ongoing. CSIR itself is in the process of migrating to FOSS. The South African government, many academic institutions, civil society, a number of industry players as well as other sectors of society are involved in a wide variety of FOSS initiatives. Sometimes as these systems are deployed, OSC becomes involved with them; an example is that of the Anti-Corruption Management Information System.

There are various deployments of activities concerning FOSS under the initiatives/ projects of OSC. Some of them are:

- The "Go-Open Source" campaign, a two-year project that had been successfully completed, was carried out in partnership with the Shuttleworth Foundation and industry partners to create awareness about FOSS by making use of the electronic media, including the production of a TV series (the *Go Open* TV series – a world first for FOSS);
- The Geek Freedom League Project, started as part of the Go-Open Source campaign, attempts to encourage as many users as possible to introduce FOSS to friends and colleagues, an endeavour that will earn them the prestigious status of geeks! Upon signing up as a FOSS geek, the volunteer will receive the materials needed to convert people and computers and this campaign has attracted over 4,500 members;
- The development and maintenance of the government website – http://www.oss.gov.za – which houses the South African's Government FOSS strategy document, as well as mailing lists and continuous online discussions on various aspects of FOSS;
- GOSSIP is a web-accessible registry of initiatives, projects and parties associated with FOSS, extending the FOSSFA online database;
- OSC led a consultation to identify how donors and others could support FOSS in Africa. This involved a number of workshops, including various countries using FOSS such as Brazil, China, Vietnam, etc., as well as donors and NGOs;
- OSC is involved in formulating project plans and strategies to assist various government agencies and bodies migrate to FOSS. These include CSIR, the State Information Technology Agency, DST and the City of Johannesburg;
- OSC is assisting the Translate.org.za project,[11] which aims to translate FOSS into South African official languages; and
- Educational and training activities to bring FOSS and free learning resources into the formal and informal education arena.

Impact

OSC is the main FOSS centre in South Africa. It is the primary vehicle that the government relies on to promote FOSS in the country, as well as to assist in its efforts to bring FOSS into mainstream usage in the government. The main impact of OSC's activities has been in bringing about awareness of the benefits and usefulness of FOSS and how it can be used to assist developing countries and communities acquire ICT facilities and skills. These activities have benefited the areas of content development, business

[11] The Translate.org.za project is involved with the translation of several popular FOSS desktop packages into the 11 official languages of South Africa. http://www.translate.org.za

development, skills development, research, ICT policy and access.

In particular, the use of FOSS in the country has seen instances where the quality of service has improved, as in the case of CSIR where it is now running its access card system for all staff on a FOSS platform. The Translate.org.za project's experience has been that, using FOSS, technical problems are being addressed faster as there is less dependence on local partners who are mostly associated with proprietary software package owners and are slower in solving the problems.

Apart from the government sector, OSC projects have also affected other sectors like education and business, as well as groups like small- and medium-sized enterprises (SMEs), NGOs and the home, as FOSS is promoted and introduced into these areas. The *Go-Open* TV show has been very popular and has proved successful in reaching out to the general public on the virtues of FOSS.

Lessons Learned

With the setting up of OSC, other organizations can seek its assistance should they need support with various FOSS initiatives. They can also benefit from the wide experience that OSC has in promoting FOSS and cultivating a FOSS environment in cooperation with various government bodies, NGOs and private companies.

Current Status of Project

On 17 May 2005, OSC became a semi-autonomous entity within the newly launched Meraka Institute. With FOSS becoming more prominent, more organizations are now involved with FOSS advocacy work and, in accordance with this, OSC has begun to shift its resources and energies from advocacy to research and development. The research activities of OSC have expanded as have engagements with other countries on FOSS issues.

Benefits and Challenges

The most obvious benefit from OSC's activities has been the increased awareness of FOSS and associated benefits for South Africa, in particular, and for African nations, in general. The activities and projects organized by OSC have impacted the public and private sectors as well as the general public. These include the assistance of the Centre in the efforts of various government agencies to migrate to FOSS; the engagement with various foreign nations and organizations on FOSS-related issues; the project to translate and localize major FOSS packages into the South African official languages; and educational and training activities on FOSS.

OSC has also benefited policy makers in the government in that it has been involved in shaping the National FOSS Strategy and developing the FOSS aspect of the national research and development strategy.

On the operations side, in addition to the usual benefits of FOSS in terms of flexibility, stability, skills and cost, the use of FOSS has seen an increase in social solidarity. FOSS has enabled OSC to freely collaborate with a wide variety of organizations across the world. The use of FOSS has promoted access while also helping to deal with a broader set of issues in the ICT sector concerned with promoting skills and bridging the digital divide, etc.

The main disadvantage experienced in migrating to FOSS in CSIR has been in the adjustment that some staff members within the broader CSIR have had to make. This has resulted in temporarily slowing down productivity levels.

Other Information

The secretariat of FOSSFA was handed over to OSC in early 2006.

There are other initiatives around FOSS that started after the launch of OSC and have grown significantly. In some cases, they have become well-known FOSS initiatives; an example being the AVOIR project.[12]

Conclusion

OSC of the Meraka Institute is a key organization in the implementation and realization of the South African Government's FOSS strategy. In acting out its main role of stimulating the adoption of FOSS in the country, it has successfully implemented many initiatives and projects to promote FOSS and introduce it to the public and private sectors of South Africa. Its successful projects include the *Go Open* TV series and the Geek Freedom League Project where volunteers are recruited to introduce FOSS to friends and colleagues. OSC is also active in efforts by the government to migrate several agencies to FOSS from proprietary software as well as in educational and training activities to bring FOSS and free learning resources into the education arena.

With more organizations now performing FOSS advocacy work, OSC has shifted its focus to research and development in FOSS as well as more international activities to forge links with other countries.

Contact Information

Project: Open Source Centre
Organization: Meraka Open Source Centre
Contact Person: Ntsika Msimang
Street Address: Building 43, CSIR, Meiring Naude Avenue, Brummerria, Pretoria, 0001, South Africa
Postal Address: PO Box 395, Pretoria, 0001, South Africa
E-mail: nmsimang@csir.co.za
Tel: +27 12 841 3728
Fax: +27 12 842 7066

Websites

The Meraka Open Source Centre
http://floss.meraka.org.za

The Meraka Institute
http://www.meraka.org.za

[12] The AVOIR project website http://avoir.uwc.ac.za

Localizing Free and Open Source Software
Translate.org.za, South Africa

Summary

The Translate.org.za project, initiated in 2001, is focused on localizing key FOSS applications into the 11 official languages of South Africa[13] by using FOSS platforms and tools. It sees the localization of application software as a means to empower local people with ICT awareness and skills, thereby enriching their lives. FOSS applications that have been localized include OpenOffice.org, Mozilla Firefox, Mozilla Thunderbird, KDE and GNOME.

The project has created tools, documentation and methodologies for localization. These resources are themselves released as FOSS and made readily available to assist new localization efforts in other software and languages. The resulting localized software from the Translate.org.za project are incorporated as localized versions of the applications by their respective FOSS projects and are disseminated internationally for use, taking the reach and impact of this project beyond South Africa.

The FOSS benefits of cost savings, quality tools and a development environment are all experienced by this project. This project is the first large multi-language localization project in the world. As a result of its success, proprietary software vendors in South Africa have begun to localize their products too in order not to lose their competitive advantage to FOSS. Localization has become a social requirement and this will benefit the people. It will also help enhance the image of the local languages thereby preserving and increasing their usage.

The project is an ongoing one. More FOSS applications are being added to the list for localization into the official languages of South Africa.

Background of Organization

Translate.org.za is a project run by the Zuza Software Foundation (Zuza), an established non-profit South African organization. In the past Zuza had been mainly involved in the localization of FOSS but, recently, it had branched into other areas. Zuza has, to date, undertaken a number of key projects including Translate.org.za. The projects that Zuza had been involved with are connected with the language and culture elements of FOSS. Zuza has built skills in these areas and is focusing on creating FOSS solutions for languages and bringing FOSS thinking to certain language- and culture-specific areas of life.

Objectives of Project

Zuza was established to develop FOSS to empower and enrich the lives of the people. One important way to achieve this is to make FOSS available in local languages and, in line with this, the main objectives of Translate.org.za and related projects are to:

- Provide software in local languages;
- Encourage multilingualism;
- Preserve languages;
- Create free language resources; and
- Create free tools that can help the above.

[13] The 11 official languages of South Africa are Afrikaans, English, Ndebele, Northern Sotho, Southern Sotho, Swati, Tsonga, Tswana, Venda, Xhosa and Zulu.

The primary target groups of this project are:

- Mother tongue language speakers;
- Language practitioners; and
- Language users.

The key partners of the project are:

- Department of Communications (DOC), South Africa – the principal sponsor of the Translate.org.za project; other donors include the Shuttleworth Foundation and Hewlett-Packard;
- Volunteers – these are the native language speakers who help out in the localization of the software, as well as spread the word; and
- CSIR of South Africa – the organization that provides financial management for DOC and input on language-related matters through their Human Language Technology Division in the Meraka Institute.

FOSS Application

Description

The Translate.org.za project selects certain key FOSS applications and localizes them into the 11 South African official languages using FOSS platforms and tools. The FOSS applications that have been localized include OpenOffice.org, Mozilla Firefox, Mozilla Thunderbird, KDE and GNOME. The criteria used for choosing the applications to localize are:

- End-user focus, so as to benefit the end users the most;
- Able to run on GNU/Linux and Microsoft Windows, so as to bring benefits to the majority of computer users who still use the Microsoft Windows platform; and
- FOSS, so that the work done here can be reused for other language needs.

The tools and methodology developed for the localization of these applications are themselves released as FOSS.

Choice of FOSS

FOSS applications are chosen for localization over proprietary ones as it usually takes a long time to get the necessary agreement (that is if the proprietary vendors agree at all) for the latter and non-disclosure agreements probably need to be signed. Further, the availability of a localized proprietary software will increase the value of the proprietary vendor's product but may not benefit the people as not everyone can access proprietary software. Thus, as this project makes use of public money and volunteer labour, it is deemed proper that it localizes FOSS applications so that everyone can have access to them.

Development and Implementation

The project has created resources such as a translation toolkit, documentation and a translation portal to assist translators and programmers.

The Translate.org.za Toolkit is a toolkit to convert between different translation formats (such as gettext-based .po formats, OpenOffice.org formats and Mozilla formats). This makes it possible to stay in one format across all of the localization. By staying in one format, translators can make the best use of their tools and need not adapt to each project. Other tools are available in the Toolkit, for example, those to help process and validate localizations. The Toolkit has now been merged into the WordForge[14] FOSS project.

Documentation from the project has been gathered and consolidated so that other people

[14] The WordForge project attempts to simplify the process of localization of software. http://www.wordforge.org

can have a single reference resource for localization. This is maintained in a project wiki.[15] The documents are targeted at a level above project localization and thus address broader issues such as strategy and terminology development, etc.

The Pootle portal (http://pootle.wordforge.org) has been created to help people manage their translation projects and teams, perform web-based translation and manage offline translation. The aim is to lower the entry barrier so that more people can become involved in software localization, especially minority language groups that might not have access to a broad skills base.

All this software is written in Python[16] and is therefore cross-platform since Python is available on FOSS as well as proprietary platforms. The software itself is released under a FOSS license.

Deployment

The products from localization are incorporated into their respective FOSS projects and disseminated from the individual project websites or bundled with FOSS operating system distributions, both commercial and non-commercial. All of SuSE, Red Hat and Ubuntu GNU/Linux distributions contain the localizations and a number of vendors include OpenOffice.org with the localizations on their computers.

Impact

The localization of an application is an important social issue and has significant impact on local users. It is important to make it possible for users to work on a computer, using their local language, without having to learn English. As a spin-off to this, the availability of software in the users' native languages is changing their perception of their own languages; they now see them as modern and worthy of using and preserving.

The project has created a number of tools to make the localization of Mozilla and OpenOffice.org more compliant with the FOSS methodology as well as the documentation of the processes and these two steps have made it easier for many other teams in Africa and the world to localize software.

The project has provided input and guidance to other localization teams through training events held at Africa Source[17] I and II and Asia Source.[18] Projects such as KiLinux, localizing GNU/Linux into Swahili, make use of the Translate.org.za Toolkit and received training and guidance from Translate.org.za. The Cambodian project, KhmerOS,[19] also made use of the Toolkit and helped document tools.

[15] A wiki is a type of collaborative software that allows users to add, remove and edit the contents of a website very quickly and easily, sometimes without the need for registration. A website built and maintained in this way is also known as a wiki. http://en.wikipedia.org/wiki/Wiki

[16] Python is a popular object-oriented FOSS programming language for use in web development work. http://www.python.org

[17] Africa Source I was the first pan-African FOSS developers meeting, held on 15-19 March 2004 in Okahandja, Namibia. Africa Source II was an eight-day hands-on workshop held at Kalangala, Uganda, on 8-15 January 2006, aimed at building the technical skills of those working with and within NGOs on the continent. http://www.tacticaltech.org/africasource, http://www.tacticaltech.org/africasource2

[18] Asia Source is an event that brought together nearly 100 NGOs and NGO technology-support professionals across South and South East Asia. Its primary goal was to act as a focal point in increasing the awareness, integration and adoption of FOSS desktop and tools as a viable option for use amongst the voluntary sector in South and South East Asia. http://www.mahiti.org/asiasource/

[19] The Khmer Software Initiative is a joint project of the National Information Communications Technology Development Authority of the Royal Government of Cambodia and the Open Forum of Cambodia, a Cambodian local NGO. This initiative forms part of the work that is needed for the accomplishment of the Cambodian government's Master Plan for the implementation of FOSS in Cambodia. http://www.khmeros.info

This Translate.org.za project is the first large multi-language localization project in South Africa. It has compelled proprietary vendors to localize their software in order to retain a competitive advantage against FOSS. The project has thus achieved the objective of making the software industry see localization as a requirement and not just as an option.

Lessons Learned

The important lesson learned is that if efforts are made to localize FOSS applications in a local language, in addition to the availability of the localized FOSS, competing proprietary software vendors are likely to localize their software as well because they do not want to lose the market advantage to FOSS.

The project also found that to encourage the use of FOSS, it has to be targeted at and packaged for the end users. FOSS itself is unique and different from proprietary software and this difference is often not exploited enough to advance FOSS usage.

Current Status of Project

The project is ongoing. OpenOffice.org 2.0 had been released in the 11 South African languages with Mozilla Firefox and Thunderbird to follow suit.

Benefits and Challenges

The use of FOSS in the localization effort has provided tremendous savings for the project. The operating platforms, the localization and translation tools, as well as the target software themselves are FOSS.

The general benefits that FOSS conveys to software and development environments in this project include flexibility and speed, control of outputs and access to helpful developers.

The biggest challenge faced in this project is the employment and management of localizers who are often not very computer-literate.

Other Information

The Translate.org.za project site at Sourecforge[20] provides more technical and documentation details of the project. The Sourceforge site is used to host the Translate.org.za Toolkit.

Conclusion

The Translate.org.za project has succeeded in localizing several important FOSS applications into the 11 South African official languages. FOSS platforms and tools themselves are utilized in the localization effort and this has resulted in cost savings and the ability to produce quality products quickly. Apart from localized applications, the project has also produced important localization and translation toolkits as well as documentation that will help other localization projects.

The availability of localized FOSS software applications has prompted some proprietary software vendors to produce local versions of their software in order not to lose out. All these have contributed to multilingualism in South Africa and benefited the local people, making them more aware of the usefulness of their local

[20] The project's site at Sourceforge can be found at http://translate.sf.net

Contact Information

Project: Translate.org.za
Organization: Zuza Software Foundation
Contact Person: Dwayne Bailey
Street Address: 63A Wenning St, Groenkloof, Pretoria, 0181 South Africa
Postal Address: Box 28364, Sunnyside, 0132 South Africa
E-mail: dwayne@translate.org.za
Tel/Fax: +27 12 460 1095

Websites

Translate.org.za website
http://www.translate.org.za

The Translate.org.za project site on Sourceforge
http://translate.sf.net/wiki

The Pootle web portal
http://pootle.wordforge.org

The WordForge project
http://wordforge.org

Connecting Farmers and Buyers

AgriBazaar, Malaysia

Summary

The AgriBazaar project is a joint effort between the Malaysian Institute of Microelectronic Systems (MIMOS) and the Agriculture Department of Malaysia to boost the Malaysian agriculture industry by enabling various stakeholders (e.g. farmers, fishermen, agri-based food manufacturers, retailers, distributors, exporters and importers) to conduct their daily agriculture production trading online. AgriBazaar consists of a web portal as the front-end interface to the users and a SCM system as the back-end application. It allows stakeholders to put up their products for sale as well as access market information and check on the latest prices. Through this project, the Government hopes to enhance the productivity of the local agriculture community and the competitiveness of the Malaysian agriculture industry while, simultaneously, introducing the use of ICT and the Internet to the target rural agricultural communities.

FOSS development tools are used to develop the portal and the back-end application while the portal runs on a FOSS platform. The portal is accessed through the Internet using a web browser. For users who cannot access the portal, a FOSS-based thin-client computer system and/or FOSS live-CDs are deployed at some suitable site for stakeholders to use.

The AgriBazaar deployment attempts to provide a solution to specific economic problems of the target users as well as address the more general digital divide issue facing the target community. The use of FOSS allows software development and system maintenance to take place without incurring high costs. Local software developers were used to develop the application, which will add to the pool of local software expertise and knowledge. Using FOSS thin-client and/or FOSS live-CD solutions as the access mechanism makes deployment to other rural areas that may lack the necessary ICT resources easier.

Challenges to the deployment of the system in rural areas include the availability of adequate Internet-access infrastructure, effective community adaptation to new technology, sustainability of the project and the willingness of the target community to take ownership of it.

A pilot trial had been conducted in one of the districts in the country and the results and feedback have been positive and encouraging. The project has since moved beyond this pilot stage and it is now being implemented in stages at various agriculture department offices nationwide.

Background of Organization

MIMOS, an agency under the Ministry of Science, Technology and Innovation of the Government of Malaysia, plays an important role in the development of Malaysia by acting as a technology promoter, partner or provider for innovation in and through ICT. It mainly acts in the technology thrust areas of pervasive computing, cyberspace security and microelectronics. One of MIMOS' main development strategies is to extend smart partnership with universities, industries, research institutes and the Government. Currently MIMOS employs about 400 employees.

Objectives of Project

The AgriBazaar project is a joint effort between MIMOS and the Agriculture Department of Malaysia to boost the Malaysian agriculture industry by enabling farmers, breeders, fishermen, producers, agri-based food manufacturers, retailers, distributors, exporters and importers to conduct their daily agriculture production trading online. This project is intended to provide an opportunity for local agriculture producers to extend the market reach of their agricultural produce. Through the use of ICT and the Internet, the project aims to:

- Bridge the digital divide between the rural and urban communities since most of the rural community is engaged in the agriculture industry;
- Enhance the productivity of the local agriculture community through better planning and management of their activities and businesses, thereby leading to better quality products and increased food exports; and
- Enhance the competitiveness of the Malaysian agriculture industry.

The target groups of this project include the small and medium farmers, breeders, fishermen and manufacturers of agriculture-based products and services located in rural areas. Also targeted are the SMEs involved in agriculture-based industries such as producing snacks, delicacies, bakery and herbal products.

MIMOS has three key partners for AgriBazaar: the Department of Agriculture from the Ministry of Agriculture which provides the domain expertise, the financial institution required for the payment for business-to-business transactions, and the retailers and producers who are the users of the AgriBazaar system.

FOSS Application

Description

AgriBazaar consists of a web portal as the front-end interface to the users and a SCM system as the back-end application. It allows target stakeholders to sell their daily production online as well as access market information and the latest prices of their produce. The users of the system make use of thin-client computers (essentially PCs without hard drives) located at some suitable location to access the portal. The web-based applications available from the portal as well as the thin-client system for users were all developed using FOSS.

FOSS software used for the development of AgriBazaar are:

- GNU/Linux operating system;
- Apache web server;
- Apache-Tomcat servlet container;
- STRUTS Java application development framework;
- CVS version control system;
- MySQL and PostGreSQL database systems; and
- GNU/Linux thin-client system and GNU/Linux live-CD for deployment to users.

Choice of FOSS

FOSS development and deployment platforms were chosen for the project because a cost-effective solution with a high degree of security and low maintenance was needed for the application. The use of FOSS will also encourage local capacity building in ICT technology and software development. Proprietary software solutions were not used as MIMOS intended AgriBazaar to be a showcase of how FOSS can be utilized for large-scale applications and, at the same time, introduce farmers to the use of computers thereby helping to bridge the digital divide. For sustainability it is important that the project can be economically owned by the target community eventually and there should be little

risk of vendor dependence and lock-in. FOSS offers a cost-effective way to achieve these objectives.

Development and Implementation

The web portal acts as the gateway that connects all players to the back-end SCM application via the web browser. The SCM system is developed internally by MIMOS to manage the production up to the point of selling and marketing the product. This system is based on the problems peculiar to the local agriculture industry. The industry deals with products that have short lifecycles and the SCM contains seven modules to address these issues:

- eBuySell – posting new offers, sending requests for quotations, negotiation on quotation and ordering online;
- eLogistic – scheduling and managing transport booking and listing of transport provider in the country;
- eStock – managing product, warehouse, and inventory;
- eMake – managing production and raw material;
- eSupport – managing company's FAQs and assisting customer support;
- ePlan – forecasting and estimation model; and
- ePayment – making payment via online business-to-business transaction.

A key design consideration is that the solution developed should conform and comply with applicable standards and mechanisms for collaboration and distribution of ICT solutions/applications. The solution should not be tied to any proprietary vendor or technology and be accessible via any mode or channel of delivery. Open standards are adhered to as strictly as possible in the development of the solution.

Deployment

The district of Batu Pahat in the state of Johor was chosen for the pilot run of the project. The district agriculture office here is the place where local farmers, the cottage industry and the agricultural community go to seek advice and guidance related to agriculture activities. It is thus an appropriate site to engage target users in the use of the AgriBazaar portal. A GNU/Linux thin-client system was set up beside this district agriculture office in the same building. A thin-client system enables easier and more efficient system administration and management, contributing to a lower total cost of ownership. The system set-up there consisted of one server and 10 diskless clients connected to it via a local area network (LAN); this LAN was connected to the Internet via a router and an asynchronous digital subscriber line link. The centre was also equipped with GNU/Linux live-CDs (localized MIMOS/GNU live-CD based on Knoppix live-CD) to enable diskless clients to run as stand-alone stations to access AgriBazaar, should the server encounter any problems that could not be resolved quickly enough.

The web-based application can be easily accessed by users from any computer connected to the Internet. The use of thin-client technology facilitates the access from a centre managed by a local authority or government agency without the need to install or upgrade to new and expensive computer systems. The existing infrastructure can be leveraged to access and use AgriBazaar and this is very useful, especially for rural communities where such a model will make it easier for them to adopt the use of AgriBazaar.

For the SCM system, a total of four modules have been deployed for the community to use – ePlan, eBuySell, eStock, and eLogistic. The remaining three modules – eSupport, eMake, and ePayment – are still under development and will be released in 2006.

Impact

The project is focused on bridging the digital divide and enhancing productivity and competitiveness in the agriculture sector of Malaysia. Some expected outcomes from this project are: increased ICT literacy and income, and improved livelihoods for the people in the agriculture and rural sectors. It is also hoped that a pool of local talent with the ability to develop local software applications for social benefits will emerge.

AgriBazaar provides an alternative to the traditional way of doing business. Through it, both producers and buyers have direct and better access to the market and each other, and the middleman is eliminated. This will result in a more open and competitive market with the seller being able to sell directly to the buyer and the latter obtaining a better value for the items purchased.

AgriBazaar can be accessible anywhere and any time. It is more flexible for producers or buyers to transact business without time constraints, thereby increasing their productivity since buying and selling can be done whenever they are free with less disturbances to their daily jobs or activities. By being a web-based application, AgriBazaar is globally accessible and buyers from other countries have used AgriBazaar as a platform to do business with local producers. In addition to the latest prices of agricultural products, AgriBazaar also provides up-to-date information on market analysis and estimation data on fruit production. Through this information, producers or buyers are able to stay better informed and be more competitive.

In the deployment of AgriBazaar, a very important impact is the bridging of the digital divide. Most farmers or people who are involved in the agriculture industry have low ICT literacy. Through this project, these people are given training regularly so that they know how to access and make use of the AgriBazaar portal; thereby making them ICT-literate.

The use of FOSS and the thin-client approach make it easier to deploy the system even to places where there is low ownership of computers. This will enable the project to reach a wider section of target communities.

Lessons Learned

Several important lessons were learned in the pilot run of the project.

As the fear among some suppliers and providers that their products may not be up to quality resulted in considerable apprehension in using the system, some means of measuring or ensuring quality of their products is needed.

The community's adoption of new technology is slow. Changes take time and the rural divide issue is not the only issue at hand. Even personnel within the organizations involved needed to be inculcated with the ICT culture. Users are reluctant to try out and use new things and/or features if their benefits are not seen or obtained immediately.

The usage and availability of appropriate Internet access technologies have to be considered beforehand. As the Internet is required to use AgriBazaar, technologies available in remote areas for Internet access (e.g. broadband versus dial-up) are key factors in the effective use of the application.

The project must be scalable and sustainable in the future for it to have a longer-term impact. The use of FOSS helps this especially in the deployment and maintenance of the project.

Current Status of Project

The project has moved beyond its pilot stage testing and it is now being implemented in stages at various agriculture department offices

nationwide. As part of the implementation plan, MIMOS is distributing PCs, in stages, in these agriculture offices to those who need the access as an incentive to encourage more people to use AgriBazaar. In the first stage, 13 PCs have been distributed to selected offices recommended by the Department of Agriculture.

The second stage of software development has now been completed and new versions of the software released.

AgriBazaar is in the stage of transferring the first level support to the Department of Agriculture for operational matters. Currently, the statistics for AgriBazaar are as follows:

- Number of registered members – 11,500;
- Number of offers for purchases of goods – 770; and
- Value amount of offers – more than MYR 15 million (US$ 4 million).

Although, the portal targets local users involved in agriculture activities, users from other countries are registered on AgriBazaar and making offers through the portal. These account for 3 percent of the registered members and they come from countries such as Australia, Canada, China, Egypt, Mexico, Saudi Arabia, Spain, United Kingdom and all the ASEAN countries.

Benefits and Challenges

The general benefits gained from using FOSS are experienced in this project. These include the relatively low-cost, reliability and security of the software. More importantly, by using FOSS, the developers were able to grasp and learn advanced concepts of software development and to deliver prototypes quickly. FOSS provided the tools needed to do the job and the references given by the resources available from the FOSS community made it possible to develop a complex system like the applications for AgriBazaar.

FOSS allows software development and system maintenance to take place without incurring high costs. AgriBazaar is a national project funded by the Malaysian government and so there is a need to have a cost-effective platform. The use of FOSS also goes towards the creation of a local pool of software developers and architects and this will, in turn, create more local content or applications that address the local needs of the nation and industry.

Among the challenges experienced in using FOSS are that a learning period is required before the developers can become productive and efficient as many are not exposed to the FOSS development environment.

The biggest challenge to the project itself is the issue of sustainability. The application needs to be sustainable in order for it to create the impact and benefits envisaged.

Clear ownership of AgriBazaar is also required so that its potential can be further explored and expanded. A dedicated team comprising technical, support groups and domain experts must be focused in providing not only the best solution and technology but also addressing industry needs. Currently, this is a challenge as AgriBazaar is still at the demonstration stage and is fully funded by the government. The people in the community must also be willing to take ownership of the project and its programmes and activities, and be convinced that they are for the betterment of their own livelihood.

Other Information

Much useful feedback has been received asking for the enhancement of the portal from the portal members themselves. The statistics and comments give a good indication that the application is being used actively by members. The media and press have also given good reviews and comments saying that AgriBazaar benefits the agriculture community.

Conclusion

The AgriBazaar project has shown how FOSS can be leveraged as an enabling tool to build ICT solutions that can benefit targeted sectors of a community, in this case, the agriculture and rural communities in Malaysia. FOSS has been utilized successfully to develop and run the system. The project has contributed towards directly improving the economic status of rural agriculture producers by providing a platform for them to have better access to buyers and eliminating the middleman. Through the usage of the system, users have become ICT-literate thereby addressing the digital divide between the rural and urban population. The use of thin-client technology to provide access to the AgriBazaar portal is very useful for rural communities where computer resources are lacking and such a model will make it easier for rural areas to adopt the usage of AgriBazaar.

While initial feedback to the pilot phase of the project has been positive and encouraging, key issues of sustainability and ownership remain as the project attempts to move from the pilot phase into nationwide roll-out.

Contact Information

Project: AgriBazaar
Organization: MIMOS Berhad
Contact Person: Norlidza Mohd Yassin
Street / Postal Address: Technology Park Malaysia, 57000 Kuala Lumpur, Malaysia
E-mail: mwliza@mimos.my
Tel: +60 3 8996 5000
Fax: +60 3 8657 9449

Websites

The AgriBazaar portal
http://www.agribazaar.com.my

MIMOS Berhad website
http://www.mimos.my

Building an Indonesian GNU/Linux

BlankOn Linux, Indonesia

Summary

Yayasan Penggerak Linux Indonesia or the Indonesian Linux Mover Foundation has released a localized Indonesian distribution of GNU/Linux called BlankOn Linux. This Linux distro is based on Fedora Linux and is targeted at first-time users. The main objective of creating BlankOn Linux is to expose the people of Indonesia, most of whom are not English-literate, to FOSS and GNU/Linux. It is hoped that with a version of GNU/Linux that is available in the Indonesian language, more people will turn to FOSS as an alternative to using illegal unlicensed proprietary software (a practice that is currently rampant).

BlankOn Linux is simpler to install than many of the normal Linux distros and comes ready with many packages for computer education, office and multimedia applications, Internet access and file sharing. A BlankOn software development kit (SDK) is being prepared and this should make it easier for other developers to build other specialized Linux distros based on BlankOn Linux. Project deployment was unique in that it took only a short time to develop BlankOn Linux and the team spent a relatively small amount of money to achieve this.

The availability of BlankOn Linux will have a positive impact on the digital divide in Indonesia as more people can now have access to software in their local language to use the Internet and other ICT facilities. Internet kiosks will also benefit from BlankOn Linux as this software can be utilized to power these outlets; and it is affordable and easy to install, use and support.

One major lesson learned from the project is that without enough money for full-time developers, the use of developers who held full-time jobs elsewhere meant that they had to sacrifice their free time and holidays in order to develop BlankOn Linux. As such, human resources in the development effort can be stretched thin at times. In spite of this, the BlankOn Linux project is being maintained and the team is preparing to come out with the next release soon. However, the long-term sustainability of the project has yet to be tested and only time will tell whether the project can garner sufficient resources to successfully maintain and develop BlankOn Linux.

Background of Organization

Yayasan Penggerak Linux Indonesia is an organization dedicated to the promotion of FOSS, especially GNU/Linux, so as to enable it to be widely accepted for mainstream usage as well as for software development in Indonesia. Its main activities are holding awareness events across the country, developing and contributing to FOSS projects, establishing contacts with other FOSS-related organizations and collecting data on FOSS growth in the country.

The Foundation runs the Indonesian Linux Certification programme and works on projects including the BlankOn Linux distribution and the OpenSyariah project for banking.

Objectives of Project

The main objective of this project is to come up with a local Indonesian GNU/Linux distribution. It is desirable to have an

Indonesian distribution of Linux so that the language used for the desktop environment and some applications can be in the Indonesian language (Bahasa Indonesia); this will enable the mainly non-English-literate users in the country to be exposed to ICT and to use computers more effectively. In the long term, the BlankOn Linux project aims to be the standard GNU/Linux distribution for desktop computers in Indonesia.

The primary target group for BlankOn Linux are new computer users, especially those in Internet kiosks, schools, and the government. A second target group is the Linux distro developers so that they can develop new distros based on BlankOn Linux.

The BlankOn development is sponsored by UNESCO, one of the UN agencies promoting FOSS for education; Indoglobal web hosting; *InfoLINUX* magazine; Linuxindo Training and Consultant; Nurul Fikri Training Centre; and some ISPs.

FOSS Application

Description

BlankOn Linux is an Indonesian distribution of GNU/Linux based on the Fedora Linux[21] distribution. It consists of the Linux operating system kernel, office application software suite, Internet access software (e.g. web browser, e-mail, chat, etc.), file sharing and multimedia applications. The desktop environment and applications have been localized so that Bahasa Indonesia is used and they have an Indonesian look and feel.

Choice of FOSS

The majority of Indonesian computer users require software for a number of common tasks such as office applications, accessing the Internet and multimedia. However, to be affordable the software has to have a low cost and preferably no licensing fees at all. FOSS, and GNU/Linux in particular, meet all these requirements as they are free for use and can be freely copied, modified and distributed. They can also be easily localized to meet local needs and language. GNU/Linux is also relatively immune to common computer viruses, worms and spyware.

Development and Implementation

BlankOn Linux was developed from Fedora Core 3. There are three key steps to follow in order to produce BlankOn Linux from Fedora Core:

- Translation and localization;
- Repackaging and installer building; and
- Testing and quality assurance.

The localization and packaging of BlankOn Linux took about three months. New versions for BlankOn are being planned for release once or twice a year, following the release schedule of Fedora Core.

Deployment

A few hundred systems have been deployed with BlankOn Linux, for example, at Internet kiosks. *InfoLINUX* magazine has bundled BlankOn Linux CDs with its printed issues for mass distribution.

Impact

This project will contribute towards providing local people with affordable legal software that they can use on their PCs. BlankOn Linux is simple and quick to install and it comes only on one CD. Unlike many Linux distros available, its multimedia applications have been packaged so that they support most proprietary multimedia formats. Its Indonesian theme and menu should make local users feel comfortable with it. As such,

[21] The Fedora Linux project. http://fedora.redhat.com

it is ideal for first-time users especially those who want desktops with local language support and look-and-feel. It is also ideal for Internet kiosks as these are small companies that cannot afford to purchase proprietary commercial software and have a lot of problems with viruses and other malicious software.

The Indonesian Government is attempting to bridge the digital divide and, at the same time, encourage the use of legally licensed software. This is a problem with proprietary software as its license does not allow it to be freely copied for distribution and hence the costs involved can be prohibitive. The availability of BlankOn Linux can have a positive impact on this issue as it is a licensed software and its licence allows users the freedom to copy, modify and distribute it.

The soon to be available BlankOn SDK will facilitate the packaging of new Linux distros based on it.

Lessons Learned

The main lesson learned from the project is that as most software developers in Indonesia have full-time jobs, only a handful are willing or able to sacrifice their time after work and their holidays to work on the project. While financial assistance for the project is received from UNESCO and some Indonesian FOSS companies, it is not enough to pay a few developers to work full-time on the project.

Current Status of Project

Currently, the project is developing a special distro (BlankOn SDK) targeted at helping developers create new distributions for specific environments based on BlankOn Linux. BlankOn SDK version 1.1 has been released with a manual in Bahasa Indonesia. Parallel to this effort, the development of the next release BlankOn Linux 2.0, based on the Fedora Core 5 distribution has also commenced.

Benefits and Challenges

The main benefit of the project is the availability of a localized Linux distribution that is easy to install and use and comes with ready applications for the office, the Internet and multimedia. The availability of a desktop environment in the local language can go a long way in attracting new users. This and the fact that BlankOn Linux is FOSS and hence can be freely copied and distributed will help more Indonesians gain access to ICT facilities as they become readily available and affordable.

The main disadvantage of using BlankOn Linux is that some effort has to be made to interoperate with the dominant desktop environment of Microsoft Windows as well as possibly other proprietary application software. Moreover, some less popular hardware and peripheral devices may not be supported by it.

The project sees its main challenge as the effort to migrate the eight million computers in Indonesia, the majority of which are using illegal software, to FOSS and BlankOn Linux, in particular. Another possible challenge to the sustainability of the project is the availability of resources to maintain the BlankOn distribution. Apart from coming out with the initial distribution, updates to cater for patches and bug fixes have to be maintained and this can be a burden on the human resources, given that the developers in the project are working on a part-time, mainly voluntary, basis.

Conclusion

The BlankOn Linux project has given rise to an Indonesian distribution of GNU/Linux targeted at first-time users. In spite of constraints on human and financial resources, the team was able to build this Linux distribution in a relatively short time. Deployment has taken place in Internet kiosks. As BlankOn Linux is localized and uses the Bahasa Indonesia, it should result in exposing more local people to ICT and the

Internet, thereby helping to bridge the digital divide. It will also have an impact in helping to reduce the number of unlicensed proprietary software in use as more people turn to it as an alternative.

The project is ongoing with the release of BlankOn Linux 2.0 in the pipeline and the BlankOn SDK that will make it easier to build customized distros.

Contact Information

Project: BlankOn Linux
Organization: Yayasan Penggerak Linux Indonesia (Indonesian Linux Mover Foundation)
Contact Person: Rusmanto Maryanto
Street / Postal Address: Jalan Mampang Prapatan X No. 4, Jakarta Selatan 12790, Indonesia
E-mail: rus@infolinux.co.id
Tel: +62 21 797 5235
Fax: +62 21 790 1205

Website

BlankOn Linux project website
http://blankonlinux.or.id

Identifying and Controlling Weeds
OSCAR, India

Summary

The Open Source Simple Computer for Agriculture in Rural Areas (OSCAR) project from the French Institute of Pondicherry (IFP) involves the prototyping of an application software for weed identification and control in rice and wheat crop systems of the IGP. It is targeted at being deployed on low-cost computing devices running GNU/Linux that can be shared among farmers of a local community.

OSCAR has been developed for both desktop computers and Simputers using FOSS tools, and is released as FOSS. FOSS is chosen as it is important to make the software freely available to the farmers and to encourage contributions to OSCAR from various groups and organizations in the IGP. These groups help enhance the system by cataloguing the weed species in their region and their respective control measures. It is also important to be able to perform customizations to suit local languages and cultural practices as the content of the application, particularly the control measures of weeds, may vary with the practices in different regions.

OSCAR is unique in that it is the first of its kind within the domain of ICT applications for agriculture. By being available as FOSS, it promotes the aggregation of information from academic/research institutions as well as from traditional knowledge systems.

The project has tested the application with various target groups in the four countries of the IGP – Bangladesh, India, Nepal and Pakistan –with encouraging results. A key lesson learned from the project is that any implementation of ICT applications for a rural agrarian population has to take into account the prevalent basic issues in agricultural practices and infrastructural constraints. It is essential that methods to integrate participation from local communities are considered.

The current project is concerned with delivering and testing the prototype OSCAR application. While this has been largely successful, the ability to move from this to the actual working environment at the field level remains uncertain, as is the ability to continue to consolidate and sustain the enthusiasm and efforts of different agencies in different countries to participate, contribute, build and enhance on the existing set-up.

The actual deployment of OSCAR will probably not be done on Simputers as several issues with implementing and using it on a Simputer were experienced during the course of the development of OSCAR and its subsequent trial runs. To overcome this and to enable it to reach a wider audience, OSCAR has been successfully converted into a web-based application.

Background of Organization

IFP, a multidisciplinary research centre located in Pondicherry, India, carries out research and training activities in South and South-East Asia in the fields of Indology, Social Sciences and Ecology. IFP is highly regarded for its work in the study of Sanskrit and Tamil languages, literature and grammatical traditions (in collaboration with the Ecole Française d' Extrême Orient) as well as for its vegetation mapping of South Indian Forests and bioclimates in South-East Asia.

The Laboratory of Geomatics and Applied Informatics in the Institute specializes in Geographical Information Systems (GIS) and in ICT. It is responsible for all the ICT infrastructural needs of IFP as well as the development of databases and multimedia products for the departments at the Institute. The Laboratory is also in charge of original applications development, aimed at improving access to new technologies.

Objectives of Project

The OSCAR project aims to address the issue of declining agricultural productivity in South Asia by producing a tool for decision-making in weed identification and control. The specific objective of the project is to demonstrate a prototype of this tool implemented in software and running on desktop computers and low-cost computing devices.

This decision-making tool targets farmers of the IGP at the village level and it will be available in different local languages so as to address the cultural diversity of the project area. An existing software for species identification - Identification Assiste pour Ordinnateur - is ported to a FOSS platform and deployed on low-cost computing devices running GNU/ Linux, that can be shared among farmers of a local community. A model database for identification and control of a set of the most important weeds of the IGP is developed for integration with the species identification software. The usage, appropriateness and acceptance of the tool at the farmer community level are also assessed.

The primary target groups are farmers and village communities of selected villages from the four countries of the IGP – Bangladesh, India, Nepal and Pakistan. The indirect target group is the farming community of the region in general. The ultimate end users of OSCAR will be the farmers, village communities and also all the actors involved in the support of agricultural activities, such as development workers, NGOs, training and extension officers of semi-government and government agencies, and students of botany and agronomy at colleges and universities.

For this project, IFP is working with three partners from Asia and Europe:

- The Centre de Coopération Internationale en Recherche Agronomique pour le Développement of France specializing in development- oriented agricultural research for hot regions;
- The Rice and Wheat Consortium of Bangladesh, India, Nepal and Pakistan has weed science experts and a strong background in agriculture in the IGP; and
- The Centre of Innovation Studies, Wageningen University from the Netherlands, is concerned with the way communication can be strategically brought in to reinforce development, pro-social behaviour, organizational efficiency and collective decision-making. Its interests cover the broad and interconnected areas of agriculture, food and health, environment and nature, in western as well as in non-western countries.

FOSS Application

Description

The prototype application, OSCAR, is the primary outcome of the project. With a weed identification system at its core, it has information on 50 of the most common weed species for the rice and wheat crop systems of the IGP. OSCAR helps the farmer to properly identify a weed species and provides information on the botanical aspects and appropriate control measures.

Choice of FOSS

FOSS is chosen as it allows easy customization of the software and data formats used are known and open. These considerations are important so as to encourage contributions to OSCAR from agronomists, researchers, student community and concerned development organizations in the IGP. These organizations can help to enhance the system by cataloguing the weed species in their region and their respective control measures. If the application were based on proprietary formats and software then the whole purpose of OSCAR would be defeated since the agencies currently involved will be required to implement any future enhancements and customization. Also, it will not be practical to have a common application for the whole region considering the cultural diversity of the target region that covers four countries – with different languages and cultural practices. Although efforts are being made to port OSCAR into respective local languages, the content of the application, particularly the control measures of weeds vary with context. By using FOSS, the community can customize the application to suit its own local needs. For example, the number of weed species for lowland rice crop systems in Bangladesh can be increased in the database compared to the numbers of weeds for wheat, so that the application contains more tangible and relevant information.

Development and Implementation

OSCAR is designed to work on GNU/Linux platforms. The Gtk graphics library package is used for developing the Graphical User Interface (GUI) for the application while the libgda library (a library for writing database programs) is used for database access. MySQL is utilized as the database back-end with the gda-mysql package being deployed to interface between libgda and MySQL. OSCAR is developed for both desktop computers and Simputers.

The core component in the OSCAR application is the species identification kit (identikit). The identikit contains a model plant species with different user selectable characters such as root, habit, leaves and flowers. Each character has a number of character states which are, in turn, selected by the user. Based on the user's selection, the identikit displays the most appropriate match compared to the species available on the database. The base code is written in the C programming language, and characters and character states are stored in the database. The database is independent of the base code so as to facilitate future enhancements to the database.

Deployment

The application is targeted at farmers, extension workers and students of the IGP. The project focuses mainly on making it available on FOSS. The application has been widely tested with farmers, extension workers, students and researchers, and has received enthusiastic responses. It is made freely available on the website and interested parties are encouraged to download and use the application. Any agency such as a government or NGO involved in rural development can make use of the application.

The project has tested the application with the various target groups in Bangladesh, India, Nepal and Pakistan. It was found that the local communities were very open and ready to adopt and own the application. From researchers and teaching community at the universities and research institutions to development workers at the grass-roots level, everyone was readily convinced of the advantages of the FOSS model and was eager to actively contribute in one way or another.

The deployment of OSCAR is unique in that it is the first of its kind within the domain of ICT applications for agriculture. The nature of

the application addresses a pressing need of the target groups, namely, to identify the weed species correctly and control them effectively. By virtue of OSCAR being released as a FOSS application, participating parties can freely contribute towards building up its knowledge base. The aggregation of information is provided not only from academic/research institutions but also from traditional knowledge systems, for example, cultural practices in weed control like hand weeding.

Impact

Enthusiastic responses to OSCAR have been received from the research community, in particular, in all the target countries. The fact that researchers can customize the application to fit their own environment has invoked much interest in OSCAR.

OSCAR will encourage and result in the participation of local bodies and organizations including *panchayats* (councils at the village level), cooperatives, farmers' associations and women's self-help groups, etc., to build their capacities with resources accessible within their village. This will also enable these micro-organizations to manage their resources at the village level with the combined knowledge base at local and institutional levels. This effect can contribute enormously towards improving the decision-making capacity of the farmers, not only on issues related to farming, but also on other issues related to development as a spill-over effect.

Another impact is the enablement of partner organizations to garner expertise on various issues including different local needs, the approach and appropriateness of ICT aids in farming, technical presentation of the application, and the integration of technical information in local farming practices and traditional knowledge systems. These factors contribute to the design of better management techniques for the future.

Lessons Learned

The project has contributed much to the understanding of how to design and implement an ICT application for agriculture. One key lesson learned during the implementation of the project was that any ICT application targeted towards a rural agrarian population has to take into consideration the prevalent basic issues in agricultural practices and infrastructural constraints. Acceptance by the target group and methods to integrate participation from local communities is essential for any ICT intervention at the grass-roots level to be successful. Merely dishing out information without considering social issues and differences at the village level and existing channels for information will only make the initiative redundant.

Current Status of Project

The project has completed its final stage and final releases of OSCAR for GNU/Linux and the Simputer. A set of recommendations for ICT initiatives for agriculture has also been published.

During the course of the development of OSCAR and subsequent trial runs, the project found several issues with implementing and using OSCAR on a Simputer. These include the lack of a standard development platform, limited availability of storage space, high local pricing (prices are comparable with a desktop PC) and poor hardware support locally. Given all these restrictions, it is unlikely that further development and deployment of OSCAR on the Simputer will take place. Instead it has been decided to port OSCAR to a web-based FOSS application as this will make it more visible and enable it to reach a much wider population and area. This has been done successfully.

Benefits and Challenges

OSCAR provides farmers in the IGP with the information and ability to identify and control weeds in their paddy and wheat fields. Prior to

this, it was very difficult for non-botanists to identify weeds properly and correctly. The OSCAR application, based on a GUI, using drawings instead of technical jargon, is simple and easy to use.

The use of FOSS tools and applications to develop and build OSCAR as well as a FOSS database to store the data provides an open and adept environment to develop and standardize applications such as OSCAR. The scientific products of academic and research institutions can be deployed on FOSS thereby encouraging wider participation and dissemination.

Positive and spirited responses experienced during the testing of OSCAR show that there is a real need for such applications and FOSS is the only way such initiatives can be sustained and replicated for a wider region. If OSCAR is not a FOSS application it may have been yet another centrally-managed decision-support system that would cease to exist once the project ends. There is now active participation from different agencies to contribute further towards enhancement and deployment.

However, in spite of encouraging signs and activities witnessed on participation in the OSCAR project, the biggest challenge still remains the ability to consolidate and sustain the enthusiasm and efforts of the different agencies in different countries to participate, contribute, build and enhance on the existing setup of the project. As the current project owners and drivers are research organizations, working within the framework of a project with a very specific objective of demonstrating a prototype, it can be difficult to fulfil the expectations raised at the field level.

Conclusion

The OSCAR prototype of an application software for weed identification and control of the rice and wheat crop systems of the IGP has been successfully developed as FOSS and tested in various target groups in Bangladesh, India, Nepal and Pakistan. The use of FOSS to develop and implement OSCAR makes it possible to encourage contributions to it from agronomists, researchers, the student community and concerned development organizations in the region. With the deployment of OSCAR, farmers in the IGP will be able to better identify and control weeds in their paddy and wheat fields. An indirect impact of the project is the encouragement of local bodies and organizations to help themselves by building their capacities with resources from within their village leading to better resource management and contributing towards the decision-making capacity of the farmers on farming and other issues related to development.

Contact Information

Project: Open Source Simple Computer for Agriculture in Rural Areas
Organization: French Institute of Pondicherry
Contact Person: Balasubramanian D
Street/Postal Address: 11, St. Louis Street, Pondicherry, India 605001
E-mail: balu.d@ifpindia.org
Tel: +91 41 3222 5820
Fax: +91 41 3233 9534

Website

The OSCAR project website
http://www.oscarasia.org

Managing Disasters
Sahana, Sri Lanka

Summary

Sahana is a disaster management system that grew out of the 2004 Asian tsunami disaster that devastated many of the countries in Asia bordering the Indian Ocean. In Sri Lanka, one of the countries hardest hit by the tsunami, ICT volunteers put together the Sahana Disaster Management System to help track families and coordinate work among relief organizations during and after the tsunami disaster. Subsequently, Sahana has been deployed to manage the earthquake disaster in Northern Pakistan (2005), the Guinsaugon landslide in the Philippines (2006) and the earthquake in Yogjakarta, Indonesia (2006).

Sahana is developed on a FOSS platform using the LAMP software stack and is made available as FOSS itself. A major advantage of having a FOSS disaster management system is that it can be readily distributed, localized and customized according to the requirements of the region or community using it and poor countries can also afford to use it. Sahana consists of a series of integrated web-based disaster management applications aimed at facilitating the management of missing people and disaster victims; managing and administering various organizations; managing camps; and managing requests and assistance in the proper distribution of resources. A new and improved version of Sahana, Sahana Phase II, is now being rolled out. This version is more flexible and powerful and can cater to more general types of disasters.

Sahana is being developed and maintained by a dedicated team of six full-time developers with assistance from the worldwide FOSS community. A key challenge for the Lanka Software Foundation (LSF), the non-profit organization that oversees the project, is to ensure that it receives adequate sponsorships to be able to support the core development team.

The success of Sahana and its availability as FOSS opens up the possibility of international aid agencies and relief organizations as well as national governments to have a single cohesive disaster management system. This will make disaster management and the associated relief effort much more efficient. It will also allow regions that frequently experience natural disasters to better prepare themselves to deal with the disasters as and when they arise.

The Sahana Project has inspired the concept of "humanitarian-FOSS". This is a term coined to denote the application of FOSS to alleviate human suffering. Such a concept can be used to bring together many volunteers around the world to build and contribute to worthy FOSS projects that can benefit mankind.

Background of Organization

LSF is a non-profit foundation in Sri Lanka that encourages Sri Lankan software developers to participate in global FOSS projects. It sees FOSS as playing an important role in the development of the country by providing an opportunity for the local ICT industry to participate in the global ICT market. It believes that FOSS can reduce the cost of ownership of large-scale software deployments and play an important role in e-government solutions. To realize its mission, LSF nurtures the local FOSS software development environment to attract developers from local companies to participate in LSF FOSS projects. It does this by providing

the necessary physical, technical and financial resources to support FOSS developers as well as play a key role in the promotion and coordination of FOSS activities and projects in the country. It also promotes FOSS actively to the local universities so as to influence and attract the undergraduate students to FOSS.

LSF is run solely on the support that it receives from its sponsors, which include commercial companies, international aid agencies, universities and individuals. This assistance may be in the form of financial assistance, equipment and infrastructural aids, services and human resources. The software developers in LSF consist of people seconded from various companies, contract staff, and industrial placement students.

Objectives of Project

Sahana is a disaster management system. It was created in the aftermath of the 26 December 2004 tsunami disaster that hit 12 countries in Asia bordering the Indian Ocean. Among the countries most severely affected by this disaster was Sri Lanka where nearly one million people were impacted. While help and relief poured in from all over the world, a disaster management system was needed to coordinate them and to maximize the impact on the affected people. As there was no software of this nature readily available, volunteers predominantly from the Sri Lankan ICT industry quickly put together the Sahana Disaster Management System over two or three weeks and it was officially used to track families and relief organizations during and after the tsunami crisis in Sri Lanka.

The primary objectives of Sahana are to facilitate the management of missing people and disaster victims; manage and administer various organizations; manage camps; and manage requests and assistance in the proper distribution of resources. The system consists of a set of integrated web-based disaster management applications. The main applications and problems they address are:

- Helping to reduce trauma by effectively finding missing persons;
- Coordinating and balancing the distribution of relief organizations in the affected areas and connecting relief groups allowing them to operate as one;
- Registering and tracking all incoming requests for support and relief up to fulfilment and helping donors connect to relief requirements; and
- Tracking the location and numbers of victims in the various camps and temporary shelters set up all around the affected area.

FOSS Application

Description

Sahana is a suite of web-based applications that provides management solutions and addresses different problems with regard to the information required for managing coordination problems in the aftermath of a disaster. It provides the four main solutions listed below.

- Sahana Missing Person Registry – an online bulletin board of missing and found people. Information on the person seeking them is also captured, which adds to the chances of people finding each other;
- Sahana Organization Registry – keeps track of all the relief organizations and civil society groups working in the disaster region. It captures not only the places where they are active, but also captures information on the range of services they are providing in each area;
- Sahana Camps Registry – keeps track of the location of all the camps in the region and provides some basic data on the facilities they may have and the number of people in them. It also provides a GIS view to plot the location of the camps in the affected area; and

- Sahana Request Management System – a central online repository where all relief organizations, relief works, government agents and camps can effectively match requests of aid and supplies to pledges of support. It effectively looks like an online aid trading system tracking request to fulfilment.

Choice of FOSS

Very few countries and organizations (rich and poor alike) can afford to invest a lot of resources in disaster management when there is no disaster present because there are always higher priorities that need the funding. There are also few proprietary software applications for disaster management as practically and ethically it will be difficult to impose strict licensing terms during humanitarian disasters and times of crisis. A system built with FOSS and made available as FOSS can overcome these issues. FOSS development tools can be obtained free of charge and the FOSS software development model encourages worldwide volunteer and community involvement. With FOSS there need not be any delays in getting permission for a license as anyone has the freedom to download the software and use it. Also such systems should be developed and shared globally as the problems and needs they address are difficult for a country to deal with when a disaster strikes. The FOSS development and community mechanisms have a proven track record to build, distribute and maintain such global systems.

The choice of FOSS makes the system open and transparent and is more likely to be trusted by all parties involved in the disaster relief effort. This is important as during such trying circumstances, tensions and problems can arise among the parties involved.

As no two disasters are alike, often localizations and customizations are needed for the software before it can be applied effectively to a disaster. With FOSS, the code is available for anyone to quickly pick up and make the necessary customizations without restriction.

Thus, it can be seen from the discussion above, a disaster management system developed and implemented as FOSS is very appropriate. It is possible to develop such systems at a much reduced cost compared to pure commercial development models. A small team is needed to drive such a project to ensure the quality of the product and this team can then be assisted by the global FOSS community to develop a good quality disaster management system. This is the working arrangement for the Sahana Project with a core team of six people assisted by a global community of over 60 participants and contributors. The FOSS community spirit, philosophy and mechanisms have been the key ingredients in the successful growth of such a vibrant community for Sahana.

Development and Implementation

The original Sahana system (now known as Sahana Phase 1) was put together immediately after the Asian tsunami disaster struck, amidst the chaos, by volunteers in Sri Lanka. Sahana Phase I was built as a collection of interconnected, yet independently usable, subsystems that interact with each other via a set of shared databases. The well-known FOSS LAMP solution stack was used as the platform to run these applications. The operating system used was Debian GNU/Linux, Apache was the web server, MySQL was the database, and the PHP or Java language was used to write the applications.

Sahana Phase I components were built in a chaotic situation and were very much a hack for the requirement at hand. Following this initial development, the Sahana Project entered Phase II in August 2005. Sahana Phase II is also developed using the LAMP stack but it has a more structured development team and process. The Phase II model has a core team

ensuring the quality and stability of the Sahana releases surrounded by a developer community. This model is very similar to the development model for the Mozilla Firefox project. The core team of six people is sponsored by the Swedish International Development Cooperation Agency and overseen by LSF in Sri Lanka. Currently, the majority of development happens in Sri Lanka whilst a global community of over 60 persons contributes in various areas. The community includes emergency management experts, humanitarian consultants, academic and FOSS developers, all currently working together towards the success of the Sahana system. Formal support at the organization level currently comes from the IBM Crisis Team and LSF.

Sahana will run on most popular operating platforms including GNU/Linux, xBSD, Mac OS X and Microsoft Windows.

Deployment

At the time of writing, Sahana had been deployed to assist in the management of several disasters:

- Sri Lanka tsunami disaster in 2004;
- Pakistan earthquake disaster in 2005;
- Philippines Guinsaugon landslide in 2006; and
- Indonesian Yogjakarta earthquake in 2006.

For the Sri Lanka tsunami disaster in 2004, Sahana was adopted by the Sri Lankan government as part of its official portal for the Centre of National Operations (CNO), the main government body in Sri Lanka coordinating the relief effort. An implementation of Sahana was deployed by CNO to help coordinate all the data being captured and at the end of its tenure it had captured data on over 32,000 families and most NGOs operating in the tsunami-affected region of Sri Lanka. For this deployment, the main Sahana components that were utilized were the Organization Registry and the Missing People Registry. The deployment model included distributed data entry of "Gramasevaka" data and police data, and authorized volunteers were given access to upload the data into the system, coordinated by the universities. As the hardware resource requirements were low it was initially deployed on a standard desktop computer, but it was subsequently migrated to its own dedicated server. It was tested and found that it could also be deployed on a resource-limited equipment like a Personal Digital Assistant (PDA) such as the iPAQ with OPIE (a GNU/Linux distribution supporting iPAQs) within 64 Mb of RAM.

After the North Pakistan earthquake in 2005, the LSF Sahana team was invited to Pakistan by the IBM Crisis Team and IBM Pakistan. Sahana was localized for use in Pakistan and training was given to the teams there to use the system. Since Sahana Phase II was not ready yet, Phase I was deployed in Pakistan. To ease the deployment, a live CD was created based on the Taprobane distribution of GNU/Linux. In Pakistan, Sahana filled the gap of making the data from the government's people database accessible to the other organizations involved in the relief effort. This was needed as although the Pakistani National Database and Registration Authority (NADRA) has built and maintained a comprehensive database on the people of Pakistan, access to this system is not web-based and it is under tight security control. LSF, IBM Pakistan and the IBM Crisis Team worked with NADRA to train their personnel on customizing Sahana for use. After that NADRA took ownership of integrating and deploying Sahana in Pakistan.

Sahana was customized for use in the Guinsaugon landslide in the Philippines in March 2006. It was used to facilitate effective coordination and information-sharing among the National Disaster Coordinating Council member agencies, private sector and civil society groups involved in disaster response, relief and rehabilitation.

Sahana was deployed to assist with the management of the relief work following the earthquake in Yogjakarta, Indonesia in May 2006. The system was operated by the Indonesian Whitewater Association and the Indonesian Rescue Source, two organizations that undertook relief support work after the eathquake. Technical support was provided by the UrRemote[22] group and the deployment was sponsored by the Communications Technologies Board of the Australian Computer Society.

Impact

In any disaster situation, getting the right information out to the correct parties is critical to alleviating human suffering and saving lives. Furthermore, for a national or international disaster, the scale of the operation will mean that in order to be able to account for each and every individual equally from their medical needs to reunification with family, to their relief supplies, a proper disaster management system like Sahana has to be put in place to help manage the data and information. The impact that Sahana has on the people in the regions and communities that suffered the disasters probably cannot be quantified with words in a document such as this. Through the disaster and relief management made possible by the Sahana system, relief effort was made more efficient and because of this, more lives were saved and the victims were able to have access to vital resources more quickly.

The success of Sahana and its availability as FOSS means that for the first time it is possible to have a single cohesive disaster management system that international aid agencies and relief organizations as well as national governments can use. If this can be realized, it will make disaster management and the associated relief effort so much more efficient and beneficial for both givers and receivers alike.

The Sahana Project has inspired the concept of "humanitarian-FOSS" which is effectively the application of FOSS to alleviate human suffering. This concept does not just apply to disaster management, but it extends to humanitarian ICT or any other ICT activity or product that concerns the improvement of human welfare. One major impact of this is that if such a concept is positioned and promoted properly there can be many volunteers flocking to build and contribute to such projects globally, as the FOSS community is well known for its strong beliefs and actions for the benefit of the community at large.

Lessons Learned

Based on the experiences in deploying Sahana in several disasters in Asia, the Sahana team has learned some valuable lessons.

First and foremost, it is vitally important to get the system accepted and approved by authorized relief coordinators. This is to enable everyone to operate as one, using one dataset. There is no better way to do this than have the relief coordinators (usually from the government) authorize the deployment of a disaster management solution.

The disaster management system should be built on open systems so that all relief groups can work together and the data contained within should be accessible to the parties involved. Sometimes problems can arise in which the government entity responsible for deploying the software is reluctant to share it with NGOs. Any disaster management portal that prevents access to NGOs or civil society or government is

[22] The UrRemote initiative is based in the Electrical Engineering Department of Udayana Universiity, Bali in Indonesia, It attempts to provide opportunities for students to engage in research and development and gain experience by working remotely with overseas (mainly Australian) organizations. http://urremote.com/index.php?title=UrRemote.com:About

a partial solution and will result in yet another parallel silo of data. The parallel silos of data tend to cause more confusion as no proper data consolidation can take place.

The organization of dedicated teams to provide localization, customization and helpdesk services should be done immediately. Disaster environments have requirements and deadlines that are needed as soon as possible. Every disaster yields different requirements and no matter how well the system is built, there will always be urgent requirements on localization, customization and helpdesk application support. Thus, when deploying Sahana it is better to have a dedicated professional team to support it. It is also worthwhile setting up a helpdesk/call centre to help users become accustomed to the application and enter data on their behalf (especially in nations with low ICT literacy).

The system has to be flexible enough to cater to the evolving granularity of data. This is because during the initial stages of the relief effort, there may not be enough time to be sifting through all the relief supplies coming in and working out the exact quantities of each package or box when people are starving and dying. However, later as operations are streamlined and things settle down, a smaller granularity to the data tracked can be introduced to improve the efficiency and transparency of aid distribution. The applications need to be built to be able to handle this sparseness of data at the initial stages.

Current Status of Project

As noted earlier, the Sahana system is being re-engineered and written to follow a more structured development process and team. Sahana Phase II still adheres to the LAMP platform but it is more generic in being able to handle any disaster scenario from a tsunami to an earthquake to a pandemic. The entire system is internationalized to allow easy localization to a particular country. Applications in Phase II conform to a base application framework making it easier to write a new disaster management component. It also caters to the integration of third party modules/sub-applications into it. Other features include better security features to protect privacy of data, the support of more operating systems and databases, adhering to existing emergency management and humanitarian data exchange standards and the support of pervasive technologies such as text messaging using mobile phones.

Benefits and Challenges

Many nations affected by natural disasters such as tsunamis, earthquakes and floods are often poor and so can ill-afford to spend money and resources to develop or purchase disaster management systems. This means that a system like Sahana, which can be obtained free-of-charge and be freely customized to suit local needs and circumstances, has tremendous benefits to these countries. The use of FOSS enables the local people to take over the system for further development and deployment based on their needs. The Sahana system has successfully helped the people in several national disasters.

The project has brought good publicity to the Sri Lanka ICT community and its FOSS community in particular. With this positive image of FOSS, it is hoped that more organizations in the country, both commercial and academic, as well as the government can promote and support more FOSS projects both at the local and international levels.

To ensure that a country is prepared to handle a disaster situation, it has to be in a state of preparedness and Sahana can help it achieve this. Towards this end, the Sahana team is working closely with NGOs, civil society groups and government bodies to pre-deploy Sahana

installations globally in order to improve adoption and disaster preparedness when the next large-scale disaster strikes.

While the benefits from Sahana are obvious, it nevertheless faces challenges in its continual development and progress. It is essential that LSF receives adequate sponsorships and cooperation to be able to support the core Sahana development team. Without a dedicated team, it will be difficult to ensure the continuous development of the system.

Other Information

Sahana has gained a tremendous amount of recognition for the project and for the concepts it promotes. The project and the people associated with it have received numerous awards.

The IBM Crisis Team proactively promotes the use of Sahana for disaster management.

Conclusion

The Sahana Disaster Management System from LSF has shown how ICT can play an important role in times of disasters to manage and coordinate the relief and humanitarian efforts. The use of FOSS for developing Sahana and its availability as FOSS is significant in that it is easily and freely available for any country or community to use both in times of disaster and also in preparing for disasters. Releasing it under a FOSS license makes it easier to customize and localize the software, a key requirement in most situations.

Sahana has demonstrated that it is possible to develop such a system at a much lower cost compared to commercial proprietary software if there is a small dedicated team, assisted by the global FOSS community, to drive the effort.

Awards and Recognition Received by Sahana

The Sahana Project and the people associated with it have received awards and recognition internationally. Below are some examples:

FSF, known as one of the two leading organizations responsible for the FOSS movement, has created a new award based on humanity, which was directly inspired by Sahana. Ref: http://www.tectonic.co.za/view.php?id=686 http://www.fsf.org/news/social-benefit-award.html

Dr Sanjiva Weerawarna, founder of LSF, received a Red Hat[23] User Summit award for inspiring the Sahana system. Ref: http://www.redhat.com/magazine/008jun05/features/awards/

The Sahana Project at Sourceforge was named project of the month for June 2006. Ref: http://sourceforge.net/potm/potm-2006-06.php

[23] Red Hat Corporation is one of the leading commercial Linux vendors in the world.

Contact Information

Project: Sahana Disaster Management System
Organization: Lanka Software Foundation
Contact Person: Chamindra de Silva
Street / Postal Address: 9th Floor, Bank of Ceylon, Merchant Tower, 28 St Michael's Rd, Colombo 3, Sri Lanka
E-mail: chamindra@opensource.lk
Tel: +941 777 886 708

Websites

The Sahana project website
http://www.sahana.lk
http://cvs.opensource.lk

Sahana Wiki
http://www.reliefsource.org/foss/index.php/Sahana

The Lanka Software Foundation website
http://www.opensource.lk

Reducing Vulnerabilities in the Pacific

Tikiwiki GeoCMS, Fiji

Summary

This project by the South Pacific Applied Geoscience Commission (SOPAC) seeks to address vulnerability reduction in the Pacific Island Countries through the development of an integrated planning and management system. ICT development and related capacity building are very important to the project. A key component of the project is GeoCMS[24] which facilitates the collection and sharing of geographical data among the stakeholders in the project. The creation of this GeoCMS is a key innovative outcome of the project. As there was no suitable software available for a GeoCMS at the time the project started, a new GeoCMS application was developed from two existing FOSS applications, MapServer and Tikiwiki. The GeoCMS system has made it possible for the Pacific Island Countries to publish their geographical data for access and sharing over the Internet and open to contributions from all over the world. All this helps in the development and vulnerability reduction of these nations as important information can now be made available more easily as and when needed.

The mapping and GeoCMS parts of the project have benefited from FOSS as they were built by enhancing and modifying existing FOSS applications. The use of FOSS makes it affordable and practical to build and deploy the GeoCMS application in every participating country. This in itself leads to local capacity building in ICT and the local recipients are able to learn and understand the technology. The development of local content is facilitated as people contribute towards the information in the maps which are made available to all.

The GeoCMS software application is currently still being enhanced and new features are being added. The main project is at its midpoint stage currently, with deployment actively taking place in the participating countries.

Background of Organization

SOPAC is an inter-governmental, regional organization providing services to promote sustainable development in the Pacific Island Countries that it serves. In particular, it provides assistance, through its Secretariat based in Suva, Fiji, to its member countries in three key programme areas: Ocean and Islands, Community Lifelines and Community Risk. To effectively provide these support services, SOPAC maintains an information technology unit, provides publication and library services, and offers technical and field services for specific project work.

Member countries of SOPAC include Australia, Cook Islands, the Federated States of Micronesia, Fiji, Guam, Kiribati, Marshall Islands, Nauru, New Zealand, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu. American Samoa, French Polynesia and New Caledonia are associate members.

SOPAC is funded by member-country contributions and also supported by donations

[24] GeoCMS is a CMS where objects (users, images, articles, blogs, etc.) can have a latitude-longitude position to be displayed on an online interactive map. In addition, the online maps link to information pages on the data represented in the maps. http://en.wikipedia.org/wiki/Geospatial_Content_Management_System

from countries and organizations such as Australia, Canada, Commonwealth Secretariat, European Union (EU), Fiji, France, Japan, New Zealand, Taiwan, United Kingdom, United States Office of Foreign Disaster Assistance and certain United Nations agencies.

Objectives of Project

The project seeks to reduce vulnerabilities and provide better decision-making in 14 of the African, Caribbean and Pacific Group of States (ACP)[25] through the development of an integrated planning and management system. The participating countries in this EU-funded project are the Pacific Island Countries of Cook Islands, the Federated States of Micronesia, Fiji, Kiribati, Marshall Islands, Nauru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu.

The project concentrates on three key focal areas in the island system:

- Hazard mitigation and risk assessment;
- Aggregates for construction; and
- Water resources supply and sanitation.

The project addresses problems such as: unavailability of accurate and timely data; weak human resource base; limited resources (financial and infrastructural); and lack of appropriate management plans, and policies and regulatory frameworks to deal with these three focal areas. It is implemented using the Island System Management (ISM) approach, in which issues of environmental management, and social and economic development are tackled for a 'whole island' or by sub-systems within an island.

ISM facilitates the integration of ecosystems, and economic and social issues with an enabling institutional framework. The main constraint to the successful application of ISM is the access to information. As such, ICT development and related capacity building are very important to the project and a fourth project activity and deliverable is in the ICT area. This activity cuts across the three focal sectors.

Ongoing ICT activities include:

- Training in GIS and Remote Sensing and its applications for planning;
- Setting up of ICT networks, including a GeoCMS, in each of the 14 participating countries, to enable sharing of information/ resources and promote awareness; and
- Providing spatial data and information for sound planning.

The project has five key objectives and outcomes:

- Sustainable development of coastal zones, in particular through identifying alternative sources of aggregates;
- Improved planning practices installed for safe and adequate water supplies and sanitation systems;
- Implementation of comprehensive hazard and risk management tools within the framework of an Integrated Holistic Approach for Sustainable Development – ISM;
- ISM infrastructure established and in use in each country; and
- Strengthened capacity of the Pacific ACP States.

The main beneficiaries of the project are the governments and decision makers of the 14 Pacific ACP States. These include planners; land, water and marine management agencies; communities and villages of case study and

[25] The African, Caribbean and Pacific Group of States (ACP) is an organization created by the Georgetown Agreement in 1975. It is composed of African, Caribbean and Pacific States signatories to the Georgetown Agreement or the Partnership Agreement between the ACP and the European Union, officially called the "ACP-EC Partnership Agreement" or the "Cotonou Agreement". http://www.acp.int/en/faq.htm

project intervention areas; educators/trainers; environmentalists; and national/regional NGOs. The governments of the participating Pacific ACP States are responsible for the maintenance, promotion and development of the system in their countries. The local and regional organizations provide datasets to the GeoCMS.

FOSS Application

Description

To achieve the goal of vulnerability reduction and better decision-making, it was determined that a GeoCMS was needed to organize new and existing geographical information. There was no suitable software available at the time the project started and so a new FOSS application was developed by utilizing two existing FOSS applications – MapServer and Tikiwiki.

MapServer is a development environment for building spatially-enabled Internet applications. It is not a full-featured GIS but excels at rendering spatial data (maps, images, and vector data) for the web. MapServer has well-defined application programming interfaces for various web scripting languages which makes it possible to integrate it inside a web application.

Tikiwiki is a full-featured web-based Wiki[26] and CMS written in the scripting language, PHP[27] and it enables the easy creation and management of web pages. A "Maps" interface was built for Tikiwiki to integrate MapServer into Tikiwiki to become a GeoCMS. By enabling this Maps feature in Tikiwiki, a user can display interactive maps of any area in the world in any projection. The user can zoom on a map, select which geographic layer to see and query any geographical object.

The operating platform used is the Mandriva distribution of GNU/Linux. This distribution was selected as it is very easy to include the built application into the Mandriva distribution packages that will be maintained and included in the distribution. As a result, the Tikiwiki GeoCMS package is now fully integrated as part of Mandriva Linux, thereby helping to ensure the sustainability of the project. The project needs to gain a worldwide support base and not a Pacific Islands-only support base.

Choice of FOSS

Current commercial applications that provide mapping applications over the web are expensive, costing possibly several tens of thousands of US dollars. The cost of deploying such an application in every Pacific Island Country would have been prohibitive. Furthermore, it is important that the mapping service is located in the user-country itself to ensure capacity building and development of local content. While it is possible to put all of the maps on a single server located overseas, it would have brought little to the development of local expertise.

At the time when the project started, there were no applications available that mixed the power of wikis with maps as this is a rather new concept.

Development and Implementation

FOSS provided all the tools needed to develop the GeoCMS application. Using MapServer to incorporate a "Maps" feature in Tikiwiki was something new that was developed in this project. The design considerations for the developed GeoCMS include ease of use, easy entry of metadata and other information via

[26] A wiki is a type of collaborative software that allows users to add, remove and edit the contents of a website very quickly and easily, sometimes without the need for registration. A website built and maintained in this way is also known as a wiki. http://en.wikipedia.org/wiki/Wiki

[27] PHP is a widely-used general-purpose programming language that is especially suited for web development and can be embedded as part of the HTML present in web pages.

wiki, and easy sharing and representation of geographical data.

The Tikiwiki GeoCMS application system runs on Mandriva GNU/Linux. The MapServer and Tikiwiki software are needed for the application. Tikiwiki, in turn, requires the Apache web server, PHP scripting language and MySQL database server. Access to the GeoCMS is from a web browser.

Deployment

The developed GeoCMS application facilitates the collection and sharing of geographical data. This information is needed for decision-making and must be available to a wide range and class of stakeholders, governments, organizations, companies, and the general public. Currently there are eight systems deployed, with seven fully online. On completion of the project there will be a total of 15 systems deployed (including the GeoCMS in SOPAC) in 14 Pacific Island Countries.

Impact

The Tikiwiki GeoCMS application is a core component of the ISM system. By using the information sharing features of the GeoCMS, geographical data collected and created can be shared more easily amongst all the stakeholders.

Only developed countries have published their geographical data over the web and made it available to the public. In many ways the Pacific Island Countries are more advanced in this domain than some developed countries. All this data helps the development of each nation by making crucial information available easily for access and sharing from all over the world. In the case of disasters, it helps to have information on the country before sending experts. It also helps people to gain knowledge of their local geography and develop curricula for schools. Some of the information from the GeoCMS is being used by universities in the Pacific Island Countries as an aid for lectures.

Lessons Learned

Several important lessons were learned from this project. To locate developers, the focus should be on the international FOSS community as there are not many local developers and the local FOSS community is not strong. In fact, it was found that it is very difficult to build a local FOSS community. Also, open systems instead of closed systems or "black boxes" should be provided so that recipients of the system can learn and understand what is being provided and they should be given systems that they can financially support.

Current Status of Project

The Tikiwiki GeoCMS software application is an active FOSS project with enhancements and new features being added constantly. The main SOPAC/EU project is at its midpoint stage in the deployment of the GeoCMS in the participating countries.

Benefits and Challenges

The project benefited substantially from the use of FOSS in the development and deployment. In particular, the GeoCMS application benefited from the main MapServer and Tikiwiki projects.

Other Information

Interns from eight countries have been trained to take charge of maintaining and developing data sets on the GeoCMS, as well as train others in their respective countries. In some countries, the server has also been used as a mail server and file server for the government department where it is deployed. This has made it possible to provide e-mail and communication facilities to many government workers.

Conclusion

The project has resulted in the creation of a new GeoCMS system built from two existing FOSS applications. In addition, the new "Maps" feature of Tikiwiki that was developed in this project will add to the usefulness of the original Tikiwiki and MapServer software. The ability of the developers in this project to easily build on the two established software to create the new GeoCMS application clearly shows the importance of having access to source code as well as the "freedom to modify and extend" aspect of FOSS, as such development would have been very difficult if not impossible to achieve with proprietary software. The usage of FOSS in the development and deployment of the system has also resulted in ICT capacity building for the nations involved.

Contact Information

Project: Reducing Vulnerability of Pacific ACP States
Organization: South Pacific Applied Geoscience Commission
Contact Person: Franck Martin
Street Address: Mead Road, Suva, Fiji
Postal Address: Private Mail Bag, GPO, Suva, Fiji
E-mail: franck@sopac.org
Tel: +67 9 338 1377
Fax: +67 9 337 0040

Websites

The Tikiwiki GeoCMS website
http://maps.tikiwiki.org

Interactive Maps and GeoCMS in the Pacific Island Countries
http://www.sopac.org/maps

Improving Government-Citizen Interaction

eGov Balkan, Bulgaria

Summary

This is a project by the Internet Society of Bulgaria (ISOC Bulgaria) in conjunction with other partners to improve the local authorities-people interaction in the south-eastern part of Europe (the Balkans) by the deployment of e-government services. It is hoped that with better and easier access to the authorities in the local municipalities, there will be more transparency and the people will be encouraged to participate more in local affairs, thereby strengthening the democratic process in the region.

FOSS is chosen as the vehicle to implement the project as the local municipalities in the region can ill-afford to pay for commercial proprietary software. Also with FOSS, an environment can be created whereby local resources are utilized to develop and support the applications benefiting the local economy. Popular FOSS software such as GNU/Linux operating system, OpenOffice.org, Mozilla Firefox and GIMP that have been localized are used for the users' desktops while the e-government web portal makes use of customized web applications running under the LAMP environment.

The initiative may be considered as a pilot project to lay down the groundwork for further and wider implementation of FOSS at other levels, both in public administration (including the central and regional administrations) and in businesses. The project is also unique in the sense that it uses the public-private partnership model to benefit the local economies and preserve/create local skills and capacities as it will provide business and employment opportunities in the participating municipalities. The direct impact of the project will be better partnerships and cooperation between local administrations and the local private sector, and better interaction between local administrations with their citizens. Indirect benefits will be better ICT and Internet awareness among the local people as well as the forging of FOSS skills and capacity building for skilled workers.

The biggest challenge in the project was that many of the municipal employees had little or no computer literacy and thus, had to be trained starting with the very basic elements of operating a computer and using an application.

Background of Organization

ISOC Bulgaria is the Bulgarian chapter of the Internet Society.[28] It is an independent, non-profit organization that aims to develop the information society in Bulgaria and promote the rapid adoption of the Internet. It is a primary source of reliable information on the development of information technology in Bulgaria and is actively represented in government and national efforts pertaining to ICT and the Internet. ISOC Bulgaria is also active in FOSS projects.

Objectives of Project

The primary objective of the project is to utilize FOSS for e-government applications at the

[28] The Internet Society is an international professional membership society that provides leadership in addressing issues that confront the future of the Internet. It is the organization home for the groups responsible for Internet infrastructure standards, including the Internet Engineering Task Force and the Internet Architecture Board. http://www.isoc.org

municipal level in the south-eastern region of Europe (municipalities from Bulgaria, Macedonia, Kosovo, and Turkey participated in this initiative). It is hoped that, with this initiative, the people in this region can, through ICT and the Internet, participate more fully in local affairs, thereby strengthening the democratic process, as well as have more employment opportunities in the ICT sector resulting in the political, social and economical empowerment of the local communities. Through this project, awareness of the benefits of FOSS will also be highlighted.

The primary target group comprises the authorities in the municipalities of south-eastern Europe, in particular, the Balkans region, that have limited budgets to purchase commercial software. A second target group is the citizens of the region who will be able to communicate more effectively and economically with the municipal authorities through the use of these e-government services and applications.

The key partners of ISOC Bulgaria in the project are:

- The Government of the Republic of Bulgaria (as represented by the local authorities in the Municipalities of Kardjali, Vratza, Mezdra, Peshtera, Belovo, Dryanovo, Kostenetz);
- 'Interspace' Media and Art Centre, the main consultant on the FOSS Project;
- UNDP Bulgaria, which provided overall support during the implementation of the project, including management issues;
- UNDP New York, which funded the project under the "Capacity development through knowledge sharing and development: Free/open source software for developing countries" initiative; and
- United Nations Office for Project Services, an implementing partner.

Other partners include UNDP in Macedonia and Kosovo, the Bulgarian Linux community and the Internet Societies in the participating European countries. These organizations provided support for various activities under the project.

FOSS Application

Description

The primary FOSS applications used in the project are divided in two major groups:

- Existing available FOSS applications; and
- New applications for the e-government portal.

The main applications in the first group are: GNU/Linux operating system, OpenOffice.org suite of office applications, Mozilla Firefox web browser and the GIMP graphics software. The GNU/Linux system used is a Bulgarian distribution (based on the Debian distribution), named Interspace Linux Distribution (ISLD). The ISLD system is a localized system that has been successfully used in another project in which it was installed and supported in more than 60 Bulgarian NGOs. It is designed especially for end users who are migrating from other operating systems (Microsoft Windows mainly) and who need to be able to quickly start working effectively with a new system. The GNOME desktop of this distribution has been fully localized for the Bulgarian language and almost fully localized for the Albanian, Macedonian and Turkish languages. It is thus very suitable for use in the region where the project is implemented.

The second group of applications come under the e-government web portal services and applications. These are developed to provide interactive communication between the government and citizens. The web services applications are developed to operate on the LAMP stack of GNU/Linux operating system, Apache web server, MySQL database and the PHP scripting language.

Choice of FOSS

In the Balkans region, the e-government solutions developed by the central administration are not applicable in most of the cases at the municipal level. In addition, the municipalities in the Balkans region do not have the funds to buy the latest computer hardware or pay for commercial proprietary software, hence FOSS is a natural choice for the project as it can be deployed on older computers and is available without licensing fees. The use of FOSS provides an opportunity to demonstrate that local e-government initiatives can be more efficient and cost-effective if FOSS is used instead of proprietary software. Furthermore, the FOSS environment encourages the training and usage of local experts to support the project, thereby contributing towards enhancing the skills of the people.

For the commonly used desktop applications, FOSS is chosen as localized versions for the various states in the region exist. Another advantage of using FOSS is that it is very easy to have several localized versions of the desktop co-existing in the same installation.

And last, but not least, the Balkan countries have a high incidence of unlicensed software usage, and using FOSS will help reduce this problem.

Development and Implementation

All applications, both existing and newly developed, had to be localized. This is a requirement as most of the countries participating in the project require localized products for use in their public administrations. The design of the e-government portal and applications follows the general guiding principle that they are meant to be deployed in many types of different municipalities and so they should be open and flexible enough for easy customization to suit the needs of an individual municipality. To achieve this, the development of the web services portal complies with certain specifications that include:

- Platform independence;
- Multilingual support;
- Modular in structure and easily extensible;
- Easy installation and easy to transfer to another site;
- Use of FOSS only;
- Database used should be either MySQL or PostgreSQL; and
- Forms used for the web applications have to be identical to the paper versions.

The web services applications were developed using PHP and made available on the Internet by Apache web servers running on GNU/Linux operating systems. Data were stored in MySQL databases.

The ISLD Linux distribution implemented for the users contains only the necessary packages for simple usage; in particular there were no multimedia and games packages installed as these were considered irrelevant to the needs of the municipality. This also resulted in less demanding hardware requirements making it possible to use older computers. This ISLD distribution is suitable for the needs of the project as it has already been tested for use in over 60 NGOs, including ISOC Bulgaria. Local experts are available to support it and package repositories are available as well.

Specific hardware was not bought or installed during the project because the main goal was to use already existing infrastructure and build over it to demonstrate the advantages and flexibility of FOSS solutions.

Deployment

The deployment at most participating municipalities followed the main steps below:

- Linux was installed for desktop usage as dual boot on users' computers that needed

to work in a Microsoft Windows environment. The set-up for these Linux computers was such that they were able to connect to a Microsoft Windows network on the LAN;
- OpenOffice.org was installed on every workstation. Mozilla Firefox was installed on every workstation with connection to the LAN and/or Internet. GIMP was installed on every workstation that had the minimum hardware requirements; and
- The web services portal was installed on a web server that either belonged to the municipality or to ISOC Bulgaria.

In order to ensure the usage of the Linux-based PCs, special training was provided to users in which the benefits of using FOSS and Linux were highlighted.

The project was deployed in nine municipalities from the Balkans region – Kardjali, Vratza, Mezdra, Peshtera, Belovo, Dryanovo and Kostenetz (in Bulgaria); Gevgelija (in Macedonia); and Klina (in Kosovo). OpenOffice.org and Mozilla Firefox were installed on 200 workstations and these represented between 50 to 100 percent of the workstations in each of the municipality that took part in the project. Linux was installed on 45 client workstations, representing between 16 to 25 percent of the workstations in each municipality (depending on its size).

The web services portal was installed in four municipalities – Kardjali, Vratza, Mezdra and Peshtera. The portal for Kardjali was hosted on the ISOC Bulgaria server while the rest used their own municipal servers.

Impact

The project offers fully functional e-government services that can be implemented at a low cost because they are developed using FOSS. Before this project there were no freely available e-government applications that could be replicated at little or no cost in other administrations. The web services portal allows easy and cheap distribution in all municipalities that are interested in using it. In addition, it is easily customizable, both in terms of web interface and functionality, and is multilingual.

The project provides a platform for cooperation between the local administrations and business sectors (in particular the local ICT businesses) as well as NGOs. This is because these organizations and companies are called upon to support the FOSS software used by providing services such as migration and training, as well as to customize the applications or develop new ones. This results in enhanced local cooperation at the business level, as well as raised level of local information technology skills.

Another important impact is increased transparency in the work of the municipal authorities as the availability of the e-government services facilitates people-government interaction. This should result in less corruption at the municipal level.

Although the project involved only nine municipalities, over 20 municipalities expressed interest in taking part but the project budget did not allow for their inclusion. This indicates that if it were possible to extend the project and more funds were available, the impact will be much greater.

Lessons Learned

Several important lessons were learned from this project. They are summarized and discussed below.

- For the success of FOSS initiatives and projects, it is important that adequate policy and legislation be developed for them, as without political support the processes will be hindered and adoption rate decreased;

- The low level of computer literacy among the older municipal employees can be a serious problem, due to the lack of understanding of the benefits from the migration. It has been recommended that meetings are held with this group of people at the initial stage followed by relevant training. After that, if it is possible, they should undergo testing and certification;
- In general, after the training, certification should be carried out. People will be much more motivated to use software for which they have an official certificate;
- Public awareness is very important for the implementation of the project. Media coverage of the activities and the work done is also important;
- Collaborative work with the local and international FOSS-supporting organizations should be carried out;
- The development and implementation of the FOSS project should not be limited strictly to the initially planned outputs. If there is an opportunity to widen the impact of the project, or there are important functionalities that can be embedded in the developed tools and applications, this should be supported without hesitation; and
- A mechanism for fund raising should be developed for the project.

Current Status of Project

The project is in its last phase and work is ongoing in the neighbouring countries on promoting the project. The initiative has also been extended to the Municipality of Bahchelievler in Istanbul, Turkey, upon request by the municipality authorities there.

Statistics on the usage of the web services portal in Kardjali and Vratza showed a much higher interest from the citizens in comparison to other similar websites running in other municipalities in Bulgaria. This is a sign that the e-government project has been successful among the targeted citizens.

Another important task that had been accomplished is the development of additional e-government services that support digital signatures for the portal of the Kardjali Municipality.

Benefits and Challenges

The usage of FOSS addresses a key problem faced by the municipalities from the south-east European region regarding ICT – that is the lack of funds to buy hardware and legal software. On the one hand, the municipalities are obliged to use licensed and localized software but, on the other hand, they have no suitable hardware to use it on. FOSS helps to deal with these problems in a very elegant and efficient manner. First, it deals with the localization problem because large teams and communities exist in the region to translate the end-user software, and to keep the latest versions available under the country's official language. FOSS also allows the end users and the administrations to possess legal products that can run on slower hardware configurations.

The e-government solutions currently available are mainly designed for the central administration only and are not applicable at the local level. These solutions require the end users to install specific proprietary software in order to use the governmental services, and to have the latest versions of proprietary software in order to send documents to the government electronically. The implementation of the e-government services using FOSS overcomes this problem. The administrations can use up-to-date software at almost no cost. Support can be obtained in a more cost-effective manner from the FOSS community or from local organizations/companies, and local people can be trained to perform the support. The municipalities can also customize the software they are using, keeping them current and without having to upgrade their hardware. As end users require only a web

browser to access the e-government services, they can easily do this from their FOSS desktop without having to install any special software. All this will enable a significant improvement in the manner of communication between local authorities and the citizens, which will result in better quality of services and confidence in the authorities.

The biggest challenge in the project was that many of the municipal employees had little or no computer literacy and so they had to be trained not only on how to work with a new operating system or program but also to be trained in the basics.

Surprisingly, there was resistance initially from the employees to working in a localized interface. It turned out that when they were working in the non-localized environment previously, as they did not understand the language, they learned the computer operations by heart while working with a specific software. With the new localized interface, since the software used was not the same, the majority did not know how to work with the programs, although they were able to understand the meaning of the commands and options.

Other Information

As a result of the positive experience from this project, ISOC Bulgaria is continuing its work to popularize the usage of FOSS, especially in public administration. It is actively involved in initiatives that make use of FOSS to implement ICT and Internet solutions for interaction among the local authorities, SMEs and the people.

Conclusion

e-Government services for several of the municipalities in south-eastern Europe have been successfully implemented using FOSS tools and applications. The use of FOSS has resulted in a fully functional e-government web portal that can be implemented at a low cost and can be freely replicated in other municipalities. This will enable better interaction and communication between the authorities in the municipalities and the people. The availability of localized versions of FOSS allows end users and the administrations, which have a constrained budget, to possess legal products that can run on slower hardware configurations. The project has also provided a platform for cooperation between local administrations and business sectors, as the latter can be utilized to support FOSS in various ways. This will contribute towards the capacity building process for skilled ICT workers in the region. From all these considerations it can be seen that the project has benefited the local communities politically, socially and economically.

Contact Information

Project: Local e-Government Initiatives in South-Eastern Europe (the Balkans)
Organization: The Internet Society Bulgaria
Contact Persons: Veni Markovski, Dragoslava Pefeva, Julia Velkova
Street Address: 31 Tzar Ivan Shishman Street, Floor 3, Sofia 1000, Bulgaria
Postal Address: P.O. Box 71, Sofia 1164, Bulgaria
E-mail: veni@veni.com, dpefeva@isoc.bg, julia@isoc.bg
Tel: +359 2 401 8009

Websites

FOSS project: Support to e-government initiatives at local (municipality) level through FOSS in South-Eastern Europe
http://www.foss.bg/foss.php

Official FOSS project profile from the website of UNDP Bulgaria
http://www.undp.bg/user_files/en/documents/projects/GLO_foss.pdf

The Internet Society Bulgaria website
http://www.isoc.bg

Inculcating ICT Usage in Educational, Social and Economic Activities

Extremadura, Spain

Summary

The Regional Government of Extremadura is committed to transforming the region into an information society, promising digital connectivity and literacy to every citizen. To meet this ambitious objective, it has embarked on a series of programmes in Extremadura to introduce ICT to the people, as well as to inculcate ICT usage in educational, social and economic activities.

These programmes include the Education Technology Network that provides one computer for every two pupils in the schools; the Digital Literacy Plan, which is an initiative to train the adult population in ICT; and Vivernet, the business incubator, that promotes ICT to SMEs. In addition, it has also placed computers and increased their use in the regional ministries.

FOSS is chosen as the vehicle and enabler for all this to take place for economic, social, political and technical reasons. As the Extremadura government expects to place many computers in schools, government offices and public places, it would be prohibitively expensive if it has to pay software licensing fees. In addition, in order to make the computer useful, friendly and familiar to the local people, it has to be able to customize the operating environment to the needs of the various targeted communities and to reflect local culture and language.

The freedom to adopt, adapt and modify the software to suit its needs is paramount to the government's initiative. The Regional Government has created its own GNU/Linux distribution called gnuLinEx (or Linex), to serve as the main ICT platform and operating environment. This is a localized Spanish-language Debian-based GNU/Linux distribution. There are specific versions of gnuLinEx adapted to specific needs and environment, e.g. gnuLinEx Edu for education, Linex Empresa for business and JuegaLinEx for games.

The project has resulted in large numbers of computers being installed in schools and public sector organizations with an equally large number of users being exposed to ICT and gnuLinEx in particular. Apart from its sheer size, the Education Technology Network is unique in that, for the first time, a government body has initiated the development and deployment of software adapted to the needs of education and identified beforehand the needs of the education community. This is done with a clear objective to provide technological literacy within the framework of a technological network.

The Regional Government has also shown its political will and commitment to utilize FOSS, both within the education system as well as in public administration, and in providing ICT facilities to the people.

The Extremadura project is still in progress with the various programmes in various stages of implementation. In the meantime, new areas where FOSS can be used are continually being explored, and collaboration with new partners and sharing the acquired knowledge with them are being done.

Background of Organization

Extremadura is an autonomous community[29] of Spain. It is situated in the south-west of the country, bordering Portugal to the west and located in the centre of the triangle formed by Madrid, Seville and Lisbon. The size of the region is some 8.3 percent of the whole of Spain and 2.6 percent of the Spanish population lives here. The economy of Extremadura has progressed steadily over the last few years and making use of the EU Communitary Cohesion Funds, the Regional Government of Extremadura has initiated several education, social and business projects involving ICT technologies. The Government of Extremadura is a firm proponent of FOSS and it hopes to bring the people of the region into the information age using FOSS.

Objectives of Project

In 1998, the Government of Extremadura announced that it was committed to transforming Extremadura into an information society and promised connectivity and digital literacy to every citizen. It launched the Global Project for the Development of the Information Society that was aimed at promoting the usage of ICT among citizens, which would result in an improvement of the quality of life. In order to realize the objectives of this project, the government needed to use software over which it had complete control and FOSS was chosen.

The government supported the creation of a version of the GNU/Linux operating system, called gnuLinEx that was not only adapted to the local language (other Spanish Linux versions already existed) but also to the local culture. With such extensive localization, it is hoped that the local people without any previous computer experience can learn and use gnuLinEx quickly.

There are two primary objectives in creating gnuLinEx:

- To contribute towards the development of the Education Technology Network with a target of providing one computer for every two students in all the schools in the region; and
- To disseminate FOSS in Extremadura through various other programmes and the administration itself.

In summary, the main objective of the Extremadura project is to utilize FOSS and, in particular, gnuLinEx, as an enabling vehicle to bring the people of the region into the information age.

The primary target group of the project is the population of Extremadura.

Several public and private organizations and NGOs are working together on ICT programmes and initiatives in order to realize the ambitions of the Extremadura project. Some of these are:

- The Regional Government of Extremadura, through the Regional Ministry of Education and the support of the Regional Minister of Infrastructures and Technological Development, is responsible for the Education Technology Network;
- The Foundation for the Development of Science and Technology in Extremadura, has a central role in the economic, structural and innovation strategy development of Extremadura. It has several programmes running under it;

[29] The 1978 Spanish constitution divided Spain into autonomous communities, or *comunidades autónomas*. These autonomous communities have wide legislative and executive autonomy, with their own parliaments and regional governments. http://en.wikipedia.org/wiki/Autonomous_communities_of_Spain

- The Centre of New Initiatives is involved in the support of the Education Technology Network as well as the development of the Linex Centre;
- Vivernet (Business Centres for New Technologies) is involved in promoting FOSS and gnuLinEx to SMEs in Extremadura; and
- The Digital Literacy Plan in Extremadura is an initiative of the Regional Government of Extremadura and the Regional Association of Popular Universities. Together with town councils and other entities, this programme is promoting New Knowledge Centres for the training of the adult population in ICT.

FOSS Application

Description

gnuLinEx is based on the Debian distribution of GNU/Linux. When it was first created, gnuLinEx was based on Debian distribution 2.2. The latest gnuLinEx that has been released, gnuLinEx2006, is based on Debian 3.1. The basic gnuLinEx includes the GNOME desktop environment, the OpenOffice.org office application suite, Mozilla and X-Chat Internet applications as well as multimedia players like XMMS, Xine, etc.

The distribution packaged for educational use, gnuLinEx Edu, makes use of the basic gnuLinEx and adds several specific FOSS education applications onto it. This education distribution makes use of the Squeak[30] platform for developing and running education software. Squeak is multi-platform, supports multimedia well and is easy to develop and display contents under it.

For business use, Vivernet adapted the primary distribution, gnuLinEx Edu, to the needs of SMEs, entrepreneurs and businesses of the region, to create Linex-Empresa (Linex for business). This distribution is widely used in the business sector of Extremadura and it contains FOSS business software catered to SMEs and large corporations.

Choice of FOSS

One of the main reasons FOSS was chosen was because of the long-term cost savings it can provide. The Education Technology Network alone involves providing a minimum of 70,000 desktops in the initial stage and software licensing costs will be prohibitive.

The ability to freely adopt, adapt and modify the various packages in the GNU/Linux distribution to suit a particular environment is also very important. The chosen software platform has to be fully customizable and scalable, and adaptable to local culture and language. The technical merits of GNU/Linux in being able to provide a secure and network-ready development and application platform are also important considerations. With the use of FOSS, the local software industry will benefit too, as it will be needed to support and enhance gnuLinEx and support the users.

Debian GNU/Linux was chosen as the distribution to base gnuLinEx on as it is a community-driven distribution; the Regional Government of Extremadura, being a public body, wanted to be independent of any commercial vendor.

Development and Implementation

The basic gnuLinEx is targeted at equipping an end user, with little computer knowledge, with office software and communications tools (e-mail and web browsers). It is simple to install and configure and this Spanish language version of GNU/Linux has been

[30] Squeak is a FOSS implementation of Smalltalk with powerful multimedia facilities. It has been used in a wide range of software projects, ranging from educational platforms to commercial web applications. http://www.squeak.org/About/

modified so that the user can be familiar culturally when using it. Consequently, icons and names of programmes refer to the regional culture. There are specific versions of gnuLinEx adapted to specific needs and environment, e.g. gnuLinEx Edu for education, Linex Empresa for business and JuegaLinEx for games.

FOSS applications, including gnuLinEx, have been adopted on a large scale by the entire public sector. Over 10,000 desktops in public administration use it, as well as over 80,000 desktops in schools. An average implementation in a secondary school will involve an average of 500 computers for the students, plus at least another 100 computers for the staff and teachers; in addition there will be at least one central server and many other hardware peripherals such as printers, digital cameras and scanners.

Deployment

The deployment in schools targeted one computer for every two pupils, and these computers are all connected together to the Education Technology Network resulting in a network of more than 80,000 computers, all running gnuLinEx. During the year 2002-2003, gnuLinEx was installed and used by 16 new secondary schools. This was expanded in 2003-2004 to all the schools in the region. A server capable of managing more than 500 computers as well as supporting remote management is installed in every state secondary school.

The size of this project has made it possible for the region to sign an agreement of collaboration with the European Organization for Nuclear Research. The scientists there intend to use the huge computing capacity available from the 80,000 computers of the Education Technology Network that lie idle at night for scientific computing work.

Apart from the schools, the different regional ministries, such as the Regional Ministry of Culture, the Regional Ministry of Education and the Regional Ministry on Infrastructure and Technological Development, are also using FOSS, with more than 70,000 computers installed with gnuLinEx and FOSS applications. Other public institutions and/or organizations that have FOSS solutions deployed include the Health and Care System of Extremadura (the JARA project), the public libraries of Extremadura and the technical inspection of vehicles (ITVs) .

Impact

The Extremadura project centres around the creation of a localized, customized distribution of GNU/Linux, and its deployment as the main component in the Regional Government's ICT programmes and initiatives. The Regional Government makes extensive use of FOSS in its efforts to introduce computer literacy to its citizens and transform the region into an information society. The Education Technology Network shows how a government body can initiate the development and deployment of software adapted to the needs of the local end users and identify beforehand the needs of the educational community with a clear objective: to provide technological literacy within the framework of a technological network. This top-down strategy identified a tool, gnuLinEx, to implement the educational objective of providing one PC for two students in all the schools.

The project has resulted in large numbers of computers being installed in schools and public sector organizations with an equally large number of users being exposed to ICT and gnuLinEx in particular. The introduction of PCs in the schools resulted in more than 80,000 computers being installed with gnuLinEx, with 183,000 pupils and 16,000 teachers using the software. The Digital Literacy Plan of Extremadura, a strategic and pioneering initiative to promote ICT to the society, has reached more than 820,000 users in

Extremadura. Over 70,000 desktops in public administration use gnuLinEx. In addition, the setting up of a public Internet access point and a public library in every village will make it possible for every person in Extremadura to participate in the information society through FOSS and gnuLinEx.

The success of this project has attracted the interest of many other regions and organizations in Spain, as well as other countries in Latin America. The Extremadura experience has been shared with other European regions, aiming to promote the use of FOSS in public administrations. This experience is also being shared with some Asian countries.

Lessons Learned

The main lesson learned from this project is that FOSS can be a key enabler to bridge the digital divide and promote digital literacy to all the people, irrespective of their geographical, economic or cultural situation. This will enable all citizens to have access to and participate in the information society.

To encourage this, a government needs to formulate policies that address the following:

- Freedom of choice of software for the user as well as for the government;
- Greater competition in the market place;
- Ensuring the technological independence of the government;
- Easier access by citizens, business and the government to technology and avoiding economic barriers;
- Promotion and development of the local software industry so that it is capable of competing in areas traditionally dominated by foreign businesses;
- Equipping local professionals with skills to compete in fields of software traditionally dominated by foreigners;
- Preservation of information through the adoption of open standards; and
- Usage and respect of local culture, practices and regional languages.

From the Extremadura experience, it is found that to develop an ICT model based on FOSS that is sustainable, universal and fair, some key policy issues that should be considered are:

- Accessibility for all;
- Technological literacy for all;
- Support to be given to entrepreneurs and businesses;
- Initiation of the technological processes in educational sector; and
- Continuous evaluation and adaptation of processes.

Current Status of Project

The Extremadura project is still in progress. It is exploring new areas to adopt FOSS solutions in the regional administration and collaborating with new partners and sharing the acquired knowledge with them. It is important, at this point, to create links and contacts among partners in order to foster innovation by sharing. This is one of the reasons for the founding of the Iberoamerican Network for Free Knowledge.

On the software development side, gnuLinEx is continually being maintained and developed. gnuLinEx2006 was released on June 2006 and it has proven to be very popular. The usage of the business distribution, LinexEmpresa, among the SMEs of Extremadura continues to increase and it is now also gaining popularity with business users in Spain and Latin America. A new gnuLinEx distribution, targeted at NGOs and civil society, is being developed and will be made available in the near future.

The status of some of the programmes is as follows:

- The Education Technology Network is being implemented;

- New systems for the Health and Care Network of Extremadura (JARA project) are in the final stages;
- Migration of the ITV systems is being finalized; and
- New possibilities for e-government are being evaluated.

Benefits and Challenges

The political advantages in using FOSS are many and these have been addressed in the *Lessons Learned* section. The main benefits of deploying FOSS are that it provides an economical and affordable means to implement the ICT programmes of Extremadura and that it allows for the creation of a localized operating environment. In addition, the general benefits of quality, security, reliability and good support by the FOSS community are also important.

The benefits of using FOSS in terms of direct savings and cost cutting in the mid to long term are unquestionable. For example, based on a distribution of a minimum of 40,000 copies of gnuLinEx software in schools, it has been calculated that this will have a total savings of Euro 30 million if compared to using a proprietary software solution.

The biggest challenge to this project is that the Regional Government is the first administration in Europe to adopt the use of FOSS. As a pioneer in this area, it has to blaze its own trail and does not have the experience of other governments to fall back on or to learn from.

Other disadvantages experienced include the cost of training and the reluctance of some users and organizations to use FOSS as they fear interoperability problems with proprietary software in use. In order to overcome the problem of interoperability, the Regional Government of Extremadura approved an agreement in July 2006 stating that electronic information generated must obligatorily use standard formats (OASIS Open Document Format and Portable Document Format). Overall, the advantages far outweigh the disadvantages/inconveniences.

Other Information

There is a lot of global attention given to this project in spite of the fact that it started out as

Awards and Recognition Received by Extremadura

Several of the projects and/or people associated with Extremadura have received awards and recognition internationally. Below are some examples:

The "Innovative Actions in Europe's Regions and Cities" prize in the category "Information Society" was awarded by the European Commission to the gnuLinEx and the Information Society project in Extremadura in 2004.

The "Miguel Hernández" Award in 2004 was given to the Digital Literacy Plan of Extremadura by the Ministry for Education and Science of Spain, as recognition of the efforts to promote education accessibility to elderly people using ICT technologies.

The "Ramon Lull National Prize on Informatics" was awarded in 2005 to the Extremadura project for its efforts in the use and promotion of Free Software.

a regional project adopted to face the challenges of Extremadura. However, the situation in Extremadura has many similarities with other regions in Spain, Europe, the USA and the rest of the world. The project is recognized worldwide as a FOSS success story and has received numerous awards.

Conclusion

The Regional Government of Extremadura has demonstrated how FOSS can be utilized as the main vehicle to bring about ICT literacy and awareness to the people. The economic, social, political and technical benefits of FOSS are borne out clearly by the Extremadura experience, in particular, the customized and localized gnuLinEx and its deployment in over 80,000 computers for the education network. In spite of the initial reluctance and problems of some of the users and organizations and the fact that the government is a pioneer by being the first administration in Europe to adopt the use of FOSS, the project has progressed well. The success of the project has resulted in large numbers of people in Extremadura being exposed to ICT and FOSS and the region is well on its way towards the information society. For centuries, Extremadura has been the most underdeveloped region in Spain and it is overcoming its situation with the innovative use of ICT and FOSS. This model of Extremadura is transferable to other developing regions because of the similarities in the socio-economic framework.

Contact Information

Project: Regional Strategy on the Information Society
Organization: Regional Government of Extremadura
Contact Person: D. Juan Carlos Rodríguez Ibarra, President of the Regional Government of Extremadura
Street / Postal Address: Paseo de Roma S/N 06800 Mérida, Badajoz, Spain
E-mail: presidente@prex.juntaex.es
Tel: +34 924 008602
Fax: +34 924 006311

Websites

The Extremadura website
http://www.juntaex.es

The gnuLinEx project site
http://www.gnulinex.org

The LinexEmpresa project site
http://www.gnulinex.net

Empowering Local Communities
Colnodo, Colombia

Summary

Colnodo is a non-profit organization in Colombia that provides a wide range of ICT and Internet services, primarily to NGOs and other non-profit organizations. The services offered by Colnodo are targeted at organizations that make strategic use of the Internet for development, empowering the local communities and promoting the peace process. Currently, Colnodo services over 500 organizations in Colombia.

FOSS is used extensively by Colnodo for its ICT and Internet services. In particular, the ActionApps CMS, a collaborative web publishing tool especially suited for NGOs, is used to enable the organizations served by Colnodo to manage the content of their websites, as well as to exchange information with other sites easily by themselves. ActionApps runs on the LAMP platform and therefore, fits well into the FOSS environment in Colnodo.

Besides providing basic Internet services, Colnodo is also involved in the development of complex information systems such as the Internet for Accountability System and the Basic Municipality Environmental Information System. The former is an information system that allows municipalities to publish information to their communities online. To implement this project, Colnodo developed a system to administer the set-up of the several hundred sites that are under the system. For the Basic Municipality Environmental Information System, environmental information stored in a database is correlated to a GIS and this information can be accessed using mobile phones with Internet connectivity.

Colnodo has been in operation for 13 years and it is able to generate its own income from the services it provides. This is unique as its customers are mainly organizations that are not well-off and it is a non-profit setup that does not depend on funding from donors. FOSS has been a key contributory factor to the success of Colnodo, as FOSS applications are able to provide all the important services required by Colnodo's customers and they are available without licensing fees.

Background of Organization

The Colombian Non-Governmental Organizations' Association for Communication via Electronic Mail (Asociación Colombiana de Organizaciones No Gubernamentales para la Comunicación Vía Correo Electrónico) or Colnodo was founded in 1993 by seven non-profit civil society organizations and is one of the first ISPs in Colombia. Colnodo provides a wide range of Internet services, including e-mail, discussion forums, online databases, web hosting, audio and video broadcast, and search engines to over 500 organizations in Colombia. It also facilitates the effective use of Internet technologies by these organizations to enable their projects to have a bigger impact on their target audience.

Colnodo is the only non-profit ISP in Colombia. It has a full-time staff of about 15 members and several volunteers and contractors working in different projects. Its mission is to empower and support groups and individuals working for peace, human rights, development and protection of the environment, through the strategic use of the Internet. Colnodo is a member of the Association for Progressive

Communications (APC)[31] and the Colombian National Confederation of NGOs.

Objectives of Project

Colnodo's main objective is to facilitate the communication and exchange of information and experiences among Colombian NGOs at the local, national and international levels. It supports the initiatives of grass-roots NGOs by providing ICT and Internet facilities and services to the people. Projects that have been carried out by Colnodo include Internet access to local communities, training in the strategic uses of the Internet for peace and conflict resolution, online education services, support for women networking online and the promotion of local services and content.

Another major objective of the organization is the empowerment of local communities using the ActionApps CMS. This software is available as FOSS and with it Colnodo has been able to support many organizations in the effective publication of online information.

The services offered by Colnodo are targeted at organizations that initiate projects that make strategic use of the Internet for development and allow people to have equal access to information. Some of the sites developed by Colnodo using ActionApps include:

- Youth Information Network (http://www.rij.org.co);
- Education for Peace Network (http://www.educacionparalapaz.org.co);
- Good Practices to Solve Conflict (http:www.saliendodelcallejon.pnud.org.co); and
- Sustainable Development Network (http://www.rds.org.co).

During the development of Colnodo, several key partners such as the Sustainable Development Network, ISOC and APC were involved in building up the Colnodo network. Currently, in carrying out its mission, it is involved with various partners in ongoing projects. These partners include: Transparency for Colombia; Colombian Connectivity Agenda; the Development Gateway Foundation; and the Presidential Programme Youth Colombia.

FOSS Application

Description

Most of the projects that Colnodo is involved with make use of ActionApps. This is a collaborative web publishing tool especially suited for NGOs and non-profit organizations. It is created by APC.

ActionApps are publishing tools that plug into websites. In addition to publishing information, ActionApps allows the organization to create what it calls "Content Pools" to share articles with partner websites. This unique Content Pooling technology enables participating organizations to exchange articles between their sites. The organizations working with Colnodo find an efficient tool to publish information online and to build strong networks by exchanging information between sites in this CMS.

As ActionApps is built using the web scripting language, PHP, and it uses MySQL as the database to store the data published, it integrates easily into a FOSS-based web platform running the Apache web server on a GNU/Linux operating system.

Other FOSS applications used in the sites developed by Colnodo include:

[31] APC is a non-profit organization that supports Internet uses for social justice and development. http://www.apc.org, http://www.apc.org/actionapps/english/index.html

- Mailman to manage mailing lists;
- Sendmail to manage e-mail;
- Htdig for search engines;
- Bekerley Internet Name Daemon to manage domain name services;
- Horde and Squirrel for web-based e-mail systems;
- Teleduc as support for online education;
- Other CMSs for specific needs – Typo3, Drupal and Wikis; and
- Mapserver to provide access to GIS data through the Internet.

Choice of FOSS

Most organizations served by Colnodo are NGOs and non-profit organizations that cannot afford to pay high prices for using proprietary software for the CMS and database. FOSS is used since it has been found to be able to meet all the requirements of Colnodo's clients and partners. Also, it will be very difficult to implement projects that are intended to be distributed freely and widely, e.g. Internet for Accountability and the Municipal Basic Information System.

Development and Implementation

Originally Colnodo used GNU/Linux as a platform to replace its old Bulletin Board Systems so that many more users can be supported. Subsequently, with the advent of the Internet and the World Wide Web, Colnodo started to provide web hosting and other Internet services to organizations so that they do not have to invest in too many resources to have a presence on the Internet. Colnodo also started to provide very specialized services such as online GIS, online broadcast of radio programmes and the creation of efficient and reliable search engines.

The implementation of ActionApps enables Colnodo to offer its customers an affordable and easy means to manage their site content and to exchange information with other sites.

Colnodo has developed complex information systems such as the Internet for Accountability System that allows municipalities to publish information to their communities online. To implement this project Colnodo developed a FOSS-based system to administer efficiently the set-up of the 460 sites that are under the system. The sites also provide tools that allow citizens to request for information and track their request online such as Really Simple Syndication (RSS)[32] feeds and e-mail alerts. These tools provide information access to anyone irrespective of their physical limitations or the platforms they are using.

In the Basic Municipality Environmental Information System, Colnodo developed an efficient system that correlates environmental information that is stored in the MySQL database with a GIS system and this information can be accessed by using mobile phones with Internet connectivity.

Deployment

Initially, Colnodo used very cheap IBM compatible machines for the servers, but in the last six or seven years, HP and Dell servers with hard disks arrays have been deployed so as to guarantee a reliable 24-hour operation. All of the servers run GNU/Linux while 70 percent of the desktops do so.

Currently, Colnodo runs more than 150 sites. Most of them use ActionApps and FOSS tools to support the communities that access them and use their services.

Most of the systems are accessed through the Internet. Communities are assisted to gain access through the telecentres and through local partners such as public schools and governmental

[32] A form of web syndication used by news websites and weblogs. http://en.wikipedia.org/wiki/RSS_%28file_format%29

programmes. However, this is still a problem as less than 10 percent of Colombians have access to the Internet. In some cases, access to information is provided through the use of CDs.

Colnodo is a self-sustaining, non-profit organization that is in existence for 13 years. It is only though the extensive use of FOSS that it is able to keep running its projects depending exclusively on its own income from the services it provides.

Impact

Colnodo serves more than 500 Colombian NGOs and non-profit organizations in projects that work for the betterment of humanity and the environment, and promote world peace. Its success will have a huge impact on the development and well-being of people everywhere and on the people of Colombia in particular. With the extensive use of FOSS, the tools and technology created can be more easily distributed and replicated to other developing countries. In particular, some of the projects served by Colnodo, like the Internet for Accountability, can have an enormous impact upon successful deployment as it allows the community to have access to the information that affects their lives.

The extensive use of the ActionApps enables NGOs to share their news and information readily. A conducive environment for information exchange and discussion is made available and these organizations should be able to coordinate their activities better and cooperate on important social issues.

Lessons Learned

The success of Colnodo shows that FOSS applications can be used in developing countries. The lesson learned is that FOSS can make many of the projects in developing countries feasible as implementing them using proprietary software will be prohibitively expensive.

FOSS can provide a chance for developing countries to make a difference and to allow them to participate globally in producing technology rather than just remain mere consumers of technology.

Current Status of Project

Colnodo is an ongoing endeavour. It is still providing Internet services to its customers and working with various parties on specific Internet social development projects, some of which have been mentioned in this book.

Other activities in the future include the setting up of wireless networks in rural areas that will help connect isolated communities and the integration of Internet tools with mobile phones, e.g. text message alerts that can be sent from networks to prevent catastrophes.

Benefits and Challenges

FOSS has benefited Colnodo tremendously in that it depends on FOSS for the numerous services and benefits that it provides to the organizations working with it. These include the economic hosting and easy management of their websites and the provision of Internet services that are usually very expensive such as GIS systems, online multimedia services and efficient search engines for large databases.

The ActionApps CMS solves many problems faced by the organizations that want to publish and exchange information in a cheap and easy fashion. With ActionApps, organizations have the power to publish and exchange information in a very efficient and easy way, allowing them to spend less time and resources in maintaining their sites. Using ActionApps, Colnodo can be competitive when compared with commercial ICT companies that charge high fees for the setting up and maintenance of websites.

Colnodo found many advantages of using FOSS at the server level and did not experience any

real disadvantages. At the desktop level it experienced some compatibility issues with proprietary platforms, e.g. the compatibility between Microsoft Office and OpenOffice.org. Also, for some desktop Linux distributions, there were difficulties in the support of certain hardware where there are no drivers available.

A key challenge is the integration of mobile phones and Internet services. In Colombia there are many more mobile phone users than Internet users and so if it is possible to integrate these two services in an efficient way, many more people can be served. This situation is generally true in most developing countries.

Other Information

Listed below are some of the current important projects by various organizations working with Colnodo.

- Internet for Accountability –Transparency for Colombia (Transparencia por Colombia) and Colnodo recently donated their new software "Internet for Accountability" to the local municipalities. More than 400 municipalities will receive the software along with Internet access on the signing of a transparency and anti-corruption agreement. With this, the mayor's office in each municipality is encouraged to have its own website. This should promote transparency in the municipality and introduce accountability practices into the management of the municipal office.
- Basic Municipality Environmental Information System – Colnodo developed, in coordination with the Ministry of Environment, Housing and Territorial Development and six governmental environmental organizations, a tool that allows these organizations and municipalities to publish their technical environmental data so that the information can be presented through a GIS.
- Youth Network for Peace and Sharing – This project seeks to strengthen the values of vulnerable youths in the urban areas of Bogota through the use of ICT.

Conclusion

Colnodo has had great success providing ICT and Internet services and facilities to other non-profit organizations in Colombia so as to help them have a bigger impact with their activities. FOSS applications are used by Colnodo to provide its services. One of these, the ActionApps, is well suited for the NGOs served by Colnodo and with this they can publish and exchange information in an affordable and easy way. Colnodo has also developed complex information systems such as the Internet for Accountability System and the Basic Municipality Environmental Information System, as part of its mission to empower the people with information through the strategic use of ICT and the Internet.

Colnodo is a self-sustaining organization that has been operating for 13 years without any funding from donors. This is probably not achievable without the use of FOSS as it is through FOSS that it is able to generate enough revenue from its services to support itself.

Awards and Recognition Received by Colnodo

Colnodo won a research award in 2000 from the Latin American Social Sciences Foundation (FLACSO) with a project entitled, "How to measure qualitative and quantitative impact: The design and implementation of online registration for public Internet access points mechanisms with Linux platforms". The measurement tool developed from this project is available at http://www.colnodo.apc.org/registro

Contact Information

Project: Colnodo
Organization: Asociación Colombiana de Organizaciones No Gubernamentales para la Comunicación Vía Correo Electrónico
Contact Person: Julián Casasbuenas G
Street / Postal Address: Av 39 14 – 66, Bogotá, Colombia
E-mail: julian@colnodo.apc.org
Tel: +57 1 232 4246
Fax: +57 1 338 0264

Websites

The Colnodo website
http://www.colnodo.apc.org

Internet for Accountability
http://www.iprc.org.co

Prototype for Internet for Accountability
http://www.municipios2.colnodo.apc.org

Managing the Environment
Galápagos, Ecuador

Summary

The Galápagos National Park is home to a highly biodiversified flora and fauna and some of the most exotic animals and plants in the world. As part of its efforts to utilize ICT to help it better manage its environment and activities, the Park has developed several software applications that are run over a network connecting the main islands. This project, which is part of the Galápagos Environmental Management Programme, utilizes FOSS and FOSS development tools to develop the applications. FOSS was chosen because the tools and development environment associated with it are versatile, easy to use and maintain, and are available for use without licensing fees.

The developed applications increased the ability of the Park to collect, store and retrieve useful, timely and accurate data and information on the key activities of the Park, as well as provide useful information towards the management of land resources. One key innovative feature of the applications is the ability for park wardens to visualize global positioning system (GPS) points on a map of the Archipelago where suspicious fishery activities or illegal tourism visits have taken place. This project has been completed and the FOSS applications and databases are in use throughout the year on a 24-hour basis. They have proven to be very stable as there have not been any maintenance or updates required since the first application was launched in 2004.

Background of Organization

The Galápagos National Park is in charge of the protection and conservation of the Galápagos Islands, an archipelago made up of 13 main volcanic islands and many more smaller ones. The Galápagos Islands are a part of the territory of the Republic of Ecuador and they are located in the Pacific Ocean on the Equator, approximately 960 kilometres from continental Ecuador.

The Galápagos National Park has its main office on the island of Santa Cruz and three branches on the islands of Isabela, San Cristobal and Floreana. About 250 people work for the Park, with approximately 60 percent of the work being carried out in the protected area outdoors. The Park consists of most of the islands' land mass (8,000 sq km) as well as the surrounding Marine Reserve which covers an area of 45.000 sq km. The Galápagos National Park is home to one of the most diverse and unusual flora and fauna in the world.

Objectives of Project

This project is part of the Galápagos Environmental Management Programme of the Ecuador government executed through the Ministry of Environment and funded by the Inter-American Development Bank (Project 1274 OC/EC). The principal objective of this programme is to stop and reverse the environmental degradation process within the Galápagos Islands. The programme uses ICT as a tool to facilitate processes and support decisions about environmental management. Under the project, the Park is provided with software applications that are used as tools for the implementation of a fishery registry within the Park, as well as the development of software applications to complement and support environmental management activities within the Park.

The primary target groups of the project are the members of the different units of the Park who are involved with managing the marine resources, tourism activities, legal issues, terrestrial areas protection and monitoring of animals (giant tortoises, land iguanas, and birds).

The other beneficiaries of the project are Instituto Nacional Galápagos, the Chamber of Tourism of Galápagos and the Artisan Fisherman Associations.

FOSS Application

Description

Software developed for the Park made use of the following FOSS development tools and applications: Apache web server, PHP scripting language, FPDF (a PHP class library, which generates PDF files with pure PHP), JGraph (a PHP class library to create graphs) and MySQL database.

The applications developed using these FOSS tools are used to solve the problems of excessive centralization and delays in the gathering and transmitting of data to the main office from the islands and the generation of reports for the Park. A WAN connects the main offices in Puerto Ayora – Santa Cruz Island, and other islands: Isabela, San Cristobal, and Floreana. The applications are accessible using a web browser.

Choice of FOSS

The principal reasons for implementing a solution based on FOSS development tools and applications are:

- Lower initial cost – there was no initial investment on software tools such as PHP, MySQL and the special class libraries. They were available for free from the Internet;
- Vendor independence – no specific vendors are required;
- Information available on the Internet – a high volume of technical information about FOSS applications is available through websites, forums and communities; and
- Security – the network administrator can set up security parameters on PHP applications, Apache and MySQL according to the in-house policies.

In summary, the Information Technology Unit of the Park selected the FOSS applications as they are versatile, available for use without licensing fees, and easy to use and maintain.

Development and Implementation

The applications were built based on a three-layer model:

- Presentation layer – Cascade Style Sheet, JavaScript, PHP layout for generating forms on-the-fly;
- Business layer – classes and objects for dispatching user requests; and
- Data layer – classes for connecting to the back-end MySQL database.

The development environment was set up quickly. The principal resources invested were time and knowledge. The use of PHP provided quick and easy implementation and the first prototype of the application was presented to the users two months after the project started.

Deployment

Five software applications and a database for monitoring were built. They are used on a daily basis by the members of the different units of the Park over the WAN that connects the main offices in Santa Cruz Island to the islands of Isabela, San Cristobal, and Floreana. The applications built were:

- The Galápagos Marine Reserve management system;

- The Tourism Management system;
- Application for managing extraction of natural resources;
- Legal process database;
- Application for Giant Tortoise Breeding Centres; and
- Monitoring database for visitor's sites (this is a module of the Tourism Management system that evaluates the status of the sites based on indicators).

As a result of the common interface used for all applications, users from a unit were able to utilize applications from another unit without trouble as everything was very familiar to them.

Impact

With this project, useful, timely and accurate data and information on the key activities of fisheries, tourism, and the management of land resources can be collected and made available to the relevant people. The applications provide support for planning tasks and surveillance within the Galápagos Archipelago. External users from other institutions/bodies have also benefited from the information offered by these applications.

The project has resulted in the judicious and efficient use of ICT resources. Although the first application was launched in 2004, there has not been any expenditure needed for maintenance and updates.

Lessons Learned

The key lessons learned from this project have been:

- Analyse ICT technologies according to users and institutional needs, not according to the technical desires of the developers;
- Avoid looking at the latest and most expensive technology;
- Keep things simple and functional for the software design and programming;
- Define clear and reasonable objectives;
- Always ask the users for feedback and treat them as co-developers; and
- Re-use software modules and components as much as possible.

Current Status of Project

The project is considered complete with the deployment of the five software applications and the monitoring database.

Benefits and Challenges

The applications developed brought a 180-degree change within the operation of the Galápagos National Park. The usage of databases for the acquisition and storage of data is one of the most important achievements as it allows data to be stored and accessed efficiently and easily. The time devoted to gather data and prepare reports has been significantly reduced and requests can be satisfied *in situ*. The applications can be accessed by properly authorized personnel any time of the day and throughout the year.

The Galápagos Marine Reserve management system contains an innovative feature that allows park wardens to visualize GPS points. With this feature they are able to mark points and visualize them on a map of the Archipelago where either suspicious fishery activities or illegal tourism visits have taken place

The main advantages of using FOSS are low costs and vendor independence while the main disadvantage is that few libraries are available for usage within PHP for working with graphics and PDF formatted documents.

The biggest challenge encountered in the project was the conversion of users' expectations (from management to operative levels) into a functional software application.

Other Information

Other projects and activities related to the Galápagos Islands make use of FOSS. These include the Charles Darwin Foundation (an organization dedicated to doing research for Galápagos conservation) and the project that is also a part of the Galápagos Environmental Management Programme – the Tourism Diving Research Project within the Marine Reserve of Galápagos.

Conclusion

The Galápagos National Park has successfully utilized FOSS to develop applications to help in the management of the environment of the Archipelago. These FOSS-based applications have resulted in the ability of the Park to collect data and manage information with regard to the activities of fisheries, tourism and the management of land resources and this will provide support for planning tasks and surveillance within the Galápagos Archipelago. The operation of the Galápagos National Park has benefited greatly from the deployment of ICT in general and the FOSS applications in particular.

The usage of FOSS to develop the applications has resulted in low development costs and encouraged vendor independence. The five applications developed as well as the FOSS database are in use on a daily basis throughout the year bearing testimony to the robustness of FOSS.

Contact Information

Project: Paola Tatiana Guanangui
Organization: Galápagos National Park
Street Address: Oficina Isla Santa Cruz, Puerto Ayora, Charles Darwin Av., Galápagos, Ecuador
Postal Address: Charles Darwin Av. Postal Box: 17-21-1154, Galápagos, Ecuador
E-mail: patyp@spng.org.ec, pguanangui@yahoo.com
Tel: +593 5 252 6189 / 252 5511
Fax: +593 5 252 6190

Website

The Galápagos National Park
http://www.galapagospark.org

Enabling Public Schools
Paraná, Brazil

Summary

The Education Secretariat of the state of Paraná in Brazil has developed a web portal that enables the public school teachers in the state to collaborate and develop course contents in various subject areas as well as other teaching resources. Apart from the objective of providing subject materials for teachers in the preparation of their work, this project also aims to contribute towards increasing the Portuguese content of the Internet as these materials will be published in Portuguese. The application software that provides the environment and facilitates the collaboration and creation of the content is the Ambiente Pedagógico Colaborativo (APC) system. This system was developed using FOSS development tools and it is released as FOSS itself.

The portal through the APC system, allows the distribution of curriculum content created by public school teachers in Paraná. The published materials may be worked on collaboratively by registered users of the portal. Through this project, the government of the state of Paraná has taken the initiative to develop information system solutions suited to its needs and making them available to other teaching institutions, both public and private. The usage of FOSS in the project has enabled it to be deployed at low costs and the software solution can be made available for free to other interested states and governments.

A culture of collaboration and sharing had to be established first among the teachers before the project could take off, and for this to happen the teachers themselves had to be convinced of the importance of the project. The teachers had to be trained in areas of basic computing as well as understand the pedagogical concept of the system.

Currently, the project has resulted in the publication of over 300 course materials covering both primary and secondary education by the public school staff. The Ministry of Education is considering implementing the APC system as a public education policy in Brazil and the Venezuelan government has shown interest in introducing this system into their public education system.

Background of Organization

This project was carried out by the Education Secretariat of the state of Paraná, Brazil, as part of its responsibility to ensure universal access to education and to offer complete basic education to its population. The Secretariat is entrusted with raising the level of performance in schools and encouraging improvement among the teaching, technical and administrative staff in the education sector. It is also the Secretariat's responsibility to guide, control and monitor the performance of pre-school, primary and secondary teaching establishments, both regular and supplementary, and special education in the public and private sectors.

Objectives of Project

The web portal "Day-to-Day Education" aims to provide educational information, teaching and curriculum content to teachers, students, school managers and the community. Information and content relating to various subject areas as well as other resources that help educators in their teaching tasks are made available in the portal. The portal offers teachers a reliable, free and

effective environment to interact and work together thereby encouraging them to collaborate on content production. In this way their knowledge and experience can be passed on to educators and other users of the system.

The project has its own identity that is a result of the collective work of the local teachers at various levels and can be viewed as part of the social benefits of ICT to the country. As the portal is in Portuguese, it also contributes to the Portuguese content of the Internet.

The main target groups of the project are the teaching staff in basic education in public and private schools all over Brazil and in Portuguese-speaking countries.

The main partners in the project are the government of the state of Paraná, the Companhia Paranaense de Informática (CELEPAR – the Paraná Computing Company) and UNDP.

FOSS Application

Description

The interactive education portal is designed to provide information and content collaboration and sharing to the educators and the community. It is designed such that it enables the user to explore resources that are of interest to him or her and contribute new information at any time. Basic FOSS software used in the development of the portal include the Apache web server, PHP web scripting language, PostgreSQL database, OpenOffice.org office application suite and Firefox web browser.

The application software that provides the environment and facilitates the collaboration and creation of the content is the APC system. This has three main modules:

- Publications/Collaboration – interactive system between users (teachers) to collaborate on content production;
- Validation/Correction of Language – interactive system between teachers validating and correcting content to ensure the quality of content being made available; and
- Administration – administration system for system managers including sending out reports, updating tables, authorizing users, etc.

The APC system is distributed as FOSS and is licensed under the LPG-AP (Licença Pública Geral da Administração Pública – General Public Licence for Public Administration).[33]

Choice of FOSS

The choice of FOSS is based on reasons of cost and quality. The usage of commercial proprietary software will incur high licensing costs. Another important factor in using FOSS is that it will be possible for the owners/developers of the project to have complete knowledge and understanding of the software used as the source code is available.

Development and Implementation

The portal application is recommended to run on a GNU/Linux platform with Apache, PHP and PostgreSQL. To access the portal, the user only needs a web browser and Internet connection. Even with low-speed connections, the portal may be accessed satisfactorily.

Several other states/municipalities have started to implement this system, thereby increasing collaboration on content production and helping to increase the share of Portuguese language content on the Internet.

[33] A free software license based on the FOSS license, GPLv2, created by the government of Paraná.

The developers and implementers of the software have found that by using FOSS they can count on a huge community to help them solve problems that may appear and that the support response time from the FOSS community is faster than that from the commercial companies. There has been a significant increase in productivity in developing the solution using free technologies. One of the advantages is the ability to re-use other free solutions found within the community. The developers are able to re-use codes from other applications in different parts of the world, a situation that has led to the creation of a network of technical cooperation to find solutions and to share knowledge generally.

Deployment

The usage of FOSS in the project has enabled the project to be deployed at low costs and the software solution can be made available for free to other interested parties.

The staff of public schools has participated in the publication of materials and this has resulted in the widespread distribution of curriculum content created by these public school teachers in Paraná. Before publication, to ensure the quality of the information published, these materials are checked by a team of teacher-guides. After publication, these materials may be worked on collaboratively by any user registered with the Day-to-Day Education portal. These registered users can add on to the information published on the APC system. This has generated much technical cooperation between different public and private institutions.

Impact

The system allows teachers in public schools to produce content from within their schools. This content is based on knowledge that teachers have created and gathered from their classroom experience. This initiative aims to encourage the publication of more web pages in Portuguese and Spanish languages.

By means of this initiative, the government of the state of Paraná has become a provider of information systems in the area of education. The state has also become a developer of solutions fitted to its needs and made available to other teaching institutions, both public and private.

The system aims to arm educators with information about the content of the various subject areas and other resources that help in their teaching tasks, making it an official repository of curriculum content. In this way it has an impact on the education community as it can play the role of a communication vehicle in which the value of the intellectual production of public school teachers is recognized and it can offer services relevant to all those working in basic education, thereby encouraging the creation of virtual learning communities and stimulating continuing education.

Lessons Learned

To develop the initial content for the Day-to-Day Education portal, training was given to 1,257 teachers working in the 17 subject areas of basic education and representing the 32 Regional Educational Nuclei. From this exercise, it was found that it was a mistake to:

- Provide temporary contracts to ICT university teachers to validate content;
- Have prior definition of content to be developed; and
- Certify teachers for starting production of the content but not for publishing it.

From this initial exercise, it was also found that the content validation process should be an activity within the functions of basic education teachers because it requires both

domain knowledge as well as experience in the classroom. Another important point learned was to allow teachers to define the content on which they would work rather decide for them beforehand.

Current Status of Project

The APC system has published over 300 course materials for collaborative learning, all drawn up by teachers in public basic education schools in Paraná. Of the over 22,200 registered users, some 16,000 are public school teachers.

The content in the system can be used by teachers in public and private schools throughout Brazil to prepare their lessons. It is hoped that if the system can be spread to other states in the country, a large collaborative network of knowledge related to basic education can be created. Discussions are under way with the Brazilian Ministry of Education on implementing the APC system as a public education policy.

An offline version of the system has been launched. This version is meant to serve users with slow dial-up connections or without Internet access.

Benefits and Challenges

The general benefits experienced in using FOSS in this project include the opportunity to engage in cooperative development, independence from suppliers, low cost, security, portability and the good support provided by the FOSS community.

High training cost was cited for this project but it was also noted that this cost would probably be the same or higher if proprietary software was utilized instead of FOSS.

The biggest challenge for this project was to develop the culture of collaboration among the teachers. For this to happen, the teachers themselves had to be convinced of the importance of the project i.e. to build a database of curriculum content by collaboratively working together.

Another challenge was the training of teachers within the public basic education system of Paraná. This training involves mastering knowledge of basic computing as well as understanding the pedagogical concept of the system.

The State Secretariat of Education's policy is to distribute the content material without charge to the other states of Brazil. Discussions are under way on how to integrate the different databases so as to enable users to find specific curriculum content.

Making the computers available to teachers at their schools presents a significant challenge. This was addressed by the Paraná Digital Project, described below.

The Paraná Digital Project

School teachers had access to the APC system through Paraná Digital (PRD), a project that consisted of the installation of 40,000 working terminals placed in academic laboratories spread all over Paraná state, together with remote management to grant quality services and security. The FOSS that enables this to take place was entirely developed by the Computing Science Department in Universidade Federal do Paraná. This ability to make available, manage and maintain the computer laboratory systems is the greatest difference when the PRD project (which makes the access to the APC environment possible) is compared to other similar initiatives. It is important to note that it is the appropriate combination of the two projects (education portal and PRD) that leads to the high quality of the final product (content and infrastructure).

Other Information

The system has been demonstrated to the Ministers of Education and Science and Technology of Venezuela, who have expressed interest in introducing it into their public education system. Free distribution of the source code of the APC system, including the databases and specifications, will be given to all governments who show interest in this project.

Conclusion

The project has shown that with the proper tools, training and environment it is possible to get teachers and educators to interact and collaborate to produce useful course content. The published materials can be used by teachers in schools throughout Brazil to prepare their lessons and it is important that these materials are available for all to share and make use of. This will further add on to the pool of materials available so that teachers in other states or countries can build on this.

The Paraná Digital project, which provided the necessary infrastructure for the APC initiative, is innovative because it is the first of its kind to attend to such a large number of schools and to maintain the operation of its systems by remote management. This project clearly shows the importance of adopting certain strategies, among which are effective remote laboratory management, good local access infrastructure and use of a multi-terminal model. The Paraná Digital project is strategic because not only has it accomplished its initial goal of providing the teachers access to the education portal, it also demonstrates the feasibility of providing continuous services and the development of products.

The use of FOSS for software development, and the release of the APC system and the PRD tools under a FOSS license, is very appropriate as it will facilitate sharing and make it affordable for other groups to implement the solution.

Contact Information

Project: "Day-to-Day Education" Portal
Organization: Secretaria de Estado da Educação do Paraná (CETEPAR – Education Secretariat of the State of Paraná)
Contact Person: Glauco Gomes de Menezes
Street / Postal Address: Rua Salvador Ferrante, 1651, CEP 81670-390, Curitiba – Paraná, Brazil
E-mail: glaucogm@seed.pr.gov.br
Tel: +55 41 3376 3323 Ext. 234 / 3377 5068
Fax: +55 41 3278 7108

Project: Paraná Digital
Organization: Departamento de Informática – Universidade Federal do Paraná
Contact Person: Marcos A. Castilho
Street / Postal Address: Francisco H. dos Santos 100, Centro Politécnico, Jardim das Américas, Cx Postal: 19081, CEP: 81531-980, Curitiba – Paraná, Brazil
E-mail: castilho@ufpr.br
Tel: +55 41 3361 3567
Fax: +55 41 3361 3205

Websites

"Day-to-Day Education" Portal
http://www.diaadiaeducacao.pr.gov.br

Paraná Digital
http://www.c3sl.ufpr.br

Glossary

Content Management System (CMS)

CMS is the term used to describe a software system used for organizing and facilitating the collaborative creation of content. Websites that allow collaborative creation and modification of content often make use of web-based CMSs to manage their contents.

Debian Linux

Debian Linux is a non-commercial distribution of the GNU/Linux operating system. It is produced and maintained by almost a thousand active volunteers spread around the world. Other Linux distributions have been derived from the base Debian distribution, e.g. Ubuntu, Knoppix and Linex.

Extensible Markup Language (XML)

XML is an internationally-accepted open standard that specifies a meta markup language (a meta language is a language used for describing other languages) for the creation of other markup languages for use on the web.

Fedora Linux

Fedora Linux is a GNU/Linux community-driven distribution sponsored by Red Hat Inc.

Free and Open Source Software (FOSS)

FOSS is a term used to collectively refer to software which conforms to the definitions produced by either the Free Software Foundation or the Open Source Initiative. FOSS is usually released under at least one of the software licenses recognized by these organizations.

Free Software Foundation (FSF)

FSF is a non-profit organization dedicated to promoting computer users' rights to use, study, copy, modify, and redistribute computer programs. It promotes the development and use of free software, particularly the GNU operating system, used widely in GNU/Linux distributions.

Geospatial Content Management System (GeoCMS)

GeoCMS is a CMS where objects (users, images, articles, blogs, etc.) can have additional attributes such as latitude and longitude positions, and therefore can be displayed on an online interactive map. In addition, the online maps can also link to pages containing additional information on the entities represented in the maps.

GNU Image Manipulation Program (GIMP)

GIMP is an image manipulation software used for such tasks as photo retouching, image composition and graphic design.

GNU Operating System

The GNU Project was launched in 1984 to develop a complete UNIX-like operating system which is free software – the GNU system. Variants of the GNU operating system, which use the Linux kernel, are now widely used. GNU is a recursive acronym for "GNU's Not UNIX".

General Public License (GPL)

GPL is a software license created by the Free Software Foundation that grants the user of a computer program the right to use, study, copy, modify, and redistribute it as well as guarantees access to the source code. It incorporates a legal mechanism known as copyleft, which requires derivative works of a GPL-licensed program to be also licensed under the GPL.

Hypertext Markup Language (HTML)

HTML is an internationally-accepted open standard used to specify the structure and presentation of the content of a web page.

Kernel

The kernel is the main component of an operating system. It controls other system programs and utilities to perform the various internal tasks and housekeeping processes needed to operate a modern computer.

LAMP

The Linux/Apache/MySQL/PHP or Perl or Python (LAMP) software stack refers to a set of FOSS packages commonly used together to develop and/or run web applications and interactive websites. The PHP, Perl or Python language is used to develop applications running on an Apache web server on a GNU/Linux operating system. These applications make use of a back-end MySQL database to store data.

Linux

Linux is an operating system kernel that is released under the GPL license. This kernel is combined with the system utilities and programs from the GNU project to form the GNU/Linux operating system or more commonly referred to as just the Linux operating system.

Linux distributions (distros)

The GNU/Linux operating system is commonly distributed bundled together with other application software for use by end users and this is known as a Linux distribution or distro.

Different Linux distros may have different applications bundled with them but they all have the same Linux kernel and core GNU utilities.

Open Source Initiative (OSI)

OSI is a non-profit organization dedicated to managing and promoting the Open Source Definition, specifically through the OSI Certified Open Source Software certification mark and program. A piece of software is recognized as Open Source Software if it is released under a license certified by the OSI.

Open Source Software (OSS)

OSS is a piece of software released under a license certified by the Open Source Initiative. OSS licences comply with the four fundamental freedoms required by the Free Software Foundation for free software.

Operating system

An operating system is a set of programs that controls the internal functions of a computer needed for all operations and performs the basic housekeeping needed. The operating system manages functions such as the loading and execution of application programs and control of the memory, storage devices and peripherals. At the core of an operating system is a piece of software known as the kernel which communicates with other system programs and utilities to perform the various operating system functions.

Portable Document Format (PDF)

The PDF file format is developed by Adobe Systems Inc. and is widely used for the display and exchange of documents containing text and images.

Perl

Perl is a general-purpose computer programming language originally developed for text manipulation and now used for a wide range of tasks including system administration, web development, network programming and graphical user interface development.

PHP

PHP is a widely-used computer programming language that is especially suited for web development and can be embedded into HTML.

Python

Python is an object-oriented computer programming language that can be used for many kinds of software development including system administration, web development, network programming and graphical user interface development.

Red Hat Linux

This is a popular commercial distribution of the GNU/Linux operating system by Red Hat Inc.

Really Simple Syndication (RSS)

RSS is a form of web content syndication used by news websites and weblogs. Web content syndication refers to making available the updated contents of a website to other sites that have agreed to receive it. This enables the receiving website to display new and updated information quickly and effectively.

Wiki

A wiki is a type of collaborative software that allows users to add, remove and edit the contents of a website very quickly and easily, sometimes without the need for registration. A website built and maintained in this way is also known as a wiki.

About the Author

Nah Soo Hoe has been in the ICT industry for over 16 years and is experienced in networking protocols, internetworking and information security issues. He participates actively in the activities of Malaysian ICT organizations, in particular the Malaysian National Computer Confederation and the Association of the Computer and Multimedia Industry of Malaysia. He has been involved in numerous events and initiatives associated with these organizations and has represented both bodies in various government committees, working groups and task forces on subject matters such as the Internet, ICT security, IT standards and FOSS, at both national and international levels.

The author participates actively in local standardization activities being a member of several technical committees and working groups for IT standards in the country. He currently works as an independent consultant in the areas of FOSS deployment and information systems security.

He is the author of the UNDP-APDIP and IOSN FOSS e-primer on *Open Standards* and is a co-author of the *Linux Desktop User Guide,* also published by IOSN.

APDIP

The Asia-Pacific Development Information Programme (APDIP) is an initiative of the United Nations Development Programme (UNDP) that aims to promote the development and application of information and communication technologies for sustainable human development in the Asia-Pacific region. APDIP aims to meet its goals by focusing on three inter-related core areas: (i) policy development and dialogue; (ii) access; and (iii) content development and knowledge management.

APDIP collaborates with national governments, regional, international and multi-lateral development organizations, UN agencies, educational and research organizations, civil society groups, and the private sector in integrating ICTs in the development process. It does so by employing a dynamic mix of strategies – awareness raising, capacity building, technical assistance and advice, research and development, knowledge sharing and partnership building.

http://www.apdip.net

IOSN

The International Open Source Network (IOSN) is an initiative of APDIP and supported by the International Development Research Centre of Canada. IOSN is a Centre of Excellence for Free/Open Source Software (FOSS), Open Content and Open Standards in the Asia-Pacific region. It is a network with a small secretariat based at the UNDP Regional Centre in Bangkok and three centres of excellence – IOSN ASEAN+3, IOSN PIC (Pacific Island Countries), and IOSN South Asia, based in Manila, Suva and Chennai respectively.

IOSN provides policy and technical advice on FOSS to governments, civil society and the private sector. It produces FOSS awareness and training materials and distributes them under open content licenses. It also organizes awareness raising, training, research and networking initiatives to assist countries in developing a pool of human resources skilled in the use and development of FOSS. IOSN works primarily through its web portal http://www.iosn.net that is collectively managed by the FOSS community. The web portal serves as a clearinghouse and a platform for knowledge sharing and collaborations.

http://www.iosn.net

Breaking Barriers

The Potential of Free and Open Source Software for Sustainable Human Development

A Compilation of Case Studies from Across the World

This is a compilation of 14 case studies on the successful deployment of free and open source software (FOSS) in select projects from Africa, Asia-Pacific, Europe and Latin America. In each case study, the reasons for choosing to use FOSS together with the development, implementation and impact of the FOSS applications are discussed. The benefits obtained and challenges encountered as well as any valuable lessons learned are also highlighted. This book aims to provide policy makers and development practitioners with useful insights as to why FOSS may be more suitable than proprietary software for use in information and communications technology (ICT) development, especially in poorer economies. This book comes with a DVD of *The Codebreakers* – a 40-minute version of a programme first shown on BBC World.

International Open Source Network (IOSN)
Asia-Pacific Development
Information Programme
UNDP Regional Centre in Bangkok
3rd Floor, United Nations Service Building
Rajdamnern Nok Avenue
Bangkok 10200, Thailand
Tel: +66 2 288 1234
E-mail: info@iosn.net

IOSN ASEAN+3
National Telehealth Center
University of the Philippines Manila
Taft Avenue, Manila
Philippines 1000
Tel: 63 2 525 6501
E-mail: asean3@iosn.net

IOSN PIC (Pacific Island Countries)
The University of the South Pacific
Private Bag
Suva, Fiji
Tel: +67 9 323 1000
E-mail: pic@iosn.net

IOSN South Asia
Centre for Development of
Advanced Computing
Block-II, 6/13, Park Avenue
Keshava Perumal Puram
Chennai-600 028, India
Tel: +91 44 2461 0880
E-mail: southasia@iosn.net

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