

Training for Open Source: A Need Not A Luxury

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Abstract: Despite the fact that public sector's interest in open source is intensifying, and there is an increasing demand for skills related to Open Source applications, both from a user as well as from a developer point of view, the uptake in educational and vocational training programmes is not yet mainstream. The TRAIN-OS project presents answers to this challenge by providing access to F/OSS training materials, based upon an analysis of the needs of the trainers and trainees. The paper will present the results from the research and will provide insight into the information, knowledge and training needs from European trainers.

Keywords: Training, Open Source

1. 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.

A substantial amount of source code has been open since the 1980s. The collaborative model that is one of the central features of the OSS model gained momentum in the late 80s and early 90s. The term "open source software" started to come into general use in 1998. Recently, the development and use of OSS has reached significant proportions globally. The potential benefits and the level of maturity of the OSS model is recognized as a viable alternative, which will in many cases prove to be the preferred approach to software development and deployment. There is now a general acceptance of open source software such as Firefox and even Open Source such as Wikipedia, as viable options

1.1 The definition of F/OSS

In computing, free and open source software, also referred to as OSS, F/OSS, FOSS, or FLOSS (for Free/Libre/Open Source Software) is software which is liberally licensed to grant users the right to study, change, and improve its design through the availability of its source code. This approach has gained both momentum and acceptance as the potential benefits have been increasingly recognised by both individuals and educational players.

'F/OSS' is an inclusive term generally synonymous with both free software and open source software which describes similar development models, but with differing cultures and philosophies. 'Free software' focuses on the philosophical freedoms it gives to users and 'open source' focuses on the perceived strengths of its peer-to-peer development model. However many people relate to both aspects and so 'F/OSS' is a term that can be used without particular bias towards either camp.

Exhibit 1: Definition

A common definition has been developed by the Free Software Foundation Europe, which defines four freedoms regarding free software and is widely used since the 1980's¹. These four freedoms are:

1. The freedom to run the programme, for any purpose. Placing restrictions on the use of Free Software, such as time ("30 days trial period", "license expires January 1st, 2007"), purpose ("permission granted for research and non-commercial use") or geographic area ("must not be used in country X") makes a programme non-free.
 2. The freedom to study how the programme works, and adapt it to your needs. Access to the source code is a precondition for this. Placing legal or practical restrictions on the comprehension or modification of a programme, such as mandatory purchase of special licenses, signing of a Non-Disclosure-Agreement (NDA) or making the preferred human way of comprehending and editing a programme (and its "source code") inaccessible also makes it proprietary.
 3. The freedom to make and redistribute copies. If you are not allowed to give a programme to someone else, that makes a programme non-free. Redistributing copies can be done gratis or for a charge, if you choose to do so.
 4. The freedom to improve the programme, and release improvements. Access to the source code is a precondition for this. Not everyone is a programmer or a programmer equally good in all fields. This freedom allows those with the necessary skills to share them with those who do not possess them. Such modifications can be made gratis or for a charge. [1]
- These freedoms are rights, not obligations, although respecting these freedoms for society may at times oblige the individual. Any person can choose to not make use of them, but may also choose to make use of all of them.

1.2 F/OSS and the need for skilled professionals

The need for professionals competent in differing aspects of F/OSS has increased significantly in the recent years. In other words there is a shortage in skilled workforce in the F/OSS area. This is a result of the success of F/OSS especially in the commercial market in the recent years

An example is the demand for Linux professionals. One of the fastest emerging operating systems in the world, in 2005 Linux was predicted to grow at a rate of 27 percent in next three years. In India, this growth was expected to be almost 80 percent in the country, in the next three to four years. Matching this development is the need for professionals who are well-qualified and experienced to take on different positions in this space, ranging from Linux administrators to principal engineers, browser/Web server developers, senior software engineers for Linux kernel programming, drivers and embedded Linux, etc. [2]

The demand arises not only in technical aspects but also in non-technical aspects (legal issues, business model, organisation, etc.) of F/OSS. In other words such curricula should be developed both as technical programs and as non-technical programs. Educational institutions should develop and implement curricula addressing this specific need. This includes curricula to be developed by institutions in the formal education system, curricula to be developed by professional training organizations, and curricula delivered in settings for life-long learning.

“Most of the people who get any form of computer training get it on proprietary software. That's why they lean on it. That's what they know, what they talk about, what they advocate. There's a need for investing in training for open source software”
James Lunghabo, general manager of the East African Centre for Open Source Software

However, despite the clear benefits, which F/OSS can produce, the majority of the educational institutions are still not considering the implementation of F/OSS applications or solutions. One of the main reasons is the lack of knowledge about F/OSS. Even for those educational institutions that do implement F/OSS, it is very common for the delivery of curricula to make use almost exclusively of proprietary software, and F/OSS is rarely mentioned as a topic of study. This is a weakness of the traditional curricula. Lack of basic knowledge on F/OSS is a concern for the graduates of these programs, both from a professional point of view and from a cultural point of view. That means that educational institutions should adopt their curricula to include components to give basic knowledge on F/OSS.

Aside from FOSS desktop applications for general use, there is a lot of Free/Open Source educational software that can be used for teaching specific subjects or courses in schools, colleges and universities, but the development of contents for training on the use of these and other F/OSS is less extended.

This is even true for training materials for the software developers themselves, an example is the situation with respect to secure application design and development. A study conducted by PORT [2] has shown that the majority of the open source developers lack common knowledge on these issues, but there is a lack of good training material that is easily accessible to open source developers.

Another example comes from research conducted by Forrester [3] on the adoption of Linux in US and Canadian businesses. When asked about training, they indicated that training for Linux was more robust, more costly. The investments companies made in training for their IT employees were significantly higher for Linux than Windows, on average, 15% more expensive. When asked why, almost all 14 organizations cited the fact that training materials for Linux were less available than for Windows.

This shows that one of the barriers to the integration of F/OSS contents into the educational and training curricula is the fact that, although many training materials have been developed, they are dispersed, and accessing them in an easy way is difficult. Trainers have enormous problems finding the right training materials for a specific learning situation.

TRAIN-OS provides an answer to this need by providing both trainers and teachers with the skills, competences and knowledge needed in order to offer formal and non-formal training within F/OSS field and related issues, to those participants in the learning process.

2. Objectives

Consequently the TRAIN-OS project mission is to ensure that F/OSS priority training needs are met in various educational institutions across the EU. This means maintaining an efficient and effective online repository of F/OSS training material and facilitating the transfer of already existing F/OSS training material to other institutions. Within the context of this mission, the vision for the TRAIN-OS project is to identify F/OSS training requirements and provide an efficient repository of existing F/OSS training material. The following tasks specify the framework by which this vision is being realised:

GOAL 1: Establish a logical, flexible, and responsive OSS training questionnaire to quickly translate field training and education requirements into easily accessible, usable, and effective training materials.

GOAL 2: Implement an efficient, open, and consistent process for categorising OSS training materials and organise them accordingly in an online repository.

The project helps improve the level of quality and innovation regarding the vocational training linked somehow to F/OSS. It will provide trainers and teachers, as well as the institutions and organisations involved in vocational training, with a powerful tool that

allows them to access available training material related to F/OSS and choose material that is most relevant to the environment and learning situation. This should improve the training quality that is currently being given in this field. The knowledge base will provide an innovative offer of F/OSS training materials, and in the ICT domain where there is a growing demand for training materials adapted towards every learning situation. TRAIN-OS will respond to these needs by providing trainers and teachers with a powerful tool to facilitate the access and use of F/OSS training material and other related issues. It will also offer relevant support services to improve the quality of training they are giving and ameliorate their own skills and qualifications.

3. Methodology

Research related to obtaining information on educational needs normally combines several of a series of research techniques:

- Documentary investigation, using archives, databases and recent studies that provide information on the organisation in question and on the socio-economic environment in which it deals, and also using the most up-to-date publications and conclusions.
- Questionnaires or standardised forms are relatively inexpensive and above all quantifiable. They can be given to a large number of persons who are able to express themselves without fear.
- In-depth interviews with trainers (key informants) to provide extensive, dense and contextualised information, which will avoid misunderstandings and errors in the interpretation of secondary data, and may reveal causes of and solutions to problems.
- Discussion groups result in a synthesis of different points of views and provide the investigator with many ideas, although there is a risk of group dynamics, which may counteract the validity of data obtained.

The methodology to perform the research in the TRAIN-OS project involves the usage of multiple techniques to collect objective information regarding the educational needs on F/OSS.

The first step has been a documentary investigation in TRAIN-OS, which includes an extensive research on the available educational materials on Free Software and Open Standards. This research is partly done by requesting the inputs of different communities. The goal of such an overview is not only to map the existing educational materials in this area but also to identify those materials that can be integrated in the TRAIN-OS platform. This kind of approach also requires that the training materials are classified in groups and categories. In this way, the classification would allow for a more systematic and clear presentation of the educational materials and will therefore make the selection of materials needed easier, according to the specific needs of the trainee or trainer.

This second research step is requesting the inputs of different target groups via a questionnaire and interview. The goal of such an approach is not only to map the existing educational material in this area but also to identify those materials that can be integrated in the TRAIN-OS platform. Therefore, an evaluation of the quality of these materials will also be performed when possible. Furthermore, an overview of all organisations, communities and platforms that are related with the production of these materials will be prepared. A follow-up interview will permit the identification of which parties can be interested in the TRAIN-OS materials as well as in participating in the uptake of collated materials.

4. Developments

The classification which the TRAIN-OS project decided to use is the following one:

1.1 Introduction to Free Software, Open Standards and OSS.

- 1.2 Basic and general issues about Free Software, Open Standards and OSS but not centred at any specific application. Basic GNU/Linux Operating System. Note that this area includes multiple applications such as kernels, plain text editors, command shells, the X-Window system, GUI desktops, system configuration tools, developing tools, and many others.
- 1.3 Office tools, including: formatted text editors and readers, spreadsheets, presentations, E-mail clients, personal information management, project management and others.
- 1.4 Educational Software. Includes applications that specifically designed for teaching different subjects at different educational levels.
- 1.5 Enterprise Software Applications, including CMS, CRM, ERP, accounting, groupware and collaboration, mail servers, DB servers and others.
- 1.6 Multimedia Applications, including image manipulation, audio mixing, video capture, editing and playback applications.
- 1.7 Others. This category will be used for those applications which do not fit the previous six areas but which are considered interesting for the knowledge base

The categories listed above were defined by the SELF Project. The TRAIN-OS consortium has decided to continue building on this classification structure since it covers the majority of the aspects, which the project aims at. In this way it will be achieved a

synergy between these two European projects and their outputs will be complementary to each other. The TRAIN-OS project will add an additional perspective to the training needs related to education on Free and Open Source software by interviewing and performing surveys with companies, higher educational institutions and educators on F/OSS while working within the classifications of the SELF project. On the other hand, the SELF project itself provides a good ground of 2 year work on

the topic related to the education on Free Software and Open Standards which would allow the TRAIN-OS project to build upon and create a further basis to respond best to the needs of the trainees.

Using the basic endpoint of detecting training needs in educational organisation, the following objectives have been sought in the questionnaire:

- To identify know-how, competencies and personal skills of organisations with regards to OSS training.
- To assess educational attitudes towards training related to OSS.
- To analyse the available educational materials on Free Software and Open Standards.
- To analyse the organisations, communities and platforms that are directly or indirectly related with the production of such materials.
- To assess the availability of training offers and material available for inclusion in the TRAIN-OS knowledge platform.

A quantitative technique is used, in the form of a structured questionnaire with mainly closed-ended questions (selection of a series of categories that are assigned in advanced),

Exhibit 2: SELF project

SELF is an international project aiming to provide a platform for the collaborative sharing and creation of free educational and training materials on Free Software and Open Standards. The SELF Platform is

1. A repository with free educational and training materials on [Free Software](#) and [Open Standards](#)
2. An environment for the collaborative creation of new [materials](#)

Inspired by Wikipedia, the SELF Platform provides the materials in different languages and forms. The SELF Platform is also an instrument for evaluation, adaptation, creation and translation of these materials. Most importantly, the SELF Platform is a tool to unite community and professional efforts for public benefit.

although some open-ended questions were included in order not to limit information that was contributed. The option of a personal interview is chosen to implement the questionnaire where possible, arranging a prior appointment with each subject.

The interview's main target group are representatives of educational trainers within educational institutions that offer Open Source training, although the business sector and existing developer's communities will not be excluded, as they can provide valuable information. Participants are to be selected according to their involvement in information technology training, preferably open source trainers/teachers.

5. Results

The research and development taking place in the project provides an answer to the main upfront problems when designing and implementing a F/OSS curriculum: there is not a homogeneous and standardized way to describe the training contents; the materials are scattered as there is not just one place to access to the main part of the available materials, and, last but not least, there is no solution to guide trainers through the big amount of available materials, providing knowledge and support to choose the most suitable materials for every learning situation.

Initial results obtained in the test phase of the questionnaires in the region of Extremadura show the enormous interest generated by the training community in the field of Open Source. Trainers and training organisations are showing significant support and willingness to share their F/OSS training materials through the TRAIN-OS knowledge base. The roll out of the questionnaires in the region are being realised with three different type of training institutions and organisations:

1. Training for entrepreneurs and SMEs, recollection the materials related to F/OSS with mainly a business orientation, examples are materials related to business management, or specific enterprise applications, such as ERP and CRM systems.
2. Training materials for non-experienced ICT users, recollection of materials related to digital literacy and the use of desktop applications, such as OpenOffice, Firefox, etc.
3. Training materials for advanced ICT users and developers, materials related to programming in Open Source.
4. Train the trainer materials, materials for trainers on how to provide training and learning for F/OSS.

The experience in Extremadura shows that the major demand for materials is to be found in the first two groups, and this is where the most training materials can be found. At the same time there is a clear demand in the region for materials for advanced ICT users and developers, although the demand here is more dispersed, as the amount of themes demanded is significantly larger than for the other groups.

The results obtained with the first set of questionnaires analysed from the different countries provides a similar view, in particular the most demanded ones are the training materials related to:

1. Operating systems,
2. Database systems,
3. Office products,
4. Internet applications and web applications.

Although almost all respondents stated that they would be interested in accessing these type of materials, a subset of these indicated that at the same time they would not be willing to share their materials with others. A paradoxical situation, which can be traced back somehow to the fact that the subset of respondents not willing to share their materials came largely from the private sector and more specifically of organisations whose business is mainly based on providing training.

6. Conclusions

Over the past 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. There is now a general acceptance of open source software such as Firefox and even Open Source such as Wikipedia, as viable options.

Despite the clear benefits that F/OSS can produce, the majority of the educational institutions are still not considering the implementation of F/OSS applications or solutions. One of the main reasons is the lack of knowledge about F/OSS. Even for those educational institutions that do implement F/OSS, it is very common for the delivery of curricula to make use almost exclusively of proprietary software, and F/OSS is rarely mentioned as a topic of study.

Another one of the barriers to the integration of F/OSS contents into the educational and training curricula is the fact that, although many training materials have been developed, they are dispersed, and accessing them in an easy way is difficult. Trainers have enormous problems in finding the right training materials for a specific learning situation.

TRAIN-OS provides an answer to this need by providing both trainers and teachers with the skills, competences and knowledge needed in order to offer formal and non-formal training within F/OSS field and related issues, to those participants in the learning process. A documentary research has been complemented with fieldwork through interviews and questionnaires with trainers and training institutions, and experts on F/OSS. The documentary research has led to a classification scheme for the training materials to be identified in the fieldwork. Preliminary test results show that the most demanded training materials can be found in the field of business management and for non-experienced ICT users.

The work is ongoing and will lead to the development of a knowledge base, which will describe in a homogeneous way, and using the classification scheme identified in the first phase, all the training materials selected. This knowledge base will provide trainers with a place where they can not only retrieve F/OSS based training materials, but where they can also upload and thus share the materials they have developed. And although training in FOSS is not normally a part of formal education or training, TRAIN-OS provides support for educational and training institutions, so that they can integrate this service for educational and training institutions in their professional trainings or adult education programmes.

References

- [1] This definition has also been used by the EU funded project SELF and was first documented in the GNU's Bulletin, vol. 1, no. 1, published January 1986 and used by the SELF project. I will also provide the basis for the TRAIN-OS project. For full definition: <http://www.gnu.org/bulletins/bull1.txt>
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