The LULA Project by the Telefónica Chair of the University of Extremadura

LULA Linux Distribution for Latin American Universities

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Abstract—**Many universities use free software applications as tools for theoretical teaching and for resolving practical exercises. In many cases they are software package,s in the development of which many users collaborate, in constant evolution and adaptable to different teaching needs. In Latin American universities there is a growing tendency to use it and there are communities highly committed to its development.**

As an attempt to compile those applications most used in Latin American universities, the LULA Project (Linux para Universidades LAtinomericanas) is about favouring the integration of this software and the exchange of educational material amongst universities. It is a non-profit initiative coordinated by the Telefónica Chair of the University of Extremadura, in which the integrating universities of the Virtual Latin American Campus (CAVILA) collaborate.

Keywords-component; Educational software; LINUX Distribution; LULA Project.

I. INTRODUCTION

The Junta of Extremadura (the regional government) was a pioneer in committing to open source software in Spain and, since then has coordinated different initiatives, at both regional and national levels. From the Junta of Extremadura, despite there not being any policy or specific strategy for the implementation of open software sources, it promotes and uses it in many institutional servers. In recent years it has been observed that open source software is being incorporated in different ambits of the Uex. From software used for practice, teaching platforms or web servers and e-mailing. Within the University of Extremadura, the Telefónica Chair of the University of Extremadura (UEx) [1], aimed at teaching and research in Communication and Information Technologies in Universities, is coordinating the LULA project for the creation of a Linux distribution oriented towards the educational ambit.

The idea of this project emerged from the cooperation of the Telefónica Chair of the UEx with AULA [2], an association of Latin American universities (the UEx among them) founded in 2007 and aimed at coordinating the creation of an ambit of higher education in which cooperation and the exchange of knowledge and experiences amongst public universities and research groups Hill be encouraged.

II. THE VIRTUAL LATIN AMERICAN CAMPUS AS THE BASIS OF THE LULA PROJECT

The Virtual Latin American Campus (CAVILA) is the main initiative of the Association of Latin American Universities (AULA) to boost teaching, research, and Latin American identity by means of cultural diffusion. In this virtual space, the different universities of AULA offer graduate and postgraduate subjects. It is a project which in the last two years has been financed by the AECI (Spanish Agency of International Cooperation).

The Action of the Virtual Latin American Campus aims, in its first phase, at the formation of a joint Teaching Organisation Plan, which is the basic tenet for the overall training of the student, with professional and social relevance, by means of professional crosscutting values training, adapted to the specific problems of their environment. The target group is, initially, the 500,000 students that comprise the Campus of AULA Universities which potentially and directly can benefit more immediately, although an ambitious offer of life-long teaching also exists, for workers and people who, for reasons of distance or lack of sufficient economic resources cannot have access to teaching requiring attendance. In this sense, millions of Spanish-speaking emigrants are being contemplated for whom this could be a great opportunity; women and other isolated indigenous groups could access business training, training or specific retraining courses for employees from their places of residence without the need to travel.

The overall aim of AULA is the creation of a Euro Latin American Virtual Campus of "innovation with social relevance", with the aim of training committed "workers of knowledge", as citizens, with human rights, peace and government, along with the solution of regional problems of the surrounding area and business innovation. Thus, it deals with the construction of of virtual space of higher education, with the necessary teaching and research quality, which is possible to achieve sharing the scientific and technical excellence of each university and with the corresponding professional and social relevance.

As for the specific objectives, it should be pointed out that with this virtuality it is hoped that borders will be overcome and the integration of a Euro Latin American university space

will be achieved, with multiple human and economic synergies.

Taking these objectives of integration, training, innovation and social improvements as principles, AULA Universities have decided to collaborate in the compilation for the diffusion of open source educational software which is being used in these universities, as an integrating and exportable model for other universities.

III. Components of the LULA project

The LULA initiative is being coordinated by the Telefónica Chair of the university of Extremadura, with the help of those in charge of education and technology at the seven universities which are currently members of CAVILA: Federal University of Santa María (Brazil), University of Guadalajara (Mexico), the National University of Entre Rios (Argentina), the Nacional University of La Plata (Argentina), the University of Porto (Portugal) and the University of Santiago of Chile (Chile). The initial diffusion of the project was to those in charge of these universities, but the news extended in a question of days over the internet to such an extent that other universities and user groups have joined the initiative.

IV. Development of the linux distribution

To create the Linux distribution, teachers of the participant universities, and those which have later joined the project, indicate the educational applications based on open source software which they use daily in theoretical and practical teaching classes. The Telefónica Chair of the University of Extremadura compiles these software packages and studies their suitability and compatibility in order to include them in the LULA distribution.

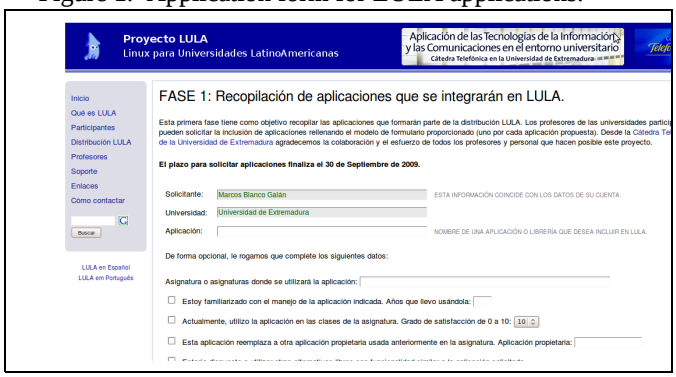
Since May 2009 the official website http://lula.unex.es is operational with the aim of facilitating communication amongst teachers during the different stages of the project, informing on its present state and offering support services and consultancy to the future users of LULA. This website will also serve as a centre for downloads where any user who desires to may obtain and use a copy of the distribution free of charge, without technical or legal restrictions.

The project has been planned in three phases. Initially, contributions and suggestions are being gathered in relation with the set of applications which will form part of the distribution. The following step consists of creating a preliminary version which can be tested by the teachers who collaborated in the previous phase. Finally, the definitive stable version will be created which will be distributed amongst Universities of CLAVILA and published on the web-site. Three phases are outlined below along with the predicted time span:

Phase 1: Compilation of applications

In this first phase, the participant universities indicate the educational applications based on free software they wish to incorporate in the distribution. An application request service has been set up on the website using web forms as shown in figure 1. Those teachers who wish to apply for the inclusion of applications should previously have a user account. The user register is free of charge and is carried out merely for statistical reasons, in order to know the level of participation and identify the requested applications better.

Figure 1. Application form for LULA applications.



The LULA project is an open project not exclusively limited to the ambit of CLAVILA universities. Any registered user belonging to another university, group of users or private user may suggest the inclusion of additional applications. For this first version of LULA, the application selection process gives greater priority to those applications requested by teachers belonging to CLAVILA universities when necessary.

On compiling applications, the Telefónica Chair will proceed to study and evaluate the suitability and compatibility of requested applications. For each application indicated, the technician will revise licences of use and will carry out installation, functioning tests and a study of their compatibility with the other applications that make up the distribution. The updated list of applications can be consulted in one of the sections of the LULA site (http://lula.unex.es/index.php?seccion=lula). The development of this phase is programmed from 1 June to 30 September 2009.

Phase 2: Creation of trial versions

The aim of the second phase is the development of one or several trial versions of the distribution, commonly termed 'beta' versions. During this phase, the applications indicated by teachers will continue to be evaluated and will give rise to the preparation of specific repositories of the distribution.

The beta versions generated will allow each teacher to see whether the distribution really adjusts to their needs in accordance with the requested applications, or whether, some sort of modification is required before the final version is published. It will also enable any user to try out any one of the educational packages and those of general purpose and check there are no errors or incompatibilities.

Many of the applications included in LULA have binary packages with ready-to-use programmes; however, some requested packages lack these packaged versions, making manual packaging necessary. The integration of LULA specific software in the package management system allows users to easily install and uninstall applications in the system,

centralised and with no need to worry about the dependencies that each application requires. The package format *.deb* and the package management system *dpkg* have been opted for in the development of LULA, both of which are characteristics of the Debian GNU/Linux distribution [3].

The launching of the first beta version of LULA is forecasted for 30 October 2009.

Phase 3: Creation of the final version

The aim of the third and last phase is to obtain the final version of LULA, stable, and completely functional. As teachers try out the trial versions and inform on their experiences, the technical team will proceed to carry out any necessary modifications. The causes for change could be related to the repair of errors or *bugs*, the substitution of applications, updating of versions and inclusion of new libraries, dependencies, or preconfigurations. The incidences derived from the use of the distribution's beta versions can be reported by users via the personalised online support service available at the LULA website, or at the email address lula@unex.es. The launching of the final version of LULA, namely, LULA 2009, is forecasted for 15 December 2009.

V. Why create a distribution?

From a technical point of view, all the Linux distribution is made up of a common element, the Linux kernel, surrounded by libraries and applications in the user's space which provides complete functionality to the operative system. One of the main characteristics which differentiates one distribution from another is precisely, the set of applications or packages which comprise it. Originally, each distribution includes a more or less predefined set of packages to satisfy the needs of a particular group of users, giving rise to classification according to purpose.

The general purpose distributions, for example, are usually aimed at home users and include applications of frequent use to carry out basic routine tasks, such as editing documents, surfing the web, watching films, listening to music, downloading contents or sending emails. On the other hand, there is a group of distributions created with specific purposes focussing on concrete aspects such as security, education, entertainment or optimum benefit of the machines resources. The fact of having a wide range of options at our disposal does not guarantee finding the ideal solution for a particular scenario. Moreover, on their being such variety often the task of choosing the best option is made more difficult.

General purpose distributions are very attractive from the point of view that they provide a wide range of packages, the handling of which is relatively simple for home users. What is more, there are normally a considerable number of users or businesses that back and support them. However, a gap may still exist made up of a group of applications not contained in the original distribution and which are required. An initial attempt to solve this consists in integrating the appropriate personal technician in the community of developers of the official distribution, in such a way that it means covering the needs for our concrete scenario from within. Although this is a viable option, the process could prove to be too complex and, more importantly, exceed the deadlines set for the project.

These are just some of the main reasons which raise interest in and the need to create a personalised Linux distribution based on a general purpose distribution. In addition to providing extra required packages, similarly, it would be possible to modify those which are considered to be unnecessary. Many organisations, businesses and user communities find an adequate solution in personalised Linux distributions to cover their needs and objectives. Given the characteristics of the LULA project, it seems that adopting this solution is a suitable option and at the same time justified. However, awareness exists that from nearly any Linux distribution a user with an average working-knowledge of Linux could install the packages that make up LULA but, with the Telefónica Chair having done this previous compilation, selection, running and compatibility tests, this time is saved and enables less experienced users to try out this software.

VI. General characteristics of the LULA distribution

In this section some of the most relevant general characteristics and technical aspects are presented of the Linux LULA 2009 distribution. Given that the project is presently in full development, the possibility of making small changes during the third phase is not ruled out.

- *Base system Ubuntu 9.04 'Jaunty Jackalope' (x86) updated until the launch date of LULA.* In the remasterization of Ubuntu [4] services and applications unrelated to the specific purpose of LULA installed by default have been eliminated in an attempt to reduce the final size of the distribution and improve the overall performance of the system.
- *Execution in Live mode with the possibility of permanent installation in the hard disc.* Currently, the development of an installer called LULA-Installer is being developed, however, its inclusion in LULA 2009 has not been confirmed as yet. The second candidate for installer is Ubiquity [5].
- *LULA specific software packaging*. Manual packaging of applications and libraries in Debian format is generally carried out when the software requested by teachers is not available in the base distribution, or the software version is not that required.
- *Creation of own repositories.* The manually packaged applications will go on to form part of its own software repository kept in the infrastructure of the Telefónica Chair within the University of Extremadura.
- *Java Virtual Machine OpenJDK installed by defect.* This is a free solution which has undergone rigorous compatibility tests, guaranteeing the correct running of the Java applications [6].
- *Wine integration*. Not all the applications that a LULA user could need possess a version for Linux or sufficiently powerful alternatives to replace proprietary

solutions in a given moment. Wine will allow an execution of a great number of native applications of Windows operative systems, in this way favouring the gradual migration from said proprietary platform.

- *Desktop virtualization with VirtualBox*. This software allows operative systems to be installed in virtual machines which can be easily administered.
- *Incorporation of new options in the menu to facilitate the control of certain services.*
- *Visual aspect of LULA. Desktop subjects and icons have been created from original material and resources available on the net under free licences.*
- *Universal and Free technical support service*.

VII. Support and advice service/helpline for lula users

As element of added value, the Telefónica Chair of the University of Extremadura will offer a support and advice service for LULA users free of charge. The catchment of the service is considerable, given that it would mean approximately half a million pupils that presently make up the universities of CAVILA, plus all those users who wish to use the distribution.

The support and advice service will be offered through a section of the site created specifically for this purpose. Registered users will be able to send all their doubts and queries related to the installation of the distribution and its software packages via web forms. Each query, once resolved by the technician assigned, will become part of the publically accessible data base. The queries resolved will be categorised to help users with silmilar problems find solutions.

VIII. present state of the project

The Project is developing as foreseen following the content and planning indicated in section IV. The second phase is currently being started. After the call on behalf of the Telefónica Chair to the rectors and other academics in charge of CAVILA universities for collaboration in diffusing the initiative, to date the LULA site has 140 registered users and almost a hundred requested applications during the first phase to be included in the distribution. The number of IP addresses that have visited the site is more than ten thousand.

It should be stressed that, since the beginning of the project, a spontaneous diffusion has been produced through news sites, forums and blogs principally related to Free Software. This has brought about interest in collaborating at other Latin American universities, groups of users and private users. In fact, more than half of registered users identify themselves as being from universities that do not belong to CAVILA.

IX. some statistical data of collaborations

A total of 95 applications were requested in the first phase, amongst which predominate programming tools, mathematical applications, statistical analysis applications and general purpose applications related to office applications, multimedia and communications. Below, some specific/concrete figures are shown which can provide us with an approximation of the type of application required by teaching staff:

- General purpose applications: 6,3%
- Programming tools: 43,2%
- Mathematics and statistical analysis: 21%
- Educational tools: 7,4%
- Servers: 5,3%
- Other software tools: 14,8%

The nature of the tools requested (listed in figure 2) and the additional information supplied by the teaching staff during the first phase, indicates that a large majority are mainly directed to the teaching and practice of subjects related with programming, ICTs and mathematics.

Figure 2. List of applications requested by users.

Aplicaciones específicas de LULA SOLICITAR UNA APLICACIÓN QUE NO APARECE EN LA LISTA

Aplicación / Librería	*Versión*	*Estado*	*Descripción*
KDevelop	?	Confirmado	Entorno de desarrollo integrado para C/C++
Eclipse	?	Confirmado	Entorno de desarrollo integrado. Preparado por defecto para C/C++ y Java EE
Code::Blocks	?	Confirmado	Entorno de desarrollo integrado para C/C++.
Anjuta	?	Confirmado	Entorno de desarrollo integrado para C/C++.
NetBeans	?	Confirmado	Entorno de desarrollo integrado para aplicaciones Java.
MonoDevelop	?	Confirmado	Entorno de desarrollo integrado para C# y otros lenguajes .NET.
GCC / G++	?	Confirmado	Compiladores de GNU para los lenguajes C y C++ respectivamente.
Protégé	?	Confirmado	Editor de ontologías y framework para bases de conocimiento.
Freemind	?	Confirmado	Herramienta para crear mapas conceptuales.
TkGate	?	Confirmado	Diseño y simulación de cirtuitos digitales.
GNU Octave	?	Confirmado	Aplicación orientada al análisis numérico.
QtOctave	?	Confirmado	Entorno gráfico para GNU Octave.
Python	?	Confirmado	Lenguaje de Programación Python.
Python3	?	En estudio	Entorno de programación y ejecución para una versión extendida de Python

According to collected data, 82% of users affirm to be familiar with the use of the proportioned free applications, and 66% currently use free applications in their teaching. Another interesting piece of information is the 41% of users who state that they replace some sort of private software for free solutions. The main applications that are replaced correspond to those belonging to Microsoft (Microsoft Visual Studio .NET, Microsoft Office y Microsoft IIS).

X. conclusions

From the Telefónica Chair of the University of Extremadura, we understand that activities and initiatives that are developed should result in a direct reward for society. In this sense, we relieve that the LULA Project could be of great interest to Latin American university communities in several aspects:

- Students of these universities will have in a single DVD all the compiled software they need for their teaching practice. It is actually relatively easy for a new user of Linux to download and install different educational packages that they may need in their subjects. However, with LULA, as well as saving installation time, they will not need to identify each application one by one and try them out to see if they

work correctly, as they will be already installed and ready to use. On the other hand, it is also possible that a percentage of the students and teachers may never have used Linux. In this sense, the LULA Project tries to encourage and facilitate the first encounters with this type of software.

- As for teachers, the fact of knowing what applied education software alternatives for teachers exist could be advantageous and enriching. On compiling all this software in a single distribution, teachers have the opportunity to compare these packages with those they normally use in their teaching. It is hoped that in subsequent versions of LULA work groups will be formed for the exchange of educational material amongst universities.
- Universities which opt for the distribution could benefit from savings in operative system licences and proprietary applications. This philosophy is already being successfully applied in universities and administrations in several countries.

It is still early days to evaluate the results and repercussions of the Project; however, the involvement on the part of teaching staff is good and requests to collaborate are still being received to date. After the first experience, it is foreseen that in 2010 new services and resources in the LULA portal will be incorporated where universities and groups of users of applications or types of specific applications participate in the exchange of material, guides,and experiences, enriching their knowledge and , consequently, of future versions of LULA- For the next version of the distribution the setting up of the most common resources of collaboration in communities of free open code software, such as wikis, forges, mailing lists and, follow-up of task lists.

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