OPEN SOURCE SOFTWARE IMPLEMENTATION UNDER THE CONDITIONS OF THE FACULTY OF AERONAUTICS

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This article focuses on the possibility of leveraging open source software under the conditions at the Faculty of Aeronautics. It presents a standard solution of deploying such solutions based on open source software at the Department of aerodynamics and simulations that can be used in other organizations.

1 INTRODUCTION

In the world of information technology, we often encounter with frequent discussions on the scope for raising and applying open source software for teaching and administration at the universities and in the public administration as an opportunity to avoid the illegal use of commercial programs. By deploying open source software, a university can save substantial resources, enhance security and stability of operation of computer equipment.

2 OPEN SOURCE SOFTWARE AT THE FACULTY OF AERONAUTICS

The open source software are also considered applications which offer the users of license right to run the program for any purpose, improved and adapt it to their needs and again redistribute copies by their free will.

Using Open Source Software for the Faculty of Aeronautics (FA) can be divided into three separate areas that closely follow each other: First, the area of deployment of "critical" applications necessary for the presentation of the faculty as Education and information web portal of the Faculty. The second area is the one of administrative communication at the Faculty. This is particularly the deployment of office software and area of the operating systems. The third area is the area of deployment of open source software in the teaching process. It's all about creating e-learning portal at LF, based on a Moodle LMS and solutions to shortage of modern computer technology for prepare of students and promotion of electronic education at LF.

In each area, we try to use open source software in order to save as much money from the faculty. Similarly, we try to exploit the potential of our students who use our skills and knowledge to help us to fulfil the objective. In the following,   a few projects are listed that   in this year have reached the stage of testing or deployment into full operation. They were designed in collaboration with our students. Thanks to their creativity, ingenuity and knowledge, we can also realize these projects.

2.1 Content management system at the FA

Content management system (CMS) is a system for creating, editing and storing of Internet content in a dynamic form that makes it easy to work with a website. Purpose of CMS system is thus clearly manage content types and enable acces for more parties to the same material, which they can edit, modify or archive together. This greatly facilitates the communication among users. One advantage of many CMS systems is in the automation of business processes or "workflow". Initial deployment of content management systems have been previously only for the personal needs of teachers in the Department of aerodynamics and simulations (DAaS) to manage communications with students. During this initial test, we have discovered distinct advantages of CMS. As a result, since 2008 we started a massive deployment of CMS systems, especially Drupal (it has enough support to communities and contains a large number of plugins that can be easily extended) system as a tool for web content management of department website as an integrated part of the education and information portal Faculty of Aeronautics. The inevitable result of this effort was to redesign and newly design the web information portal of the FA.

Information portal of the FA

All Slovak colleges and universities are now confronted with the need to publish and update the information and documents to their own information portals. Faculty of Aeronautics uses a static type of websites with content managed by the administrator. He also takes care of the entire system. Over time we came to the conclusion that the old system in use is no longer sufficient of need for Faculty and therefore, based on the experience of others universities, we have decided to support a change in the structure of information system services and start using the CMS systems to administrate Web content. From new information portal the Faculty of Aeronautics expected well-resolved content management, categorization of content, user management, user access to the site, and other specific requirements. It is important defined to each user the strict rules for which it is entitled to interfere in the activities of other users and do not impair the operation of an information system. Every department of the faculty must be able to edit and publish their own content in public or private mode. In term of the contents, it is closely related requirement to divide pages to sections providing information about faculties, departments, for applicants, students and graduates, of science and presentation of faculty. The specific requirements include the development of electronic commerce for the sale of publications. The resulting implementation of the portal you can at Fig. 1.

Fig. 1 Information portal of FA

The resulting information portal, based on Drupal CMS, fulfils the basic functions required in a modern portals or web sites. Thanks to modern technology the product is comparable with similar solutions of other colleges or universities.

2.2 LMS Moodle at FA

System Moodle at Faculty of Aeronautics is used in a production environment since July 2008 for the purposes of the Department of Air Technical Training and of the Department of aerodynamics and simulations. In the present the system actively used almost every student of the faculty. Under a voluntary activity, 36 teachers used this system. In the system there are more than 2,721,497 records. Currently the system is integrated into the Moodle Faculty Learning and Information Portal Faculty of Aeronautics. This popular system serves as a useful tool to support of education. With its capabilities, it allows you to create interactive courses where students are able to draw information and creates a space for self-study too. A huge benefit of this is that it can serve as a tool for fast and efficient testing of students.

Full deployment of Moodle is currently blocked by legislation limitation the quality management system at TU called. QMS TUKE. Resulting from the registry administration and records schedule,   Technical university has responsibility for archiving documents such as written work and tests students (intermediate, final assessment) for one year. System Moodle, although to some extent, allows the export of tests, interim and final evaluations in other formats, but these are not very appropriate, especially with regard to their contents and recovery. Not given   are   the   time   demanded,   complexity   of recovery, access rights, and overall efficiency.

That's why we tried to find appropriate solutions and an export document format to eliminate this inefficiency. Creation and export of documents containing completely tests with questions and answers of student in Moodle system is not possible now. Our solution now allows for archived, in PDF format, all the tests for each student or the whole group, grader report of course and user report for each student individually. All documents are created with the document headers, which is a mandatory part of

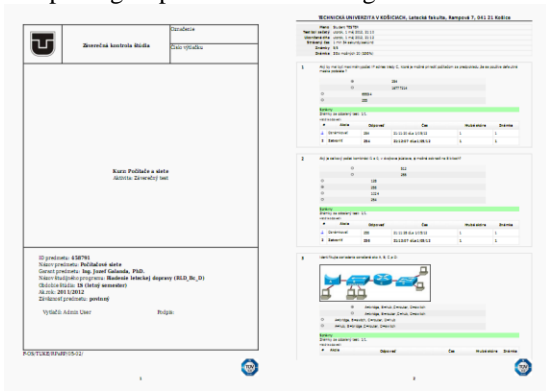each archived document and it is generate, after completing a special form. See Fig. 2.

Fig. 2 Exported document

By combining form and statement of activities - tests, trademark statement and statement of the user we are created monolithic document that meets the requirements of current legislation for archiving documents, and thus fulfilling our goal.

2.3 Thin client technology at FA

Frequently problems of schools or other organizations that do not have enough funds is keeping their computing devices on the required level. The total cost is counted as costs associated with their operation, maintenance and management. A possible solution is terminal network technology based on thin clients. The advantage of this solution is that the client computers are connected to the server, where are running all the calculations, booting the operating system, running applications and etc. The costs are reduced by using so-called thin clients and a powerful server, instead of more expensive powerful computers. Centralized server, which offers a variety of client software simplifies management efforts. It is not necessary to configure each computer, installing software and etc. Just enough to perform all these tasks on central servers.

Terminal solutions are based on Windows and Linux. Selecting the appropriate operating system is a complex process. It is necessary to take into consideration various aspects such as license, usability, user friendliness, server management and price. A practical example is the use of thin clients at the Department of Aerodynamics and simulations (DAS), where they are used for teaching all computers permanently. These classrooms are equipped with, at present, already outdated computers on a performance level on Intel Pentium II with up to 196 megabytes of RAM. One classroom has computers on performance level Pentium IV with 128 to 256 megabytes of RAM. One computer responds to current trends in performance by Intel PCore2/Quad with a storage capacity of 4 gigabytes Together these computers (about 40 computers) with support for PXE boot (Preboot Execution Environment), allows booting from the network. As can be seen, computers no longer meeting the current requirements on modern software. Therefore, we looking for a new way to use this outdated technology.

Based on the primary analysis of the state to PC on DAS, we focused to a solution that would not involve additional costs to hardware and software. Finally, we decided to deal with Skolelinux/Debian Edu, which does not increase the cost to implement, and complete implementation was is only possible with yourself. Skolelinux/Debian Edu comes with a standard architecture that makes it very easy to install and maintain a university-wide solutions. Many services and a large number of software is pre-installed, configured and ready to use. The Skolelinux network computers may play a role of the master server, thin clients server, workstations, thin clients and a separate computer. Fig. 3
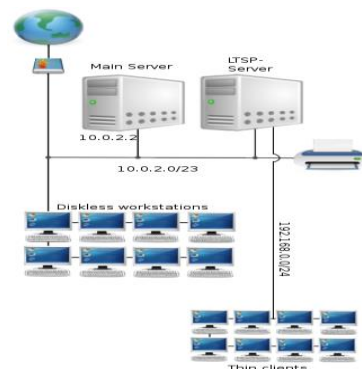

Fig. 3 Architecture of Skolelinux [3]

All software is run on the server, but clients are behaving as if the software running on them through direct interaction with users.

With this implementation, we use again available computational resources, which now serves as a terminal network, where all the computing power is centred in one place on the server and not on local computers. On these terminals can run a modern and high quality software. Another advantage is that maintenance is much easier because all the installation and configuration is done on the server, so they just make only once. We don't need to purchase additional licenses for the operating system because we use open source operating system as Debian Linux, which was also equipped with the basic applications to work with documents, email and the Internet.
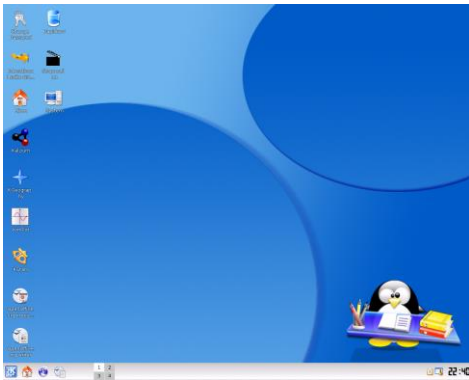

Fig. 4 Skolelinux/Debian Edu desktop

Our Skolelinux network, at present, running in trial operation and going through exercise tests in order to verify the applicability of the solution even before we put her into full operation.

The current main and most difficult goal is to inform computer users about this possible change, and especially encourage them to reflect on the possible transition to open-source software. Generally, we can assume 'that a user who uses "old" system is very difficult to go over to new (other) technologies, if willing to do it at all. It is therefore very important to deal with choosing the "perfect" programs because users of proprietary software must not have a feeling that they work with open source software.

3 CONCLUSION

Open software can be deployed in an IT infrastructure, public administration, education sector and small and medium enterprises as a full alternative to the traditional proprietary software. When fully deployed, open source software create notable savings in addition to so positive secondary consequences for the company such as use at a scale that would significantly speed up the overall process of the information exchange within the society. Given that we are heading towards a knowledge-based economy, the deployment of open source software in the public sector is becoming an issue of strategic importance to society. We have unfortunately concluded that Slovakia a broader effort to deploy software with open source has not been felt.

This may be changed with the fulfilment of strategic objectives within the university project "Package of innovative features for education reform in TUKE" under the EU structural funds operational program of education: Create and develop innovative forms of education that can rationalize and improve educational programs for TUKE.

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