ELEARNING SYSTEM BASED ON ODOO

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Abstract: *Development of an eLearning platform for the PT&SCHE project, which is a part of the EU programme. The paper focuses on the features of the LMS system, its functionalities that meet the demands of a modern student. Furthermore, it describes the architecture and main characteristics of the eLearning solution from the perspective of the users of the system.*

Keywords: *eLearning, Odoo, LMS*

1. INTRODUCTION

This paper presents an implementation of the eLearning platform based on the ODOO [1] open-source platform. Implementation is done for the "Introduction of part-time and short cycle studies in Serbia" (PT&SCHE) project [2], which is a part of the EU programme Capacity Building in the field of higher education. In the introductory part of the paper, the features and characteristics of the LMS system are discussed with an emphasis on essential functionalities that meet the demands of a modern student. The rest of the paper presents the architecture and main characteristics of the solution from the perspective of the users of the system, students and the author of the content.

1.1 LMS

The term LMS is not completely clearly defined. Several slightly different terms are used for the same concept. The most commonly used are: CMS - course management system), VLE - Virtual Learning Environment, LCMS - learning content management system), VLS - virtual learning system, learning portal, or e-learning platform (e-learning portal). Each of these terms has a slightly different meaning depending on the specific interpretation. Maybe this system should be called "instructional management system", since instructors and not students determine the parameters for learning. However, for the purposes of this document, the term LMS will be used in the context of complex integrated software that supports the development, delivery, testing knowledge and and administration of traditional F2F courses, "blended" or online learning systems.

Educational institutions use LMS software for planning, organization, evaluation and monitoring of the learning process. With this software they centralize: the preparation of courses, content and resources; content administrators and educators from various perspectives.

Today there are over 500 different LMS's that are in use [3]. Each LMS is unique. Some of them allow users to implement different scenarios and approaches, such as predominant orientation to the content (content-centric), to the connection (network-centric), to activities (activity-centric), or to a linear or branched approach. Some systems are better at delivering asynchronous instruction, while others are better at synchronous mode of instruction delivery. Some LMS systems deliver content to students and allow the assessment using mobile devices, while others do not have that option. Therefore, instructors should identify available possibilities and use them adequately in their instructions. It is necessary to carefully analyze available tools and their functionality in order to be implemented adequately. Selecting the right LMS depends on many factors, including the age of students, the type of teaching and learning methods, experience of lecturers, as well as the objectives of the educational institutions.

1.2 LMS SELECTION AND CHARACTERISTICS

A modern approach to the LMS selection should be based on the answer to the following question:
What are the real chances for its application in the real learning process?
A positive answer to this question has the greatest weight. But the answer to this question can not be given without a systematic approach in the evaluation of individual criteria.
Criterion 1: The time required for implementation.
Criterion 2: Is it possible to adapt to the specific needs of the institution?
Criterion 3: How reliable and secure is it?
Criterion 4: Functionality LMS is a mission critical APP. Its reliable and safe operation is a prerequisite for successful use. What does this actually mean?

2. ODOO CHARACTERISTICS

Based on previous discussions it was clear that we should choose a platform that has the following characteristics:

- Open source [4]
- Matured (graduated)
- Suitable and very open for developing broad spectrum innovative applications that are easy to integrate with other modern application and meet expectations that students have.

After a detailed analysis, we decided to choose the ODOO platform. Several key arguments for the selection:

- From Wiki: "Odoo is an all-in-one business software capable of covering all business needs, including CRM, Website/e-Commerce, billing, accounting, manufacturing, warehouse- and project management, and inventory, all seamlessly integrated"
- 12 years of continuous development of the open source community that counts more than 2000 developers led by the Brussels' company Odoo S.A Odoo S.A is recognized as an example of innovation, potential, growth and success in the Belgian economy, Odoo has been chosen by the European Commission and the European Investment Bank (EIB) to illustrate the 315 billion euro investment plan jointly launched by the two institutions to foster business competitiveness
- One of the Top 10 Open Source software [5].
  1. LibreOffice
  2. FlatPak
  3. Rocket.Chat
  4. Mattermost
  5. Odoo
  6. iDempiere
  7. SuiteCRM
  8. Alfresco
  9. Camunda BPM
  10. Talend Open Studio

- Odoo is built upon a Model-View-Controller (MVC) architecture. One of the primary goals of this architecture is to separate the visual display of the information from the business rules and management of the underlying data.
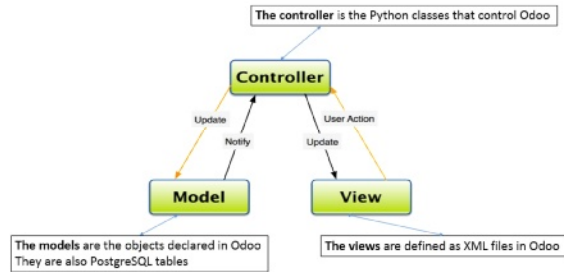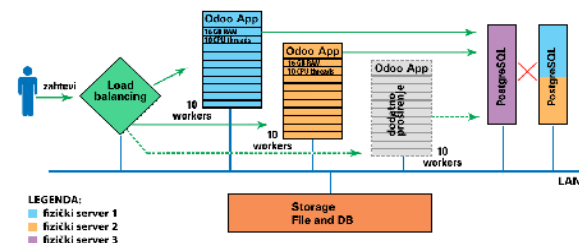

Image 1: MVC architecture

- Odoo system is formed from three main components:
  a. PostgreSQL database server: which contains all of the databases, each of which contains all data and most elements of the Odoo system configuration.
  b. Odoo application server: which contains all the enterprise logic and ensures that Odoo runs optimally.One layer of the server is dedicated to communicate and interface with the PostgreSQL database, the ORM engine. Another layer allows communications between the server and a web browser, the Web layer.
  c. Web client: Which provides user interface, it is running in a web browser as Javascript application. The client issues a request to the server, gets data back and display the result (e.g. a list of customers) in different ways (as forms, lists, calendars, …). Upon user actions, it sends queries to modify data to the server.
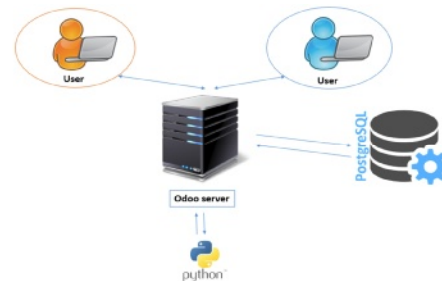
Image 2: ODOO components

Scalability - ODOO is very flexible and scalable. It can be used in systems with only a few concurrent users, but it can easily be extended to a system that can be used by a few thousand users, as is the case with the installation in the Portuguese Ministry of Education. The following Image shows such physical architecture.

Image 3: ODOO scalability

3. eLearning architecture for PT&SCHE

Image 3 represents a global vision of the architecture of the eLearning platform of an one HE institution. The platform consists of 3 interconnected units:
- Odoo platform itself
- Beckend application for PT@SCHE program administration
- Students Portal

The student portal is realized as a standard website, and it enables easy connection to the existing web site of a HE institution. This ensures consistent expansion of the existing websites of HE institutions which will organize PT&SCHE education.

This architecture should provide the automation of the complete education process within PT&SCHE program, starting with enrollment for a particular program, through the delivery of study materials to the examination.
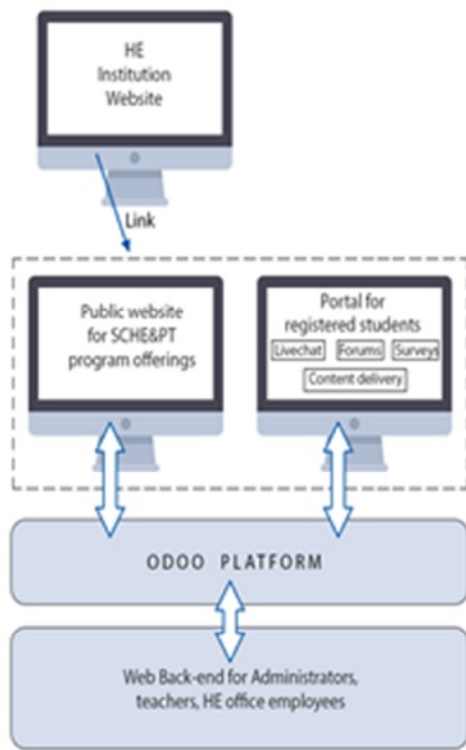

Image 4: eLearning platform architecture

3.1 BACK-END

The Back-end component provides authorized access to the eLearning platform users, and through certain access rights and roles in the system of PT&SCHE education it provides access to individual modules. The following Image shows a dashboard with all the available Back-end modules, which are used by HE staff and employees.

Image 5: Back-end

Discuss is a module for exchanging messages between all users of the platform, through email, or chat.

LMS Management is the key module for the organization of the structure of PT&SCHE program.

Admissions is a module that supports the whole student enrollment process through a previously defined workflow.

Faculties is the module intended for teaching staff and their activities.

Students is a module for managing tasks that a student needs to do during a program attendance. The module enables the definition of tasks, their publication and acceptance of student's works.

Tests is a module for the management of tests a student has to complete during the program attendance.

Surveys is a module that provides data for the analysis of the program's quality. It enables the creation of ad hoc questionnaires, their forwarding to student's personal pages, and the analysis of the answers.

Live Chat is a module for creating and managing information from chat rooms. The following image shows how to configure a chat channel. When an operator joins a channel, an appropriate message appears on the student's page and the student can enter into direct communication with the operator.

3.2 STUDENTS PORTAL

Public website for PT&SCHE programs is an informative, responsive website, the primary purpose of which is to provide potential students with information about available programs and terms and conditions for PT&SCHE. It contains a powerful editor for easy maintenance of the web content.

Image 6: Website management

Website is visually divided into several sections:
● Top horizontal area with contact info and social media links
● Horizontal menu area with logo
● Central section for showing page content
● Footer area

Another important informative page is the list of available courses, where visitor can select a desired course and see all available information regarding the program. A typical course details page has the following areas:

Image 7: Course details page

Links to Tests, Comments, Blogs and Forum are enabled only for enrolled students.

For the content delivery of the PT&SCHE program the portal for students uses the channel concept. The Image 8 depicts this concept in more details.

Image 8: The Channel concept

In order this concept could deliver maximum effects, the contents of the PT&SCHE program should be prepared and structured in an appropriate way. The rules for content organization are as follows:
1. One PT&SCHE program consists of the following components:
a.One or more courses, some of which are mandatory and some elective
b.Two or more surveys. One before, and the other at the end of the course
c.One or more assignments
d.One or more exams.
2. Each course consists of one or more Learning Objects in the form of lessons, which can be prepared as video material, a static document (Pdf or PPT) or a Dynamic XHTML document (LAMS seq.) which can contain links to other multimedia content generated by mDITA authoring Tool.
3. Each course has its own Forum for collaboration with other students on that course and teaching staff.
4. Each course has its own Chat Room for scheduled online consultation with the teaching staff.

The screenshots below show the front-end screens of the learning content delivery:

Image 9: Video content delivery

Image 10: mDita content delivery

Image 11: PDF content delivery

For the purpose of collaboration of students and professors within a single subject, channels for Forum, Blog, Comments and Live Chat are provided. These systems enable the students and the teachers to make learning process better and interesting by enabling free flow of information and improved sharing techniques.

4. COURSE CREATION PROCESS

The Course module efficiently manages courses, subjects and sessions for the educational institution. Course creation is performed in the back-end area, where administrators have at their disposal all the necessary forms necessary for defining and creating courses.

Before creating a new course, it is necessary to have prepared the following information:
- Course title
- Course code
- ETSB number
- Short description of the course
- Detailed description of the course
- A photography that illustrates the course
- List of the course materials
- List of instructors (faculty) with short description and email addresses
- A blog for each course
- A forum for each course

Furthermore, it is necessary to prepare the following information related to the short program curriculum:
- Subject title
- Subject code
- ETSB number
- A short description of each subject
- Titles of each lesson
- Lesson material in one of the following format:
  - PDF document
  - Video file (from YouTube or some other server)
  - Audio file
  - mDita document
  - iFrame (link to the content located on another server)
- Total time for learning a lesson
- A short description for each lesson

After the preparation phase has been finished, the first step in creating a course would be to insert teaching materials in the appropriate back-end module.
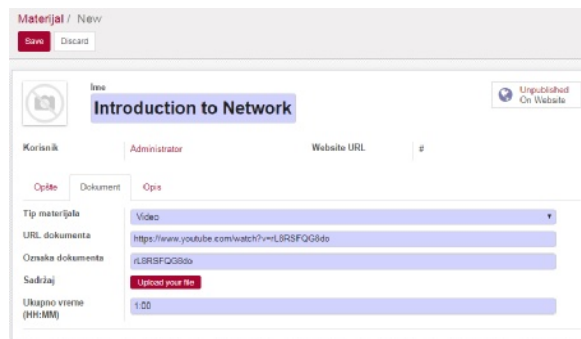
Image 12: Inserting teaching material

Creating the course itself is very intuitive through user-friendly forms of the course creation module.
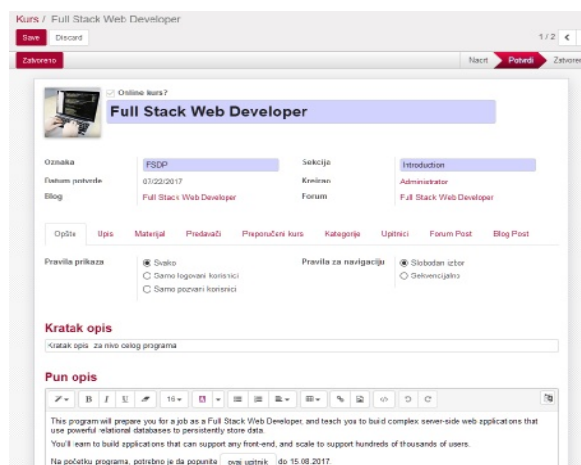
Image 13: The course creation module

5. TESTS

An interesting, easy and effective way to evaluate all the participants in a learning system is through the use of online tests. The eLearning platform allows the instructors to create tests as per their need and then make them worth attending by randomizing the questions and options.

Instructors can configure the following options for a test:

- Test title
- Test description
- Duration
- Number of questions per page
- Number of attempts
- Grade for each question
- Total grade
- Result message based on total grade, etc.

Test questions can be:

- Multiple choice questions
- Fill in the blank questions

Questions are entered into a WYSIWYG editor, meaning that they can contain images, source code, and formulas and equations.
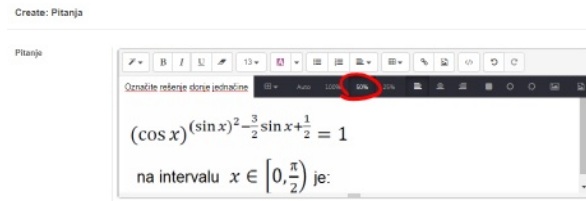
Image 14: WYSIWYG editor

During the test the following information is available for students all the time:

- Number of question
- Remaining time
- Percentage of the answered questions

At the end of a test, students have insight into detailed statistics of the test:
- Total number of questions
- Total number of correct answers
- Total number of wrong answers
- Total available marks
- Received marks
- Test result in percentage
- Questions with correct answers
- Questions with wrong answers
- Not attempted questions

Instructors also have both group test statistics for all students, and detailed statistics for each student.

6. SURVEYS

Instructors can have instant feedback on various activities with surveys which can be created in the built-in survey system. Similar to tests, surveys can have one or more pages, each of them may contain one or more questions.

The following types of questions are available:

- Multiple Lines Text Box
- Single Line Text Box
- Numerical Value
- Date and Time
- Multiple choice: only one answer
- Multiple choice: multiple answers allowed
- Matrix

Image 15: Creation of a survey question

Created survey can be available to students via a public web link, via email notification, or via private invitation.

Instructors can access the detailed statistics of the submitted answers, including pie charts and numeric data.

7. CONCLUSION

Based on the requirements and conclusions of the document for the selection of LMS platform, Odoo is selected as the platform of choice.

Odoo is built upon a Model-View-Controller (MVC) architecture, and is formed from three main components:

- PostgreSQL database server
- Odoo application server
- Web client

A global vision of the architecture of the eLearning platform contains 3 interconnected units:

- Odoo platform itself
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- Students Portal

The student portal is realized as a standard website, and it enables easy connection to the existing web site of a HE institution.

This architecture should provide the automation of the complete education process within PT&SCHE program.

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