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Development of Knowledge Portal using Open Source Tools: A Case Study of FIIT, UNISEL

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***Abstract*—**Knowledge sharing culture contributes to a positive working environment. Currently, there is no platform for the Faculty of Industrial Information Technology (FIIT), Unisel academic staff to share knowledge among them. As it is done manually, the sharing process is through common meeting or by any offline discussions. There is no repository for future retrieval. However, with open source solution the development of knowledge based application may reduce the cost tremendously. In this paper we discuss about the domain on which this knowledge portal is being developed and also the deployment of open source tools such as JOOMLA, PHP programming language and MySQL. This knowledge portal is evidence that open source tools also reliable in developing knowledge based portal. These recommendations will be useful to the open source community to produce more open source products in future.

***Keywords*—**Knowledge management, Portal, Content Management, JOOMLA.

I. Introduction

TO develop a portal, we need reliable software, knowledge and technical skill. Purchase suitable software that suits our needs will require money and time consuming. But not many organization has sufficient budget for it. Therefore, Faculty of Industrial Information Technology (FIIT), University Industry Selangor have decided to develop knowledge portal using open source tools. Open source software can be defined as "software that is made available freely to all and many of them voluntarily contributes developing software for the organization" [1]. This portal can be accessed from any computer clients connected to the internet. The purpose of this knowledge portal is to be a catalyst center of knowledge information within the FIIT, UNISEL. It is hope that the portal will increase the efficiency and productivity of the faculty by eliminating manual and offline knowledge sharing.

In this article we present the domain analysis on which this portal going to be implemented, methodology practiced during the development of the portal. Then, we explain open source tools deployment and also how is the architecture of knowledge portal. At the end of this article, there is a few screen shoot of knowledge portal also showed as a result of the open source tools reliability.

II. Domain Analysis

Before developing the knowledge portal, we need to understand the domain or the boundary for the portal being developed. Here, the domain is higher learning institute (HLI) and focusing on knowledge sharing information in FIIT. The traditional ways of sharing information or knowledge in FIIT are as listed below:-

- Faculty Meeting
- Informal discussion
- Faculty Activities
- Email
- Chatting – Yahoo Messenger, Skype and others
- Mobile device – SMS
- Document Sharing
- Pen/Thumb drive, CD, external hard disk

The entire communication channel as said above did not have any repository for future retrieval. These knowledge is only available at current time and may be lost or damage in future. The proposed knowledge portal is been developed in web based environment which can be accessed via internet or wireless connection. Fig. 1 show the environment, where the knowledge portal resides.

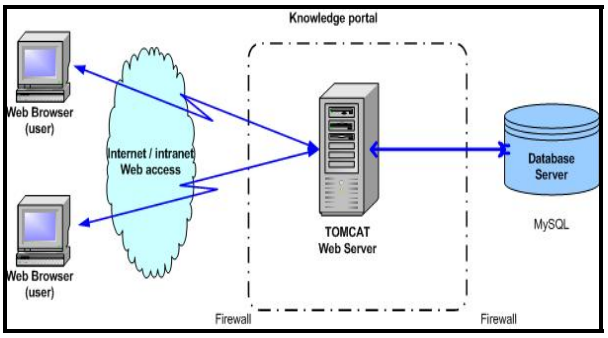

Fig. 1 Knowledge Portal environment

III. Methodology

The system development life cycle (SDLC) is the process of developing systems through investigation, analysis, design, implementation, testing and deployment until the maintenance of the system. Here, V-Model has been chosen to complete our development cycle. V-model is a software development model which can be presumed to be the extension of the waterfall model [2]. Instead of moving down in a linear way, the process steps are bent upwards after the coding phase, to form the typical V shape. The V-Model demonstrates the

relationships between each phase of the development life cycle and its associated phase of testing [3]. Fig. 2 depicts the aforementioned process in a graphical mode.

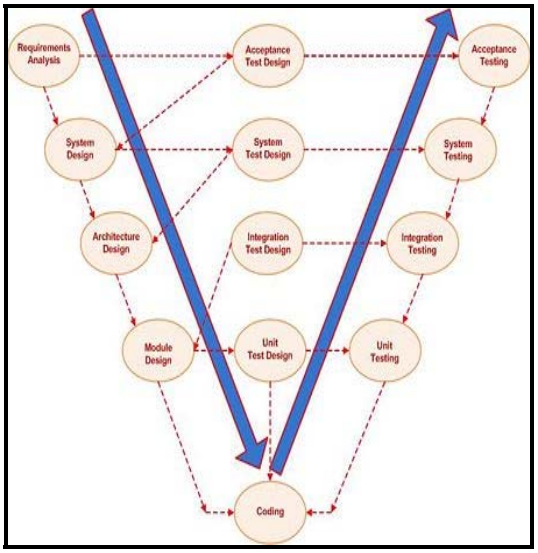

Fig. 2 V-model

After define the requirement, the next step is design and then coding and implementation. Each stage has their own testing phase to ensure there is check and balance for each phases during development.

IV. Software Requirement

Faculty academic staff requirements are vital in developing knowledge sharing portal. Our first and the most important concern before gathering the requirement from user, is to identify which development tools is more reliable to be used in developing knowledge portal. We decided to use web content management system (CMS) to develop knowledge portal. Web content management system is designed to enable non technical user with no knowledge on computer programming, graphic imaging tools, or markup language like HTML to add new material to a website or modify the existing contents as and when required in an intuitive and real-time fashion [4]. There is many open source web content management system available in market. Table I shows the comparison between the open source web content management systems which is available in market.

TABLE I
Web Content Management System Comparison [5]

CMS Application	Programming Language	Database	Web Server	FTP Support
Joomla	PHP	MySQL	Apache	Provided as a free add-on
Drupal	PHP	MySQL, PostgreSQL	Apache IIS	Limited FTP support
Mambo	PHP	MySQL	ApacheIIS, any PHP-enabled web server	Not available
Open CMS	Java 1.4	MySQL, PostgreSQL Oracle, MSSQL	TomcatApache	Not available

After considering the differences between the open source web CMS, we have decided to use JOOMLA as our development tools for knowledge portal. Availability of support and stability of the tools itself become a reason for our decision. JOOMLA as open source web CMS contain PHP as programming language, MySQL as a database and Apache Tomcat as a web server.

V. System Architecture

Knowledge portal is implemented based on the JOOMLA architecture (see Fig. 3). JOOMLA architecture also known as 3-tier architecture. It does consist of 3 layers: Extension layer, application layer and framework layers.

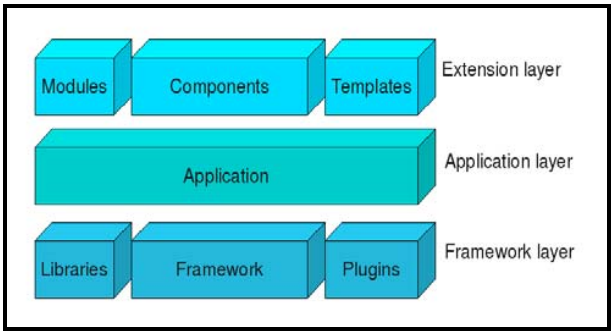

Fig. 3 JOOMLA architecture

A. Extension Layer

As we can see on the Fig. 3, extension layer consist of modules, components and templates. Contents inside the knowledge portal were developed using appropriate modules and components. All this modules and components can be downloaded from JOOMLA website. For example teaching material which also can be classified as document management developed using Remository. Remository

supports the secure hosting of local or remote files for download by site visitors. Files can be uploaded by users, and locally hosted files can be stored in either the database or the file system. These criteria help us in developing a repository for teaching material for academic staff in FIIT.

B. Application Layer

The middle application layer consists of applications that extend the Framework JApplication class. Currently there are four applications included in the Joomla distribution. JInstallation, JAdministration, JSite and XML-RPC. JInstallation is responsible for installing Joomla on a web server and is deleted after the installation procedure has been completed. JAdministrator is responsible for the back-end Administrator. JSite is responsible for the front-end of the website. Meanwhile, XML-RPC supports remote administration of the JOOMLA website.

C. Framework Layer

Framework layer consists of JOOMLA Framework itself, whose classes are listed below.

- Libraries that are required by the Framework or are installed for use by third-party developers.
- Plugins extend the functionality available in the Framework.

VI. FIIT K-Portal Features

FIIT knowledge portal developed with an intention to encourage knowledge sharing culture among academic staff. At the same time this knowledge portal will help in academic staff to discuss topics regarding the research interest group. This knowledge portal can be a platform for them to communicate and share their ideas regarding the subject they teach and also the research that they involve. The arrangement of the menu item in portal shows the realization of the above said objective. The contents of portal are as follows:

TABLE II
FIIT K-Portal Features

Features	Description
Registration	- Faculty member will be registered by web master. - Web master will deal with admin to get details about staffs.
Paper Presented	- Paper that already presented by faculty member either internal or externally will be published here for knowledge sharing and acknowledgement by others faculty member.
Conference	- Provided list of web links to upcoming academic and research events either local or international events.
General Information	- Other unregistered user can view this page which contains UNISEL website and FIIT WEBSITE. - They can also retrieve some information about FIIT K-portal itself.
News/Announcement /Event	- Latest information regarding any faculty activities provided by Dean's PA and will be upload by K-portal web master.
Collaboration	- In this column, any information that relates with Industrial Training and Industrial Collaboration Program will be updated here by K-portal web master. - All info regards industrial training and industrial collaboration program will be given by person in charge.
Other application	- It contains link to other application. - This link can be divided to four types; Freeware, Shareware, Public domain and Open source.
Download Material	- All FIIT internal forms template can easily be uploaded here.
Teaching Material	- Lecturer's can retrieve a complete lecture's note, assignment, quizzes, exam questions and schemes, etc. - All information will be put accordingly in a different folder by program, course subject and semester.
Help	- It contains guideline on how to use the FIIT K- portal

VII. Result

The home page for this knowledge portal developed using JOOMLA. The other module for this portal developed using the appropriate component available in the JOOMLA extension directory. Using administrator access level each component is installed in the extension manager option in JOOMLA. For example, teaching material module used Remository component. Remository component is a module for web master to develop lecturer teaching material section. The arrangement of teaching material module is as shown in Fig. 4. This content developed especially to encourage the faculty academic staff to share teaching material among them.

Fig. 4 User Interface for teaching material module

Another example of module developed inside the knowledge portal is the "Others Application" module whereby it's developed using Weblink component. The structure of this module is as illustrated in the Fig. 5. Below is the User Interface when user clicks under Faculty Documents/Forms link.

Fig. 5 User Interface for Faculty Documents/Forms link

Fig. 6 below depicts the FAQs module user interface which currently consists of two categories, General and Features in K-portal.

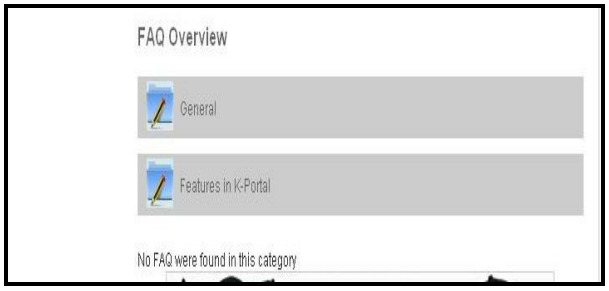

Fig. 6 User Interface for FAQs module

The next screen as shown will appear once user click on "Features in K-Portal" link. A few of FAQ question about these features are explained in this page to assist the user as guideline.

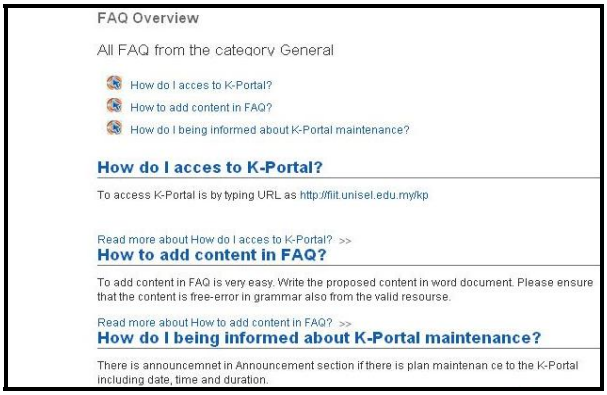

Fig. 7 User Interface for Features in K-Portal

VIII. Conclusion

FIIT knowledge portal become a platform for the academic staff to share their knowledge, teaching materials, ideas, feedback and research interest among them. This knowledge portal also helps them toward paperless working environment. Open source tools consider as a reliable tools to be used in developing knowledge based application. Open source tools reduce cost and time in developing the code from scratch and it is easily implemented using JOOMLA and deploying it in web server.

Acknowledgment

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