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Web application for university level thesis and dissertation repository using MVC model and Struts framework

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Abstract: The students of any university during the academic process write project report and thesis as a requirement to get degree from the university. These documents are of high academic value. Most of such documents are never published hence the work of the students remain unnoticed by the academic community which leads to duplication and repetition of the work. Sometimes really interesting work is being done by the engineering students at the undergraduate level but it remains as untapped. The UGC guideline is clear about ETD but they are not available to the other researchers. The infolibnet publishes the PhD thesis in India but there is no other facility for the online publication of the theses and project work of postgraduate and undergraduate students. This paper talks about the creation of the ETD for undergraduate, post graduate and doctorate level of the BPUT, a technical university of Odisha. The web application was designed on MVC model and implemented on Struts platform. The system is empowered with searching based on keywords and browsing facilities to locate the desired document.

Keywords: MVC, Struts, ETD, JSF, Thesis, dissertation, repository

1. INTRODUCTION

Every University and its affiliated colleges create huge volume of and unique intellectual materials in form of project reports, dissertations and theses. Most of the theses documents are never published, hence other scholars and students are in the dark about the completed and ongoing projects in the different colleges of the university. These dissertations are very useful to the researchers and students alike to determine future course of action and often to build careers. The theses and dissertations remain an un-tapped and under-utilized asset, leading to unnecessary duplication and repetition of research and wastage resources. The UGC Notification (Minimum Standards & Procedure for Award of .Phil./ Ph.D., Degree, Regulation, 2009) dated 1st June 2009 provides for submission of electronic version of theses and dissertations with an aim to facilitate open access to Indian theses and dissertation to the academic community world-wide. Online repository of electronic dissertations and theses maintained at the university level will not only ensure easy access and archiving of dissertations and theses but will also help in raising the standard and quality of research. This would overcome serious problem of duplication of research and poor quality resulting from the "poor visibility" and the "unseen" factor in research output.

The Shodhganga@infolibnet in India provides a platform for research students to deposit their Ph.D. theses and make it available to the entire scholarly community in open access. There are no other platform where the undergraduate or postgraduate level dissertation, theses are available in open access mode to the students and others. Most of the times very interesting work is done in the UG or PG level. This paper discusses to create a repository of the Electronic thesis and dissertation (ETD) of students of university so that other students and researchers get benefit from it. Indian universities are lagging behind from universities of the western countries in research work. With the creation of unique platform at the university level students faculties and the researchers of the

university can be informed about the ongoing project reports, dissertation at the university level. The university level repository is a method for capturing, collecting, managing, disseminating, and preserving scholarly works created in digital form by the constituent members of an institution (Chang, 2003).

In this paper the detail architectural design of the ETD repository is discussed which is specifically created for the Biju Patnaik University of Technology (BPUT), Odisha. BPUT is the technical university of the state of Odisha having more than 100 affiliated colleges. BPUT offers different degrees undergraduate, postgraduate and doctoral courses in various branches like engineering, management, pharmacy and architecture. Even though the shodhganga project of the infolibnet can offer the facility to publish only PhD thesis, there is no such facilities for the students of other level like undergraduate and postgraduate courses of the university. Hence, for the improvement of the research and to make aware the students the state of the research activities going on in the different colleges of the university this project is created. This project will increase in a very fundamental way the resources available to the universities for research and teaching. This is essential for a technological university considering the fast pace of changing technology. The lead time of technology implementation is drastically reduced these days. Hence for faster implementation of the research such a platform is highly essential for any country.

2. OBJECTIVE

The objective of the project is to develop a web application with the following characteristics:

- Create repository of the dissertations, project works and theses for all the students of the affiliated colleges of the university.
- The students can even upload the draft of the project dissertation or thesis to the system and they can download

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the draft and make correction and upload the draft to the system

- The guides of the project and the dissertation can view the project reports, dissertations of the students working under him and suggest modifications and comments.
- The guide (any guide in case of multiple guides) has to approve the document before it is publically available
- Other students of the university or to that matter anyone can read download the dissertations in pdf formats.
- The system should also maintain metadata which is readily available for searching.

This web application will enable to store the dissertations of all the students both current and the graduated students. This will be the knowledge repository of the university and the credibility of the university can be known going through the students work.

3. METHODOLOGY

While designing such a information intensive web applications two requirements have to be kept in mind: the ease of use and the completeness of the information being provided [9], [10], [19]. Anglicism that means “easy to use” – as indicated by [3], [4] seems to have its origin in the expression “user friendly”, which is replaced by its subjective and diffuses connotations [13], [18]. Numerous authors have proposed several definitions of usability, normally through the numbering of different attributes or factors which allow to evaluate it, finally driven by the focus which it can be measured [6], [8]. Although for most users "the interface is the application" since it is the part they see and through which they interact [1], [7].

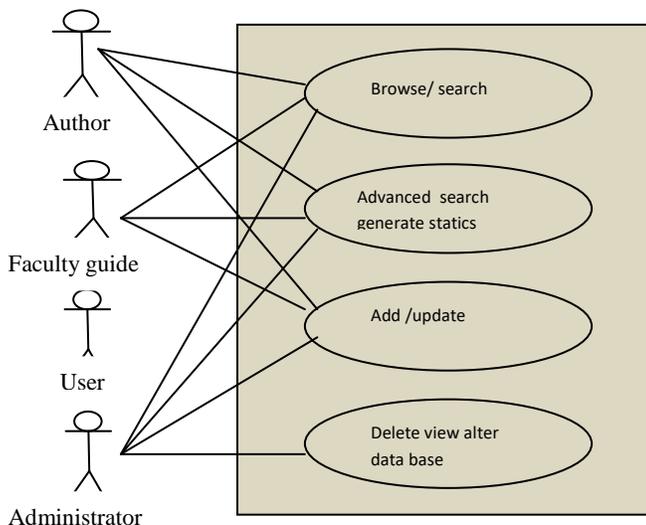


Figure 1: USE CASE

We must understand that the usability of the application depends not only on the interface design but also of its architecture of the design. Information Architecture (IA) is defined as the art and science of organizing information spaces in order to help users meet their information needs [12]. The activity of organizing involves structuring, classifying and

labeling the contents of the web application [2].

4. FRAMEWORK

To implement the MVC model for our work we have chosen Apache Struts application framework with JavaServer Faces(JSF) technology[17]. A Configurable front controller Servlet provides abstract classes which can be extended to handle the requests. In J2EE platform a front controller is mainly implemented as Servlet which handles the HTTP requests. The main scheme is based on Servlets for processing requests and selecting views.

Model View Controller (MVC) design pattern is chosen to implement the proposed dissertation repository. The MVC [5], [11] design pattern is a widely used architectural pattern in J2EE applications. The basic components of MVC model is shown in figure 2. In MVC, the View displays information to the user and, together with the controller which processes the user's interaction, comprises the application's user interface.

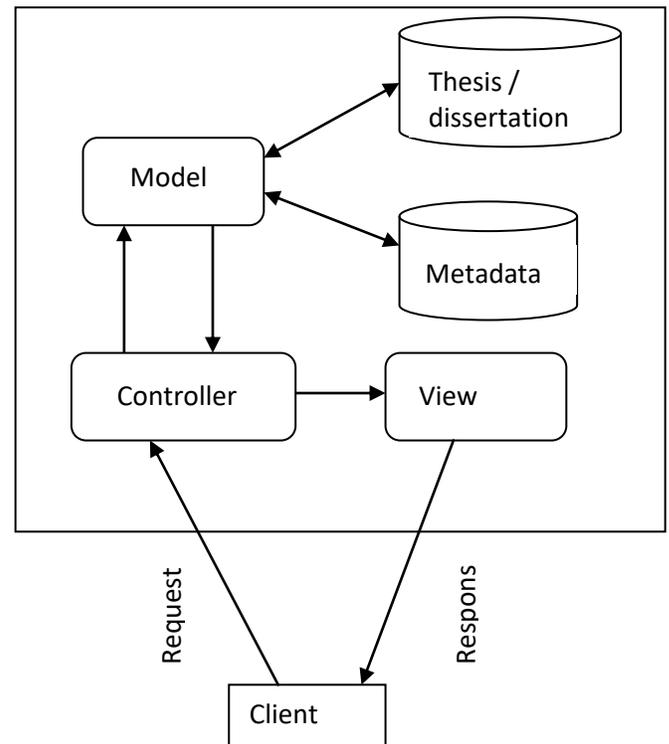


Figure 2: MVC Model

4.1 View

The view provides the presentation of the state represented by the model. It manages the visual display of the applications. Particularly, there is no processing logic within the view; it is simply responsible for retrieving objects (in the model) that may have been previously created by the controller. The view should be notified when the state changes in the model. In addition, it has no knowledge about the controller. The view of a Struts based application is constructed using JavaServer pages (JSP)[16]. The JSP pages can contain static HTML. The JSP environment includes a set of standard action tags. Apart from the built-in actions there are standard facility to define

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own tags in “custom tag libraries”.

4.2 Model

The Model is the portion of the application that contains both the information represented by the View and the logic that changes this information in response to user interaction. The model contains the core functionality of application components, such as database access and transaction management. It encapsulates the state of the applications and conducts associated transformation on that state. Typically, the model has no specific knowledge of either the view or the controller. It is the logic of the application which is dependent on the purpose of the application. The model has to be separated from the other two. It is not difficult to obtain this separation. It can be done by programming the model as a single object without focusing on the rest of the application. For database MySQL has been used in this application.

4.3 Controller

The controller is in charge of user interaction with the model. It is focused on receiving the request from the clients who runs a web browser. It manages the request processing and the creation of any objects (in the model) used by the view. It decides what business logic functions is to be used and then delegates the work to for producing the next phase of user interaction to an appropriate view component. In Struts the primary component of the controller is servlet of class ActionServlet. When the controller is initialized it assesses a configuration file (struts-config.xml) and uses it to deploy other control layer objects from the Struts configuration. All the objects together form the Struts configuration. The Struts configuration defines many things including the ActionMappings(org.apache.struts.action.ActionMapping) for an application[14][15]. The Struts controller servlet consults the ActionMappings as it routes HTTP requests to other components in the framework

4.4 Data model design

The BPUT university is already having a student database with unique student registration number is which is the keyfield. The registration number is a 10 digit number of which the first two digits refer to the year of admission and the next two digit refer the course the student is admitted to, the next three digit is the college code and the rest three digits is the serial number. This way the structured registration number of the students can be used from the existing database of the university. Similarly, all the faculties of the university given a unique registration number. These two databases can be adopted without any problem.

The other database of the system contains the information who has authored the ETD. In undergraduate courses the project work may be authored by many students. The main categories in which a student can author a document is :i. Project report ii. Dissertation iii. Thesis. The project report and the Dissertation is mainly used by the undergraduate students. Thesis is the term generally used by the M. Tech and Ph D level and are generally authored by a single person. When it comes to the guides a guide may guide many students in different projects. Similarly, a project or thesis can have more than one guide and sometimes a guide can be a person who is

not faculty of the colleges of the University. For these outside guides of the university, a guest reference number is allotted. The data collected are kept in different categories as mentioned. The simplified representation of the database of the project is presented here in form of ER diagram in Figure 3. Creation of a metadata schema is very significant for such project. It will facilitate in searching and will improve the searching efficiency.

User interface design: The system has four type of users namely: ordinary users, student authors, faculties and administrator. Simple users can search and browse through the documents. The authors can upload the document to the system and the guide approves the document. Only after the approval of the guide, the document will be officially listed as available for searching and the document link will be activated. When a student uploads his thesis it is in the system which is only visible to the student and the guides and waits for guide’s approval. If there are many guides approval of any one guide is sufficient. A very user-friendly interface is designed in form of GUI. The interface is made in English. The system provides metadata based filleting to facilitate searching and browsing.

5. DISCUSSION

This system maintains all the details and of any dissertation or thesis that are written by any students of university and the affiliated colleges of the university as part of the course completion program. The system provides information to the faculty, students of the university and the student and other interested persons outside the university about the type of projects, dissertations and theses written by the students of the university. This is also a feedback to the university management to know the standard of the research works carried out in the affiliated colleges of the university. This system is interactive and user friendly hence it is easy for anyone to search thru the archives. The role of the system administrator is vital and we didn’t discuss much about his role as it is similar to the role of the administrator in most of the system.

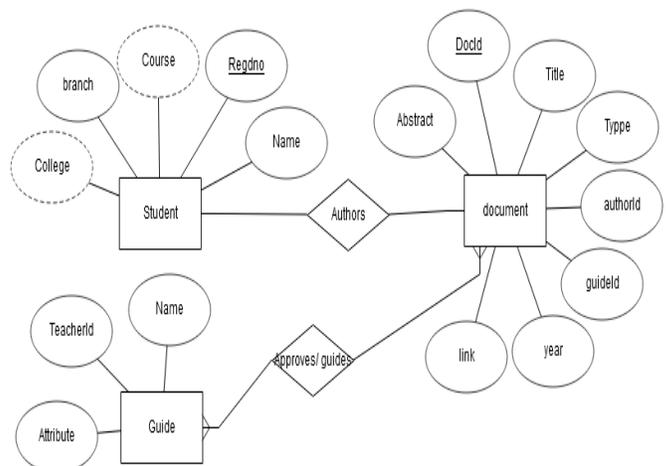


Figure 3: Simplified ER Diagram

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There are four types of users for the system and Figure 1 describes the privileges of all the four types of users. The administrator can insert a document in to the system after it has been uploaded and approved by the guide. For updating the documents the same process is followed. The Administrator can also delete a record from the database.

The searching and searching and browsing is powerful. A user can browse and search based on a specific college and a specific stream and specific year. The searching can be done on the basis of key words parts of title. The system also provides advance search facility based on college year branch level of the dissertation like undergraduate, post graduate or PhD.etc.

6. CONCLUSIONS AND FUTURE WORK

The benefits and potential to use for the benefit of the students of such system in the university is enormous. After few years it will be a very powerful resource university level repository in the electronic form. And in future the dissertation or the thesis can be examined online with minor change in the system. Further in the plagiarism check may be incorporated into the system so that the students and the faculty know the originality of the thesis thereby increasing the academic integrity of the students. As a result of such system the work of other students doesn't simply lie idle instead it is brought to the notice of other students of the university so that the current students may find something interesting in some previous thesis and may like to continue working in a specific field. Even though it is designed for BPUT, with minor change to suit specific requirement, this can be adopted by any university to preserve the hard of the work created by the students of any university.

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