DEVELOPMENT OF AN INSTITUTIONAL REPOSITORY FOR THE STORAGE AND RETRIEVAL OF GRADUATE THESES IN COMPUTER SCIENCE

[1]Olusanya, O.O., [2]Omilabu, A.A., [3] Adebare, A. O., [4]Adedeji, O. B.,[5]Peters, O. J., [6]Awotunde, J.B. & [7]Arowolo, O. A.

[1,2,3,4,5]Department of Computer and Information Sciences, Tai Solarin University of Education, Ijagun, Ogun State, Nigeria.

[6]Department of Computer Science, University of Ilorin, Ilorin, Kwara State, Nigeria.

[7]Department of Computer Science, Tai Solarin College of Education, Omu Ijebu, Ogun State, Nigeria.

Corresponding Author: Olusanya, O.O. (yinka_olusanya@yahoo.com)

Abstract:

Institutional repositories bring together all university's research under one umbrella, with the aim to preserve and provide access to those resources on demand. Institutional repositories capture, preserve and disseminate a university's collective intellectual capacity and can as well serve as a meaningful indicator of an institution's academic quality. This study was aimed at the development of an institutional repository that can be used for the storage and retrieval of information about graduate thesis thereby curbing the likelihood of duplication of existing studies. The study identified the functional and non-functional requirements of the system following which the design of the system was specified using the unified modeling language (UML) tools. The system was implemented using Web 2.0 technologies. The results of the study showed that the system provided an online institutional repository which improved the quality of research conducted by graduate students by eliminating duplication.

Keyboards: *institutional repository, information storage and retrieval, HTML, PHP, SQL.*

Introduction

Data is, if not the most valuable, certainly one of the most valuable resources for organizations today. It is the simple facts and statistics collected through the internal and external activities of an organization for the purpose of measuring and recording results. Data alone does not provide essential information however, it is the basis for information about an organization's activity, and is critical to all organizations. As a result of this, information is the data presented in a comprehensible way, enabling organizations to know what is happening in their businesses and to assist them in the implementation of significant decisions (Okoro & Okogwu, 2017). Such data includes a thesis or dissertation, which is a document submitted in support of candidature for an academic degree or professional qualification presenting an author's research findings (Schopfel *et al.*, 2012).The term graduate thesis is sometimes used to refer to both master's theses and doctoral dissertations.

Librarians of higher institutions of learning face a number of challenges which include the provision of a means for the effective management, maintenance, preservation and provision of intellectual properties of graduates. Most institutions in developing countries such as Nigeria, practice the traditional paper-based methods of adopting catalogues, indexes and abstracts for the collection, organization, dissemination, preservation and provision of access to academic and research-related resources. These paper-based methods have a daunting effect on their ability to meet the demands of researchers in the presence of an increasing number of contributions of knowledge. This has led to the need of the development of digital and internet-based solutions for meeting up to the present demand of the 21st century researcher (Dutta and Paul, 2014).

A Repository can be referred to as a receptacle where a large volume of information is stored. It represents a location where potentially rich resources of information, data, images and

other valuable research results are collected to access and use (Hornby, 2010). Institutional repositories (IRs) bring together all university's research under one umbrella, with the aim to preserve and provide access to those resources on demand (Crow, 2002; Ware, 2004; Eke, 2011). IRs enhances access to institutional resources as well as increase the visibility of a university globally. The real strength of IR is in its ability to collect, preserve and display scholarly research of a university to the people in the community and beyond (Bepress, 2009; Gutam *et al.*, 2010). IR captures, preserve and disseminate a university's collective intellectual capital and can as well serve as a meaningful indicator of an institution's academic quality (Levy *et al.*, 2012).

Over time, it has been discovered that students are becoming very lazy and are no more original in the project carried out to qualify them for the degree awarded. From the little findings carried out, it was discovered that since students are allocated to different supervisors, a project carried out by a student in a particular year with certain supervisor could be picked up by another student in another year and replicated to another supervisor within the same department without the supervisor's knowledge, and sometimes a supervisor may get a particular project topic approved to more than one student (Soyemi & Isinkaye, 2017). The reason for these is often characterized with a manual process which involve a paper-pen method of keeping past projects. Keeping track of such paper-pen projects by supervisors could be tasking, repetitive and tiring.

Sivan (2013), in her briefing paper on open access repositories, listed a number of benefits that institutional repositories bring to institutions. They include: opening up outputs of the institution to a worldwide audience, maximizing the visibility and impact of these outputs, collecting and curating digital contents, measuring and managing research and teaching activities, providing a workplace for work-in progress, for the collaboration of large-scale interdisciplinary approaches to research, and facilitating the development and dissemination of digital teaching aids.

Related Works

Crane (2007) stated that repositories offer a model of a sustainable future for libraries, faculty, academic institutions and disciplines. In effect, they reverse the polarity of libraries. Hence, rather than import and aggregate physical content from many sources for local use, as their libraries have traditionally done, universities can, by expanding access to the digital content of their own faculty through repositories, effectively export their faculty's scholarship. The centers of gravity in this new world remain unclear as each academic institution probably cannot maintain the specialized services needed to create digital objects for each academic discipline. University libraries in Korea have developed and utilized online bibliographic databases, which provides users access to electronic publications such as theses (Park *et al.*, 2007). In a report by Alhaji (2007), several universities in Nigeria have switched to the digitization of their library materials such as theses and dissertations.

Ghosh (2009), examined nine thesis repositories in India and proposed on creating a national e-theses repository for India. Livingston and Naltasie (2009), conceptualized the creation of Institutional Repository as a huge support to academic activities in higher institutions. However, they pointed out that the challenges of sustainability, preservation, security and interoperability are capable of undermining the entire project if not clearly articulated and resolved. Romdhani, Tawse and Habibullah (2011), carried out a statistical analysis on student project performance management system for effective final year and dissertation project supervision. The study was tailored towards integrated and collaborative online supervision system for final year and dissertation projects. They proposed an e-supervision

system under development that can federate the communication and the process among all involved parties in final year project supervision.

According to a study Levy *et al.* (2012), East Tennessee State University (ETSU) made their undergraduate theses available to the campus community and general public through an electronic repository system. Abdulkareem and Dike (2013) in their study, designed a portal-based system used for the automation of the processes associated with the management of final year projects. The processes started from the allocation of project supervisors to students down to the final clearance of the student after the project defense. ASP.NET was used to create the web server, C-sharp language (C#), Microsoft SQL server 2005 as the back-end. Leung *et al.* (2015), developed a final year project management system for Information Technology programs. The study implemented an online platform that facilitated the final year projects process. The system among others was able to help project supervisors track the progress of the projects in form of group projects using project management tools.

Materials and Methods

This section presents the various materials and methods that were adopted for the purpose of the development of the online repository for the storage and retrieval of graduate theses proposed in this study. The section presents the various requirements of the proposed system which were specified using unified modeling language (UML) diagrams followed by the various programming languages which were selected for the implementation of the proposed system.

Requirement analysis

This is the analysis of the functionalities and components of a proposed system. it is achieved through the requirement process which involves analyzing, finding and sustaining the requirement of a system still under development or already in use.

The specific functional requirements of the proposed system include the following:

The system shall allow the system administrator to login, approve users, upload thesis, delete thesis, add supervisors' names and make general changes to the thesis database.

The system shall allow student users to register with their matriculation number and password of choice.

The system shall allow student users to log into the system.

The system shall allow student users to check already uploaded thesis through the search option.

The specific non-functional requirements include the following:

The system shall only allow matriculation numbers (of not less than or greater than 11 characters) to be used as username.

The system shall not allow users the privilege of uploading thesis to the database.

The system shall allow an admin an upload a thesis that already exists in the repository.

System design

Unified modeling language (UML) diagrams such as use case diagrams was used to describe the functionality of a system from the context of the system users. This implies that it

represented the details of individual features of a system and its available functionality from the users' perspectives. Figure 1 shows the use-case diagram of the proposed system.

As seen in figure 1 (left), the use case diagram shows a system administrator with seven actions. The system administrator can log into the system, add new or delete existing thesis, add new or delete existing supervisors, add new or delete existing student users, search thesis title, reset user passwords and log out of the system. Figure 1 (right) shows the diagram of a student user with five actions. The student user can log into the system, search or view thesis, view supervisors, change passwords, and log out of the system.

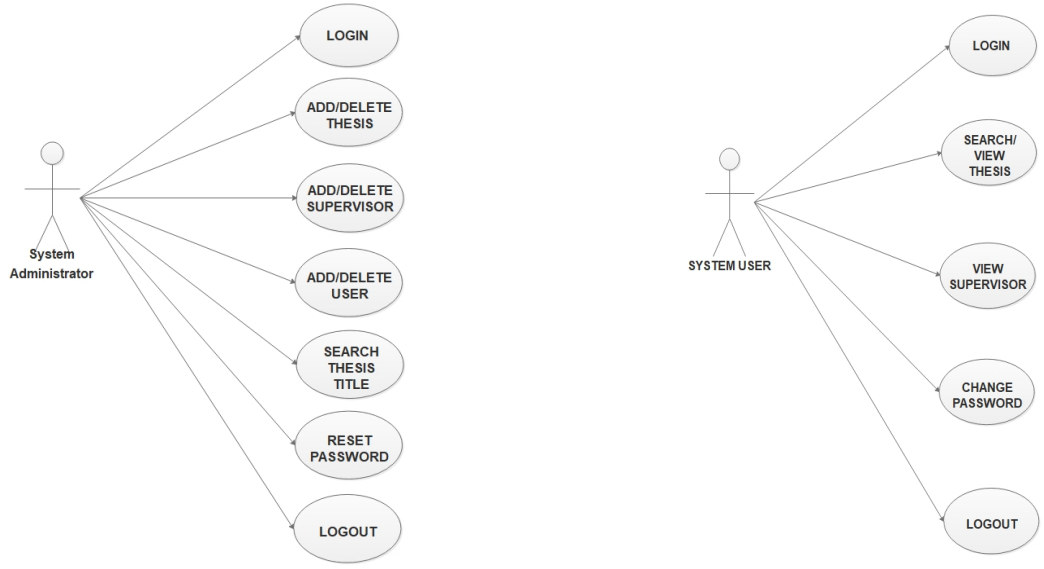


Figure 1: Use-Case diagram of proposed repository

Flowcharts are used in designing and documenting complex processes. Figure 2 shows the diagrammatic representation of the system in terms of the process operations. The process begins with the user having to login. The login operation confirms both the validity and access rights of a user. The user is then offered the process operations of updating repository, creating supervisors, adding thesis, searching for topics, and viewing existing thesis. If the access is not right that user is not valid, then an error message is flagged.

Results

This section presents the results of the implementation of the user interface of the proposed system. There are so many programming languages that can be used to implement this system. To test the effectiveness of the design, PHP and HTML were used with MySQLand JavaScript as the back-end integration database.

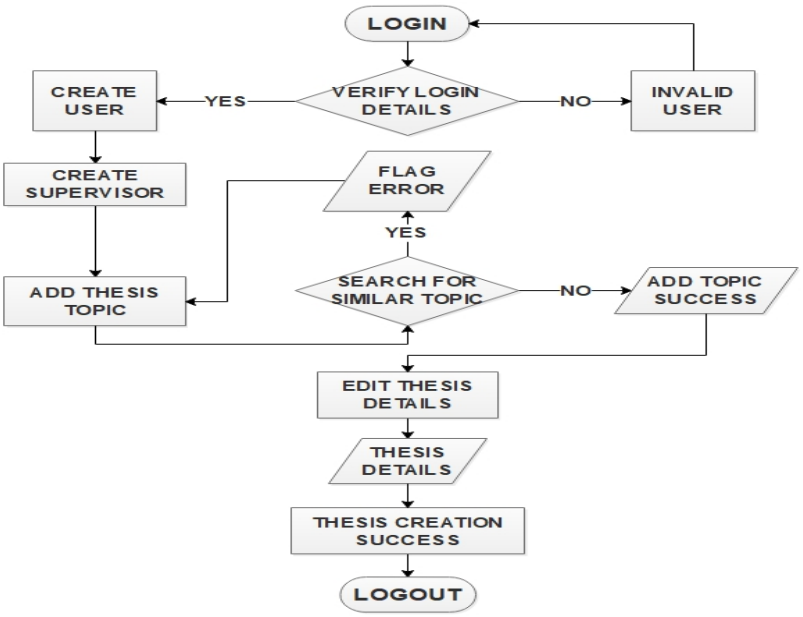
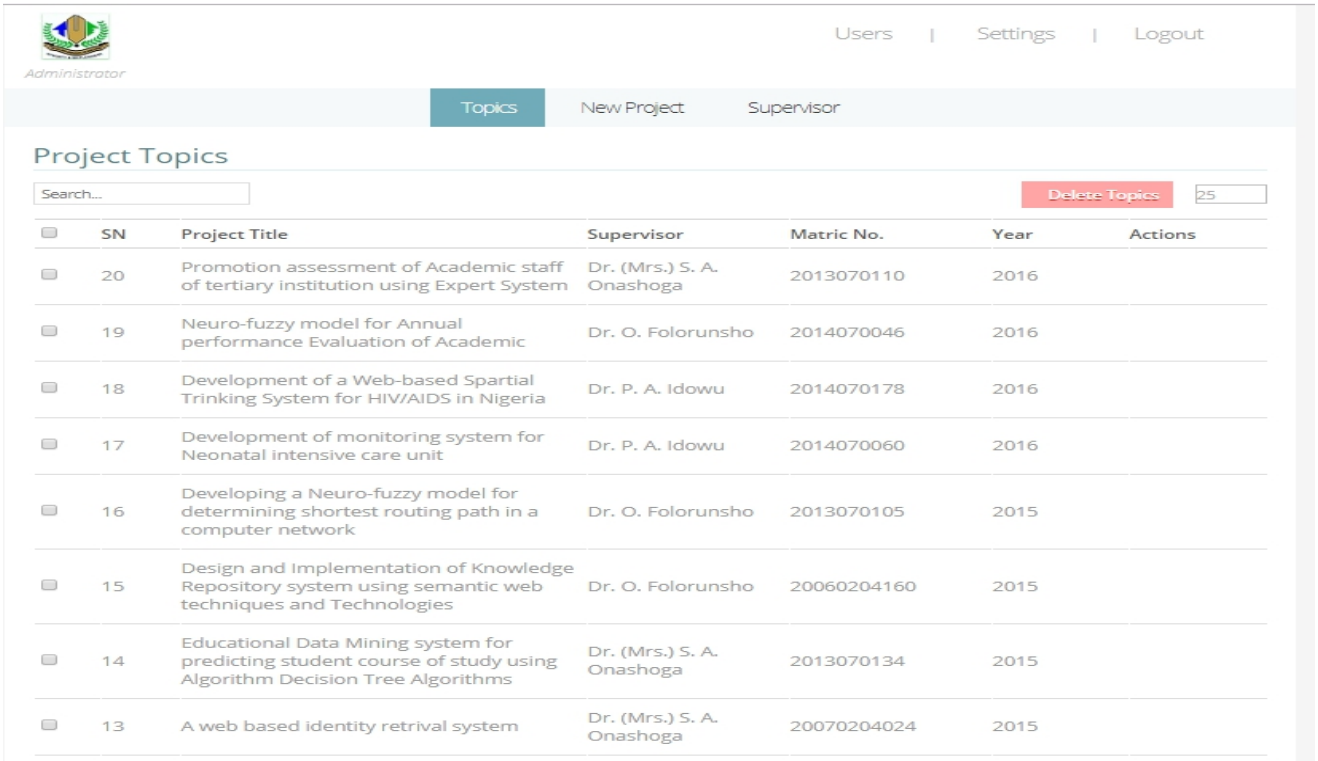


Figure 2: Activity Diagram of Proposed System

Figure 3 shows the home page which is an interface which aids users and administrator to perform certain operations. The home page is an interface that aids the administrator and registered users to perform some operations in the repository. On the home screen of this page is the thesis titles, search bar, new project, supervisors, users, matric no of Masters' students, year of thesis completion, delete topics, settings and log out.



SN	Project Title	Supervisor	Matric No.	Year	Actions
20	Promotion assessment of Academic staff of tertiary institution using Expert System	Dr. (Mrs.) S. A. Onashoga	2013070110	2016	
19	Neuro-fuzzy model for Annual performance Evaluation of Academic	Dr. O. Folorunsho	2014070046	2016	
18	Development of a Web-based Spartial Trinking System for HIV/AIDS in Nigeria	Dr. P. A. Idowu	2014070178	2016	
17	Development of monitoring system for Neonatal intensive care unit	Dr. P. A. Idowu	2014070060	2016	
16	Developing a Neuro-fuzzy model for determining shortest routing path in a computer network	Dr. O. Folorunsho	2013070105	2015	
15	Design and Implementation of Knowledge Repository system using semantic web techniques and Technologies	Dr. O. Folorunsho	20060204160	2015	
14	Educational Data Mining system for predicting student course of study using Algorithm Decision Tree Algorithms	Dr. (Mrs.) S. A. Onashoga	2013070134	2015	
13	A web based identity retrival system	Dr. (Mrs.) S. A. Onashoga	20070204024	2015	

Figure 3: Home Page of the developed system

Figure 4 shows the login page of the proposed system. The login interface contains two fields; the username field and the password field.

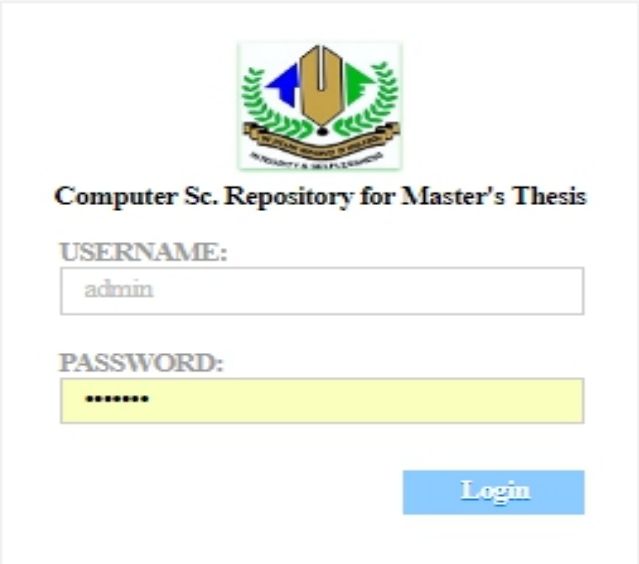


Figure 4: Login Page of Proposed System

These fields are unique to a user and when entered are checked against the entries in the database. There's also a box which says remember me and the forget password in case of resetting your password. This interface gives direct access to the system. It is only the system admin that can add a new thesis topic to the database and the system admin does this by clicking on the *NEW PROJECT* link on the dashboard. Figure 5 shows the interface which the system admin uses to add a new project to the system.

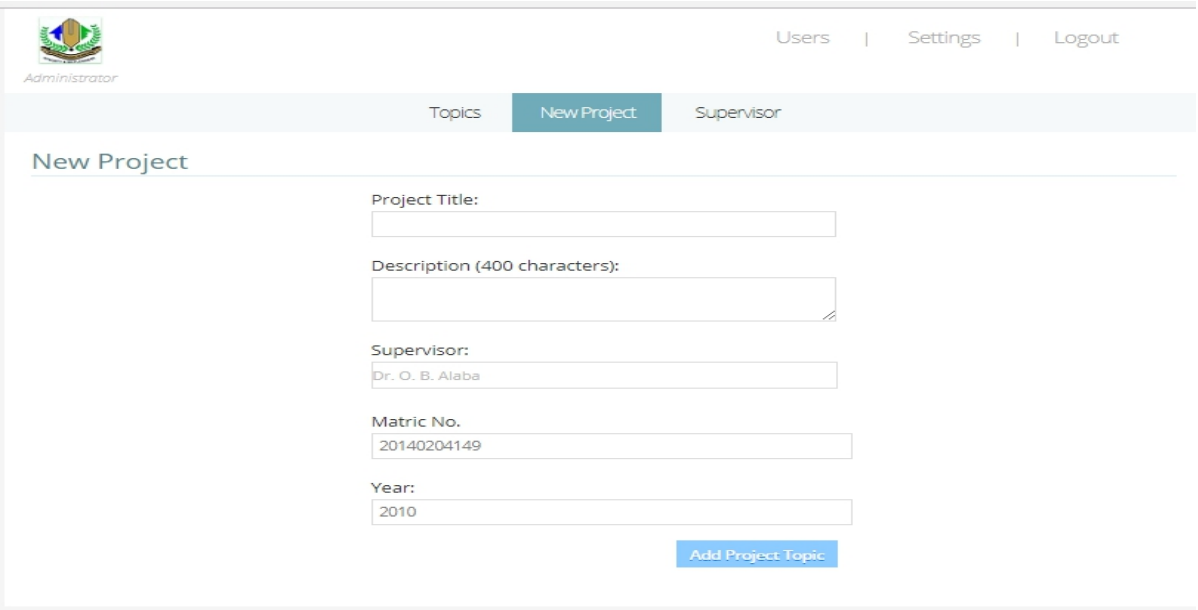


Figure 5: Interface for adding new Thesis

After clicking on the new project, the system admin provides all the necessary details such as the project title, description, supervisor, matriculation number of the student and year of completion. If the new project has not been registered in the repository then the new project will be successfully added. Figure 6 shows the interface for a successfully added project to the system.

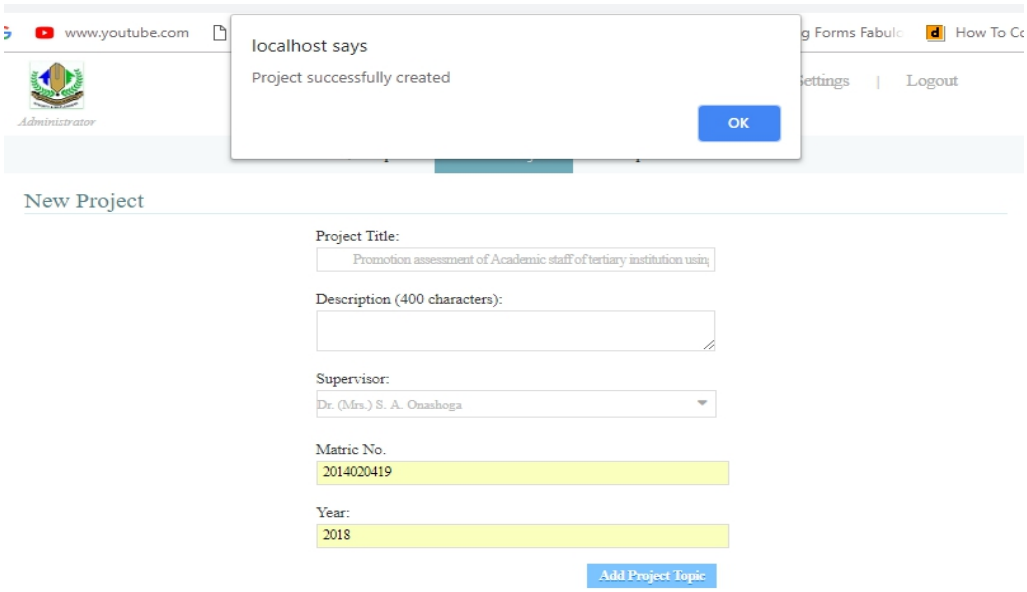


Figure 6: Interface showing a successfully updated Thesis

However, if the project title already exists in the repository there will be a flag warning indicating that the specified topic already exists and thereby restricting the user from choosing the specific thesis title. Figure 7 shows the interface which displays the response for an already added thesis topic.

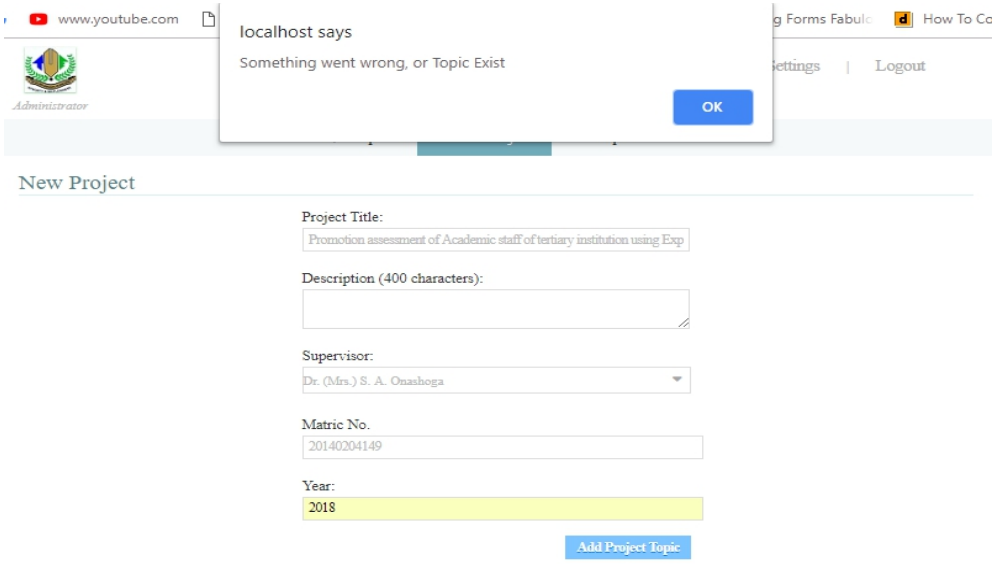


Figure 7: Interface showing an unsuccessful update

The remaining interface shows the view of various information stored on the online repository. Figure 8 shows an interface displaying the list of the various supervisors existing on the system's database. Figure 9 shows the interface which displays the process of adding a new supervisor to the system. Figure 10 shows the interface displaying the list of student users who have been added to the system.

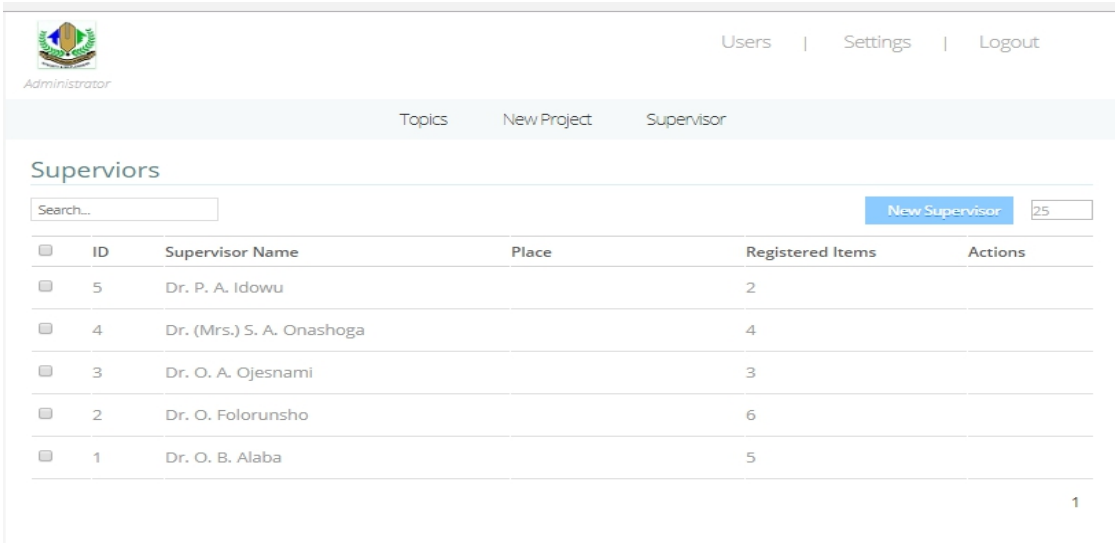


Figure 8: Interface showing List of Existing Supervisors

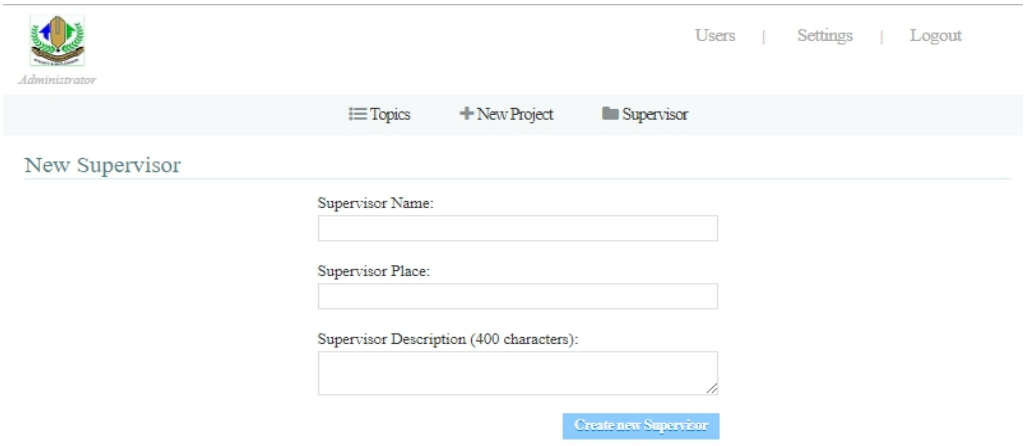


Figure 9: Interface showing the process of adding New Supervisors

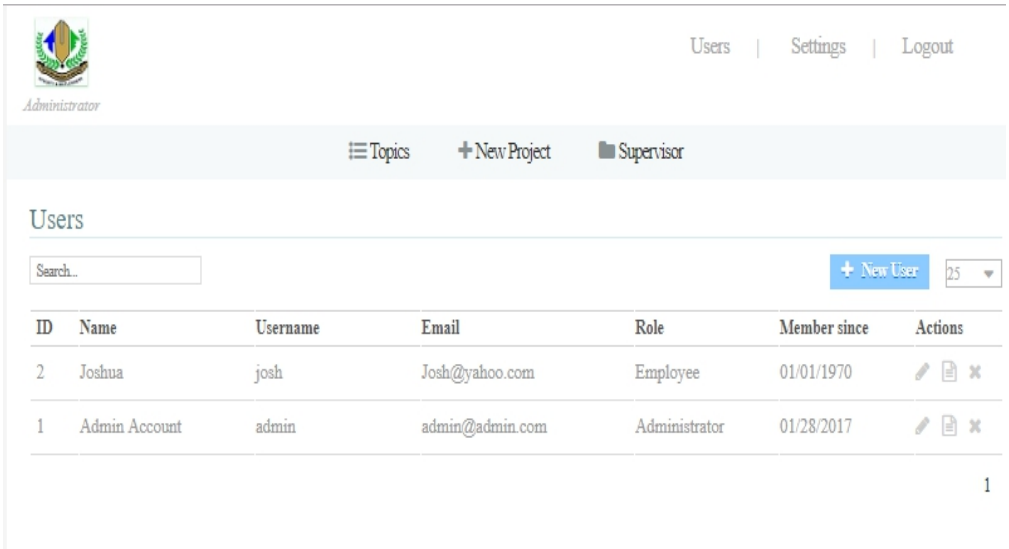


Figure 10: Payment Page of Proposed System

Conclusions

Graduate theses repository serves as a very efficient storage medium for the completed theses by students upon submission to the faculty. It is an improvement on the manual process of handling graduate theses, thereby eliminating the duplication of graduate thesis due to the laziness of some students. Also, students would be able to register to the platform and would only be able to login only when the admin has approved their registration. Registered users will be able to select a thesis topic that does not exist in the repository with the aid of a system that flags the action of an existing topic, when trying to add an already existing topic to the repository thus curbing the duplication of thesis. The ultimate achievements are: the repository has been able to prevent the duplication/replication of past thesis work, it is now a more efficient means of keeping record of past thesis work.

References

Abdulkareem A.A. & Dike, U.I. (2013).Design and development of University portal for the management of final year undergraduate projects.*International Journal of Engineering and Computer Science, 2*(10),2911-2920.

Alhaji, U.A. (2007). Digitization of past question papers, dissertations, and theses. The *International Information & Library Review, 39* (3-4), 228–246.

Bepress (2009) Making the Case for an Institutional Repository to Your Provost.http://works.bepress.com/cgi/viewcontent.cgi?article=1027&context=ir_research

Crane & Greg (2009). Open access and institutional repositories: The future of scholarly communication. Retrieved May 3 from http://www.academiccomms.org/common/review/Gregory-crane

Crow, R. (2002) *The Case for Institutional Repositories: A SPARC Position Paper*. Scholarly Publishing & Academic Resources Coalition, Washington DC.http://www.arl.org/sparc/bm~doc/ir_final_release_102.pdf

Dutta, G. & Paul, D. (2014) Awareness on Institutional Repositories-Related Issues by Faculty of University of Calcutta. *Journal of Library and Information Technology, 34*, 293-297. http://dx.doi.org/10.14429/djlit.34.5138

Eke, H.N. (2011). Digitization of resources for University of Nigeria Repository: Process and challenges. *Webology, 8*(1).

Ghosh, M. (2009). E-theses and Indian academia: A case study of nine ETD digital libraries and formulation of policies for a national service. *The International Information & Library Review, 41*(1), 21-33.

Hornby, A. S. (2010). Oxford Advanced Learner's Dictionary of Current English. 8 Edition, Oxford: Oxford University Press.

Leung C. Lai T. Yuan W. Pang K.T. Tang W. Ho & T. Wong (2015). The development of a final year project management system for Information Technology programmes. Springer-VerlagICTE, CCIS 494, 86-97.

Levy F., Pyles R., Szarejko C., and Wyatt L. (2012). Developing an electronic repository for undergraduate theses. Honors in Practice – Online Archive.Paper 160.

Okoro, C. & Okogwu, F. (2017). Sustenance of Institutional Repositories in Nigerian University Libraries: Issues, Prospects and Challenges. *International Journal of Applied Technologies in Library and Information Management, 3*(2), 10-17.

Park, E., Young-joon, N., & Sanghee, O. (2007).Integrated framework for electronic theses and dissertations in Korean contexts. *The Journal of Academic Librarianship, 33*(3), 338–346.

Romdhani M. Tawse and S. Habibullah (2011). Student project performance management system for effective final year and dissertation projects supervision. In: Society, (Ed.) London International Conference on Education LICE. London, UK, 2011.

Sivan, A. (2013). Open Access Instirutional Repositories: A Briefing Paper. Enabling Open Scholarship (EOS). Retrived from www.openscholarship.org on January 21, 2020.

Schopfel, J., & Soukouya, M. (2012).Providing access to electronic theses and dissertations: A case study from Togo. D-Lib Magazine: The Magazine of Digital Library Research, 19 (11/12).

Soyemi, J. & Isinkaye, F. (2017). A Web-Based Final Year Student Project Duplication Detection System. *International Journal of Computer Applications, 7*(1), 1-7.