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A Web-based System for Final Year Student Project Allocation and Management

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ABSTRACT
In Nigerian universities, the final year project is a requirement for a student to attain a bachelor's degree. The existing process of coordinating the final year project among students and supervisors can be somewhat tedious for project coordinators, especially when the volume of students is large and also inconvenient to students due to constant follow-up for project approval.
OBJECTIVES: This study proposes a web-based system that improves on the existing manual system of final year project management in the Faculty of Computing and Information Science, Al-Qalam University, Katsina, through the design and implementation of a web-based allocation system for final year student project management.
METHODS: An evolutionary model of the software process was employed in the analysis, design and implementation of the proposed web-based system, the system was concurrently designed, implemented and put into operation incrementally for a period of two academic sessions in the faculty of Computing and Information Science, Al-Qalam University. The system was implemented using web technologies such as PHP, Mysql, javascript, HTML and CSS. Observation techniques were used in evaluation of the system.
RESULTS: The operation of the system was observed to ascertain any positive productivity gap with the introduction of the system as compared to the manual system. The results of the evaluation indicated an improvement over the existing manual system. and confirmed that the system is useful to its users.
CONCLUSION: With the advancement in Information technology, there is always room for improvement on existing systems. The work described in the study addresses some inefficiencies with the final year project management activity in the faculty of Computing and Information Science, Al-Qalam University.

Keywords:
Web-based System,
Student,
Coordinator,
Supervisor

INTRODUCTION

In Nigerian universities, the final year project is a requirement for a student to attain a bachelor's degree. It also contributes to assessing the skills and experience acquired by students over the years (Nisha, Prashanth, Preethika and Deepak, 2021; Bhavesh et al. 2022). The final year project usually runs for a duration of one academic session (Nisha, Prashanth, Preethika and Deepak,2021), specifically the final academic session. In addition, it is usually coordinated by a project coordinator. The project coordinator oversees the activity of the final year project. From accepting the topic proposed by student and approving or rejecting the proposed topic, to assigning supervisor to student, scheduling the student defence and aggregating and compiling the students project score. The existing process of coordinating the final year project among students and supervisors can be somewhat tedious to project coordinators, especially when the volume of students is large. It can also be inconvenient to students due to constant follow up for project approval. As an example, scenario, every student has to submit a proposed topic to the project coordinator, the coordinator in turn has to go through every topic to ensure no duplication of topic and proposed topic meet a required standard before approval. Students have to constantly follow up to ensure they have a project topic approved. After the approval process, each student is assigned a supervisor to guide the student through the project. Various research works have proposed an electronic system to address similar final year project management issues. For instance Nisha Prashanth, Preethika and Deepak. (2021), Bhavesh et al. (2022), K Thanuja et al. (2023), Md Rawshan et al. (2023) and Chun-Hang et al. (2015),

proposed final year project allocation, review and mailing system between the supervisor and the student, facilitating communication amongst supervisor and student, the system is able to facilitate easy tracking of student project progress and provision of timely feedback to students.

Abidah et al. (2020), Saadia et al. (2018) and Adamu, (2020) proposed a platform with a project archiving feature, their system will help students in generating project ideas by having easy access to the archived final year project.

Mychael (2018) and Arman, Sutedi and Melda, (2019) implemented a mobile based platform for project monitoring, the platform has some similar features to K Thanuja et al. (2023), Bhavesh et al. (2022),Abidah et al. (2020) and Saadia et al. (2018).

M. H. Hasan et al. (2009) proposed a project title selection system that replaces a system of project title approval based on first to propose, their proposed system allows students to propose ten project titles and allocate one of these titles to students,

The above highlighted studies have addressed final year project management issues such as project archiving, final year project stakeholder collaboration, project review and progress tracking, topic selection e.t.c. There has not been much work on improving the project allocation process, specifically in the area of supervisor allocation and topic approval process. The proposed system allows for students to propose three project topics and three preferred supervisors through a fair distribution algorithm (for supervisor selection i.e there is a weight-wise, even, rotational and student-friendly allocation of students to supervisors). The system then randomly chooses a supervisor for students from their preferred selection. Thereby improving the satisfaction of students in the supervisor allocation and topic approval process, allowing project coordinators to perform their task almost effortlessly, and helping supervisors and examiners to effortlessly keep record of students allocated to them.The rest of the paper contains the related work, methods, system evaluation and the conclusion of the study.

MATERIALS AND METHODS

This study employs an evolutionary model of the software process to analyse, design and implement the proposed web-based system, evolutionary model was employed to hasten the operation of the system, thus, providing few deliverables that are useful to the system users repeatedly. Consequently, the system was concurrently designed, implemented and put into operation incrementally for a period of two academic sessions in the faculty of Computing and Information Science, Al-Qalam University. Figure 1 describes the working description of an evolutionary development.

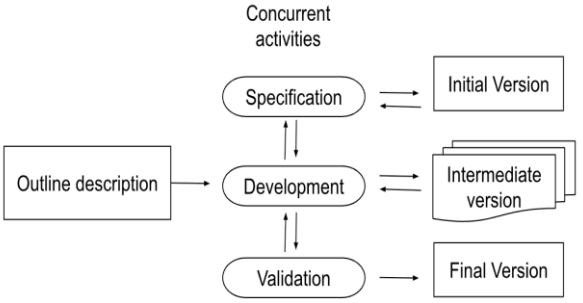

Figure 1 Evolutionary Development

The system was implemented using web technologies such as PHP, Mysql, javascript, HTML and CSS. Observation technique was used in evaluation of the system, i.e the operation of the system was observed to ascertain any positive productivity gap with the introduction of the system as compared to the existing manual system.

System Analysis

In the implementation of a software system, system analysis was conducted to obtain an explicit understanding of the system requirements and functionality (Ian, 2015). The system. The system comprises four types of users, namely, the administrator, project coordinator, supervisor and student. And five modules, namely, Administration Management, Staff Management, Student Management, Allocation Management and Result Management. The following subsections provide the overview analysis and requirement specification of the system.

Overview Analysis

Administration Management: This module allows the administrator to keep record of faculty and department in the university, the administrator can also use the module to switch and view logs of activity of previous academic sessions of the project, and also to activate new sessions.

Staff Management: This module allows administrator and project coordinators to manage record of the university staff eligible for project supervision and examination, also to assign supervisor and examiner role to staff with suitable weight (where weight indicate the maximum number of students that can be allocated to a supervisor, the higher the weight the fewer the students assigned) and manage the supervisor and examiner record.

Student Management: This module allows the project coordinator to add and import records of students to undergo a project in a given academic session, the module also allows students to select their choice of supervisor and also to propose a project topic.

Allocation Management: This module allows project coordinator to approve and reject project topics,

supervisor and examiner interact with the module to view the list of students allocated to them and also to approve students for their project defence and submission. The module is also responsible for automatically assigning a supervisor to students out of his/her selected choices of supervisor, and also allocating students to examiners.

Result Management: Allow project coordinator to upload project result of student, supervisor and examiner can also upload the result of student allocated to them, students are able to view their project score.

Requirement Specification

The requirement specification is a crucial aspect of the system analysis, as it describes the services of the system in a structural, concise and specific manner (H.S Bahera & Phillip and Mohamad, 2022), table 1 below presents the requirement specification of the proposed system.

Table 1: Proposed System Requirement Specification

Requirements	**Descriptions**	**Stories**
R1:Login	The login function presents users with a login form, the users are then expected to input their login details (username and password), users are granted access to the system if the details are correct, otherwise, they are denied access.	**R1.1: Login** **Input**: username & password **Output**: access to the system **Processing**: access is granted to users only if username & password is correct, otherwise, they are denied access.
R2: Create Account	The create account function firstly presents the student user with a student account form, the student user is then expected to provide the required information to create his/her account. The student account is then created for only students that are eligible to undertake final year projects for the given session.	**R2.1: Create Account** **Input:** required information to create a student account. **Output:** Notification for successful account creation. **Processing:** account is created if the student user is eligible for final year projects.
R3: Select Supervisor	The select supervisor function presents the student user with a form to select three choices of supervisor. The list of supervisors in the form varies based on the current allocation status.The student users are expected to select and submit their three choices from the list. The system then randomly assigns one of the supervisors to the student, and navigates to the submit topic form interface.	**R3.1: Select Supervisor** **Input**: three choices of supervisor from the list of supervisors provided. **Output**: Submit topic form. **Processing**: Randomly assigns one of the three choices of supervisors to the student, if all three choices selected, otherwise output an error notification
R4: Submit Topics	The submit topic function presents the student user with a form to input his/her three proposed project topics. The student users are then expected to submit their three proposed project topics, thereafter the student user is	**R4.1: Submit Topics** **Input:** Three proposed project topics. **Output:** Dashboard page **Processing**: Navigate to dashboard page, if all three proposed project topics are

	directed to the dashboard page.	submitted, otherwise output an error notification.
R5: Dashboard Page	The dashboard page presents the student user with vital information relating to their project status. The student user finds pending notification when his/her project topics have not been approved/rejected in the page, when the project topic is approved, the student user finds his/her supervisor, examiner, the approved topic e.t.c.	**R5.1: Dashboard Page** **Input**: Logging into the system. **Output**: Dashboard Page **Processing**: access to the dashboard page is granted to the student user if username & password is correct, otherwise, they are denied access.
R6: Manage Topic	The manage topic function presents the project coordinator user with the records of proposed topics submitted by student users along with action (approve/reject, edit). That can be performed on each record. The project coordinator user is expected to approve or reject the topic, change topic by editing the record.	**R6.1: View Topic** **R6.2: Approve/Reject Topic** **Input:** user selected topic record for approval/rejection. **Output:** Notification of approval/rejection of topic. **R6.3: Change Topics** **Input:** user selected topic record and the new topic information. **Output:** Notification of successful change of topics.
R7: Manage Allocation	The manage allocation function presents the project coordinator and supervisor user with the records of student allocation. The project coordinator can view all supervisor users' allocation and can also change an allocation record and release a student for defence or project submission. The supervisor user can only view his/her allocation and release students.	**R7.1: View Allocation** **R7.2: Edit Allocation** **Input:** Required information about the new allocation such as supervisor, examiner, project topic. **Output:** Notification of successful change of allocation. **R7.3: Release Student** **Input:** user selected allocation record for approval. **Output:** Notification of successful approval for defence or submission.

R8: Manage Student	The manage student function presents the project coordinator and administrator user with the records of project students. The project coordinator can add, import, and edit records of students to undergo projects from his/her department. The administrator can also do the same for every department.	**R8.1: View Student** **R8.2: Add Student** **Input:** Required student information. **Output:** Notification of successful Registration **Processing:** Student information is added if all required information is provided correctly, otherwise output an error notification. **R8.3: Import Student** **Input:** Required student information in a specified excel template format. **Output:** Notification of successful Registration **Processing:** Student information is added if all required information is provided correctly, otherwise output an error notification. **R8.3: Edit Student** **Input:** user selected student record and the required student information. **Output:** Notification of successful changes. **Processing:** Student information is changed if all required information is provided correctly, otherwise output an error notification.
R9: Manage Staff	The manage staff function presents the project coordinator and administrator user with the records of the university academic staff. The project coordinator can add and edit records of staff and also can remove or assign a staff member as a supervisor to supervise projects from his/her department.	**R9.1: View Student** **R9.2: Add Staff** **Input:** Required staff information. **Output:** Notification of successful Registration **Processing:** Staff information is added if all required information is provided correctly, otherwise output an error notification. **R9.3: Edit Staff** **Input:** user selected staff record and the required staff information. **Output:** Notification of successful changes. **Processing:** Staff information is changed if all required information is provided correctly, otherwise output an error notification.

		R9.4: Assign Supervisor **Input:** user selected staff record **Output:** Notification of successful assignment **R9.4: View Supervisors** **R9.5: Remove Supervisor** **Input:** user selected staff record **Output:** Notification of successful assignment
R10: Manage Faculty	The manage faculty function presents the administrator user with the records of faculties in the university. The administrator can add and edit faculty, and also edit departments within faculties.	**R10.1: View Faculty** **R10.2: Add Faculty** **Input:** Required faculty information. **Output:** Notification of successful Registration **Processing:** Faculty information is added if all required information is provided correctly, otherwise output an error notification. **R10.3: Edit Faculty** **Input:** user selected faculty record and the required faculty information. **Output:** Notification of successful changes. **Processing:** faculty information is changed if all required information is provided correctly, otherwise output an error notification. **R10.4: Add Department** **Input:** Required department information. **Output:** Notification of successful Registration **Processing:** Department information is added if all required information is provided correctly, otherwise output an error notification. **R10.5: View Department** **R10.3: Edit Department** **Input:** user selected department record and the required department information. **Output:** Notification of successful changes. **Processing:** department information is changed if all required information is provided correctly, otherwise output an error notification.

R11:Manage Session	The manage session function presents the administrator user with the records of academic sessions of the project. The administrator can switch and view logs of activity of previous academic sessions of the project, and also to activate new sessions	**R11.1: View Sessions** **R11.2: Activate Session** **Input:** user selected session**.** **Output:** Activation of project activity for the selected session.
R12:Manage Result	The manage result function allows the supervisor, project coordinator to upload project scores while it presents the project coordinator and administrator user with the records of student project score. Also allow them to download the score sheet.	**R12.1: Upload Result** **Input:** Required project score information in a specified excel template format**.** **Output:** Notification of successful upload **Processing:** Student project score is uploaded if all required information is provided correctly, otherwise output an error notification. **R12.2: View Result** **R12.3: Download Result**

System Design

System design defines the flow of operation of a system, its interaction between users and communication between components etc (Alan, Barbara and Roberta, 2012). The following section presents the use case, activity and entity relationship model of the proposed system.

Use Case Model

The use case model of the system abstractly illustrates how each of the system users interact with the system service, the following figure 2 is the use case model of the project allocation system.

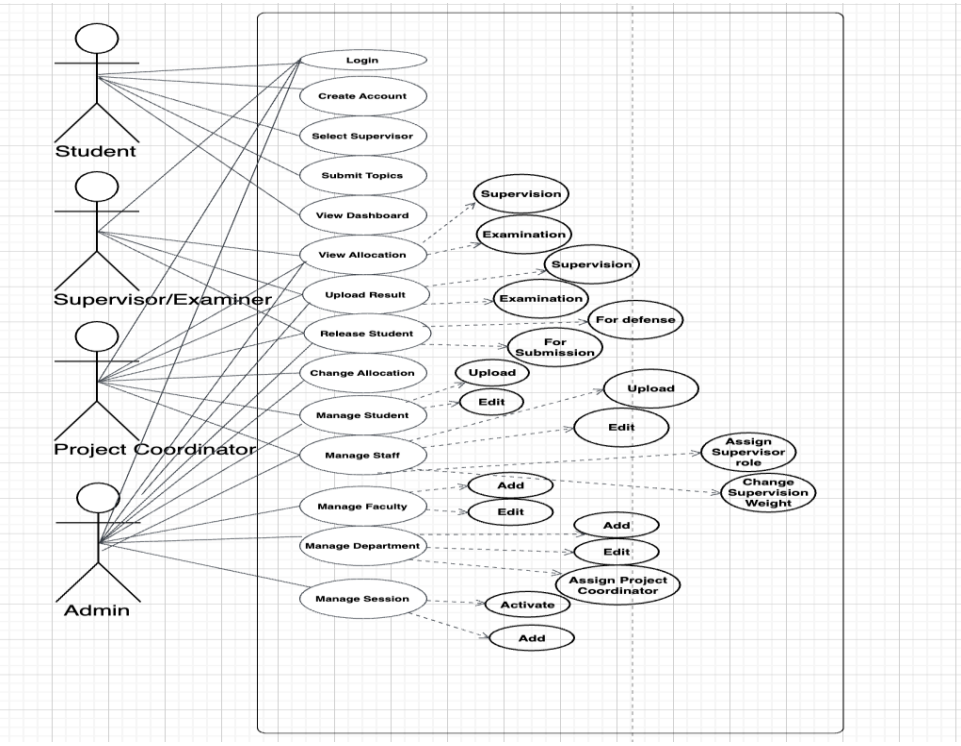

Figure 2 Project Allocation Use Case Model

Figure 2 presents the use case model of the system, the following tables 2 and 3 provide the description of the use case model.

Table 2: Use Case Actors Description

Actors	**Description**
Student	An actor of the system that represents the final year project student, they interact with the system by creating an account, proposing a project topic and accessing their dashboard.
Supervisor	An actor of the system that represents the project supervisor, they interact with the system by logging in, managing their student allocation and uploading project results.
Project Coordinator	An actor of the system that represents the project coordinator, they interact with the system by logging in, managing staff, student, student allocation, and project results.
Administrator	An actor of the system that represents the system administrator, the admin has access to all the system services.

Table 3: Use Case Cases Description

Case	Description	Pre condition	Post condition
Create Account	Depict the scenario where a student user attempt to create an account in the system	Access to the account creation form	Notification of successful account creation if required information are filled correctly, otherwise error notification
Login	Depict the scenario where a user attempt to login to the system	Access to the system login interface	Menu options to access system services if login details are correct, otherwise access is denied.
Select Supervisor	Depict the scenario where a student user attempt to select his/her choices of supervisors from available list	Login to the system	Access to the submit topics form
Submit Topics	Depict the scenario where a student user attempt to submit their proposed project topic	Selection of supervisor	Access to the student dashboard
View Allocation	Depict the scenario where a project coordinator or supervisor user attempt to view project student allocation	Navigation to the allocation management service	Menu options to navigate to other system services
Upload Result	Depict the scenario where a project coordinator or supervisor user attempt to upload project student score	Navigation to the result management service	Notification of successful upload along with Menu options to navigate to other system services

Release Student	Depict the scenario where a project coordinator or supervisor user attempt to release a student for defence or project submission	Access to the allocation view	Notification of successful release of the student along with Menu options to navigate to other system services
Change Allocation	Depict the scenario where a project coordinator or administrator user attempt to edit an allocation record	Access to the allocation view	Notification of successful change of the allocation record along with Menu options to navigate to other system services
View Student	Depict the scenario where a project coordinator or administrator user attempt to view project student	Navigation to the student management service	Menu options to navigate to other system services
Add Student	Depict the scenario where a project coordinator or administrator user attempt to add or upload records of project student	Navigation to the student management service	Notification of successful operation along with Menu options to navigate to other system services
Edit Student	Depict the scenario where a project coordinator or administrator user attempt to edit an allocation record	Access to the student view	Notification of successful edit of the student record along with Menu options to navigate to other system services
Add Staff	Depict the scenario where a project coordinator or administrator user attempt to add or upload records of the university academic staff	Navigation to the staff management service	Notification of successful operation along with Menu options to navigate to other system services
Edit Staff	Depict the scenario where a project coordinator or administrator user attempt to edit a staff record	Access to the staff view	Notification of successful edit of the staff record along with Menu options to navigate to other system services
Assign Supervisor	Depict the scenario where a project coordinator or administrator user attempt to assign a staff a supervisor role	Access to the staff view	Notification of successful assignment along with Menu options to navigate to other system services
Remove Supervisor	Depict the scenario where a project coordinator or administrator user attempt to remove the role of supervisor from a staff	Access to the supervisor view	Notification of successful removal along with Menu options to navigate to other system services
Add Session	Depict the scenario where a project coordinator or administrator user attempt to add a new academic session of project	Navigation to the session management service	Notification of successful operation along with Menu options to navigate to other system services
Activate Session	Depict the scenario where a project coordinator or administrator user attempt to activate an academic session of project	Navigation to the session management service	Notification of successful operation along with Menu options to navigate to other system services

Add Department	Depict the scenario where the administrator user attempt to add records of department in the university	Navigation to the department management service	Notification of successful operation along with Menu options to navigate to other system services
Edit Department	Depict the scenario where the administrator user attempt to edit the department record	Access to the department view	Notification of successful edit of the department record along with Menu options to navigate to other system services
Assign Project Coordinator	Depict the scenario where the administrator user attempt to assign a staff a project coordinator role	Access to the department view	Notification of successful assignment along with Menu options to navigate to other system services
Add Faculty	Depict the scenario where the administrator user attempt to add records of faculty in the university	Navigation to the faculty management service	Notification of successful operation along with Menu options to navigate to other system services
Edit Faculty	Depict the scenario where the administrator user attempt to edit a faculty record	Access to the faculty view	Notification of successful edit of the faculty record along with Menu options to navigate to other system services

Activity Model

The activity models of the system illustrate the flow of activity or the interactions each kind of user can have with the system. Figure 3, 4 and 5 presents the activity models for student, supervisor and project coordinator users respectively.

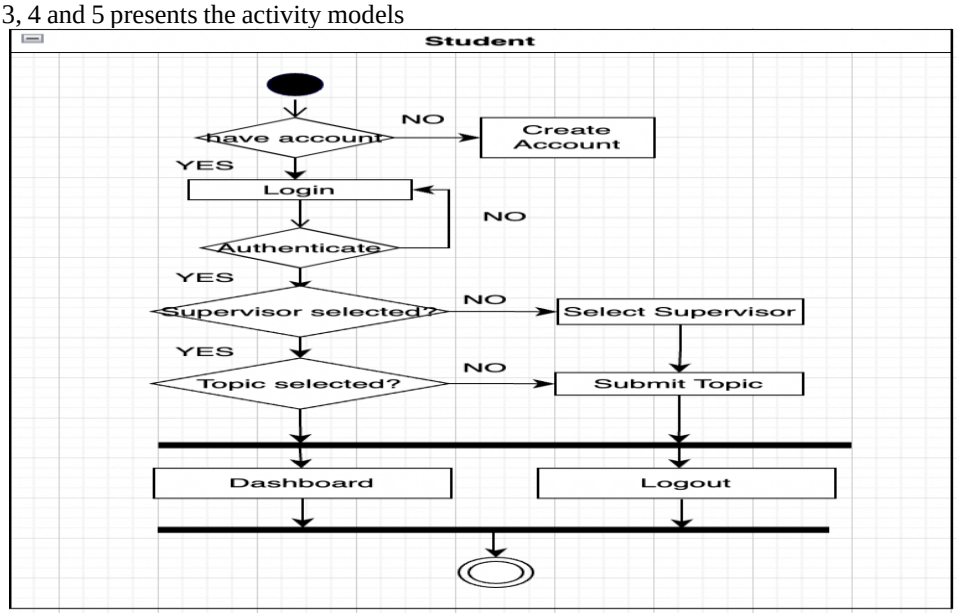

Figure 3 Student Activity Model

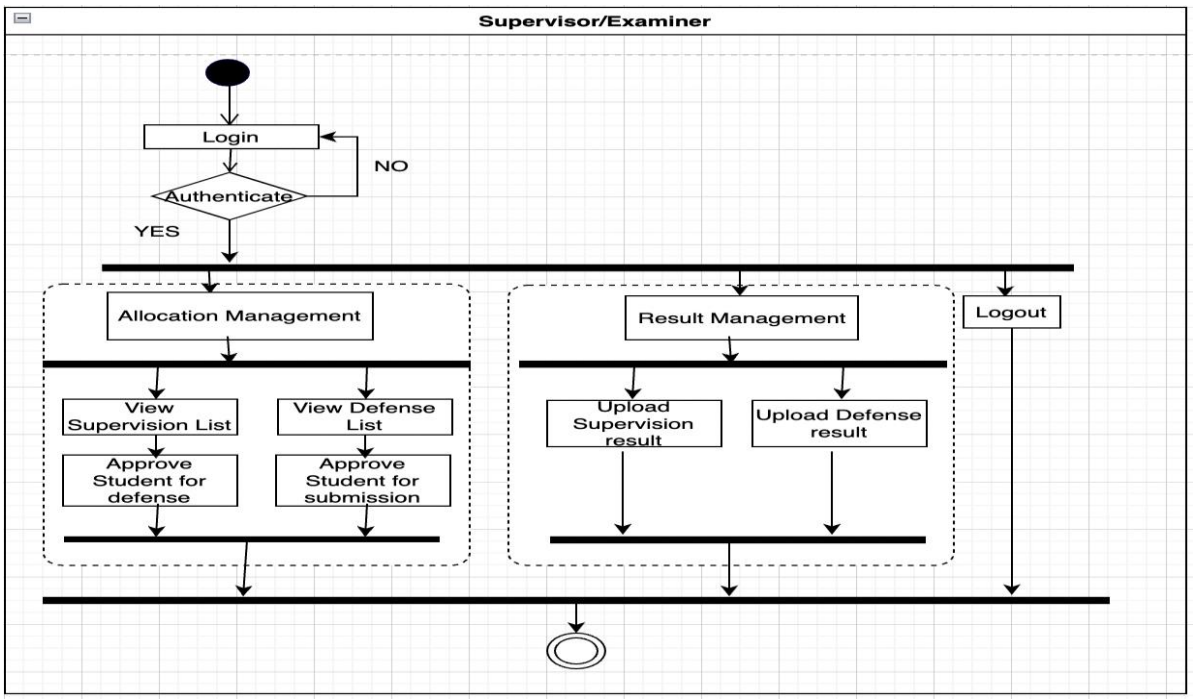

Figure 4 Supervisor and Examiner Activity Model

Figure 3 is the student user activity model of the system, the figure illustrates how a student user interacts with the system, right from creating an account, logging in, proposing a project topic and supervisor, to having access to his/her dashboard and logging out. Figure 4 presents the activity model of the supervisor user, the supervisor user has access to two modules in the system, the allocation management module, for maintaining record of his/her allocation and releasing students for defence or submission. And the result management module for uploading student project scores.

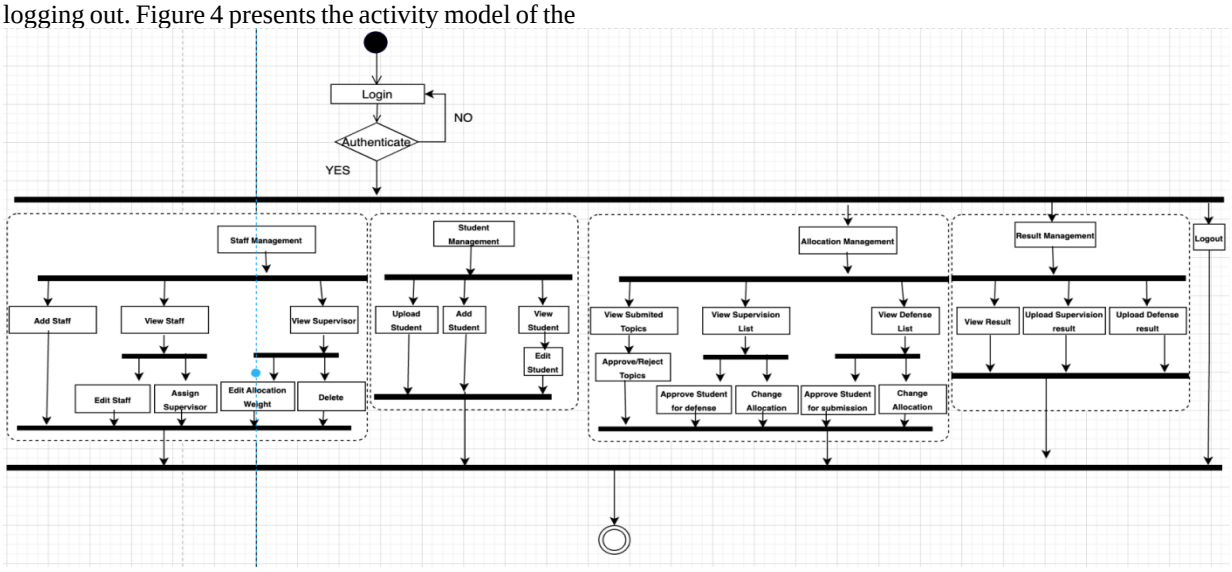

Figure 5 Project Coordinator Activity Model

Figure 5 is the project coordinator activity model, the project coordinator has access to four modules in the system, the staff management module, to maintain record of staff and supervisor , student management module, to maintain record of staff and supervisor, allocation management module, to maintain record of his/her supervisors allocation and result management module, to maintain the record of student project score.

Entity Relationship Model

The entity relationship model of the system represents the format of information stored in the system and the

relationship between the information. The system is made up of eight entities namely staff, supervisor,student, department, faculty, topic, session, result and allocation.

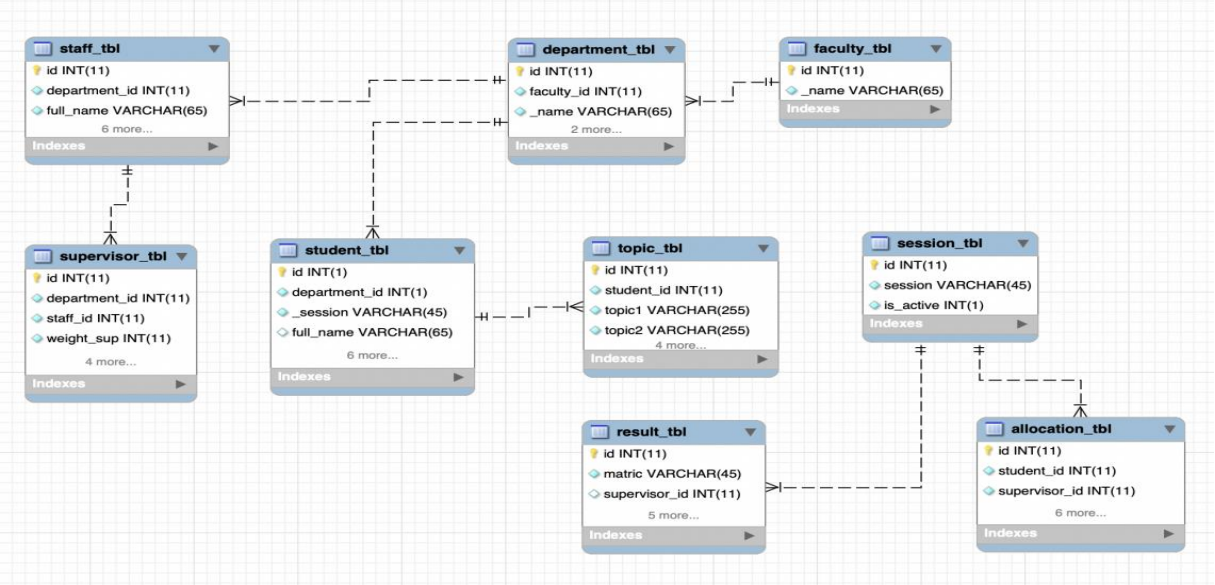

Figure 6 Entity Relationship Model of the system.

System Architectural Model

Figure 7 describes the system architectural model, a centralised principle of client-server approach; the various system users access the system services via a web browser and internet connectivity. The server receives HTTP (HyperText Transfer Protocol) requests and respond appropriately to the requesting client.

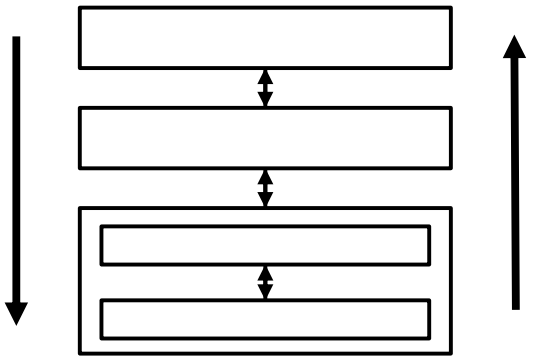

Figure 7 System Architectural Model

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System Implementation Tools

The system was implemented using network technologies such as PHP, Mysql, Javascript,HTML and CSS. The PHP (Hypertext Preprocessor) is a scripting language popularly used for developing applications that communicate over the network (Adrain and Steve, 2018). Mysql is a relational database management system, mostly used with PHP for developing databases for web applications. HTML, CSS and Javascript are used to define the frontend of a web application. In addition, javascript performs some dynamic processing in a web application.

RESULTS AND DISCUSSION

An observation technique was used to evaluate the system, i.e the operation of the system was observed to ascertain any positive productivity gap with the introduction of the system as compared to the existing system. The results of the observation indicated an improvement over the existing manual system. and the system offers benefits to its users as follows.

Project coordinator benefit from the system in the following ways:

- Effortlessly allocate supervisor to students as the allocation process is automated.
- Easily approve or reject student topic proposals as coordinators can search a proposed topic to identify topic duplication before making a decision.
- Effortlessly process project results as the system only needs to be supplied the student project score sheet, for it to process and generate the entire project result.

The student users benefit from the system in the following ways:

- Timely and efficient feedback on their topic submission as a student does not need to constantly follow up with the coordinator on their project submission, they can easily login into the system to view their submission status,

and when a proposal is rejected, they can easily resubmit a new proposal.

- Friendly supervisor allocation process: Students are given the choice to select three supervisors, and out of these three supervisors one is allocated to them.

Lastly, the supervisor users benefit from the system by effortlessly keeping record of the student allocated to them, as all they need to do is to login into the system and view their allocation record.

CONCLUSION

In Nigeria universities where final year projects are a requirement for a student to attain a bachelor's degree. A project coordinator oversees the activities of the final year project. From accepting topic proposals from students and approving or rejecting the proposed topic, to assigning supervisor to student, scheduling the student defense and aggregating and compiling the students project score. The existing process of coordinating the final year project among students and supervisors can be somewhat tedious to project coordinator, especially when the volume of students is large and also inconvenient to students due to constant follow up for project approval. With the advancement in information technology, there is always room for improvement on existing systems. The web-based system proposed in this study aims to address some existing inefficiencies with the final year project management activity, associated with project coordinators, supervisors and students. The proposed system was put into operation in the faculty of computing and information science, Al-Qalam University. And also evaluated using observation techniques, the result of the evaluation indicated an improvement over the existing manual system, and the system is useful to its users.

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