Program of study:

Bachelor Of Science (Hons) in Computing

COMP 1640

Enterprise Web Software Development

Link to screencast:

https://drive.google.com/file/d/1taH3jrk65hXgzOhfSFPy08XALShAQfeK/view?usp=drive_link

Link to code repository:

https://github.com/fish-afk/Uog_COMP1640_Group1_EWSD_Assignment_2023_24

Name	Banner ID	Team role
Abdul Qadir Moinuddin Patel	001355374	Scrum Master/Programmer
Shihab Mirza	001356993	Programmer/Database Engineer/Web designer
Chikondi Banda	001356376	Web Designer/Product Owner
Fatimah Amin	G20023(ZCAS)	Web Designer/Information Architect
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Kombe Chibuta	202002473(ZCAS)	Programmer/Tester
Abhinav Maddineni	202001972(ZCAS)	Database Engineer/Tester
Fredrick Mwansa Bwalya	G12084(ZCAS)	Web Designer
Kelvin Chaimakana	G17048(ZCAS)	Database Engineer

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1. Introduction

Higher education is always changing, and universities all around the world are committed to pursuing innovation and excellence in their curricula. It is necessary that universities constantly look for new ways to improve and adapt to the evolving demands of their students because they are institutions dedicated to the progress of learning and the betterment of society. In light of this, this group report provides a thorough analysis of the development of a secure web-enabled role-based system intended to enable university staff to submit their ideas for improving and developing the university. By utilizing the agile scrum methodology, the development team has worked as a unified group to swiftly and effectively bring these ideas to life.

1.1. System Requirements and Functionality:

The described web-enabled role-based system is designed to facilitate quality improvement initiatives within a university, allowing staff members to submit ideas, discuss them, and promote quality assurance across various departments. In order to fulfil the requirements, the system can be built to work as follows.

1.1.1. Quality Assurance Manager (QA Manager): The QA Manager is the highest-level role in the system, responsible for overseeing the entire quality assurance process. They have the following functions:

- Adding and managing categories for ideas.
- Deleting unused categories.
- Exporting all data after the final closure date in a CSV format and any uploaded documents in a ZIP file.
- Blocking users from posting further ideas and comments (disabling user accounts).
- Hiding all ideas and comments by a user and disabling the user account.
- Undoing actions to unblock users and unhide ideas and comments.

1.1.2. Department QA Coordinators: Each department has a QA Coordinator who is responsible for managing the quality assurance process within their department. Their primary role is to oversee the ideas submitted by their department and encourage staff to participate. They receive email notifications when new ideas are submitted.

1.1.3. Staff (Academic and Support): All staff members have the opportunity to submit one or more ideas after agreeing to the system's Terms and Conditions. They can also optionally upload supporting documents for their ideas. Staff can:

- Submit ideas, categorize them, and add tags.
- Comment on any idea.
- Give Thumbs Up or Thumbs Down for any idea (only once for each idea).
- Receive automatic email notifications when comments are made on their ideas.
- Report inappropriate posts, such as swearing or libel.

1.1.4. Idea Submission and Management:

- Ideas can be posted anonymously, but user details are stored in the database.
- New ideas are disabled after a closure date for new submissions, but comments can continue until a final closure date.
- The system automatically notifies the Department's QA Coordinator when an idea is submitted.

1.1.5. User Interface:

- The web interface is designed to be responsive and suitable for all devices, including mobile phones, tablets, and desktops.

1.1.6. Lists and Pagination:

- Lists of Most Popular Ideas (based on Thumbs Up and Thumbs Down), Most Viewed Ideas, Latest Ideas, and Latest Comments are available to all users.
- Lists of ideas are paginated, typically displaying 5 ideas per page.

1.1.7. Administrator:

- An administrator role is responsible for maintaining system data, including setting closure dates for each academic year and managing staff details.

1.1.8. Statistical Analysis:

- The system provides statistical analysis capabilities, such as tracking the number of ideas per department.

1.1.9. User Reminders:

- The system reminds users of the date and time of their last login or welcomes them if it's their first login. This helps improve security and user engagement.

1.1.10. Monitoring and Reporting:

- The administrator can access reports that show which pages are most viewed, identify the most active users, and track the usage of different browsers.

1.1.11. Blocking and Hiding Actions:

- The QA Manager can block users from posting ideas and comments and hide all ideas and comments by a user, effectively disabling the user account.
- The QA Manager can also undo these actions if necessary, restoring user privileges and making ideas and comments visible again.

2. Aims and Objectives

2.1. Aims

This project aims to implement a web-based system using the agile scrum methodology that will be used to collect ideas and other information from the staff of a university. It will enable users to input ideas that can potentially help improve the university. It will also enable certain members such as Quality Assurance Manager, Quality Assurance Coordinator and Admin to view and create reports of statistical information based on the departments and roles of the university.

2.2. Objectives

The following are the objectives of the system:

- Utilization of the Agile Scrum Methodology
- Creating the Documentation
- Database Design and Development
- Site Design and Development
- Implementation of site functionality
- Create test plan and carry out site testing
- Presentation of the developed system

2.3. Assumptions

- The admin is in charge of keeping the system up to date; as such, they have access to all data and may make any required modifications.
- The QA coordinator has access to department members' ideas and users inside their department.
- The role will be picked when signing up and the role of their choice will be assigned to newly registered users.
- When submitting an idea's supporting document, users can only upload one file.
- The system needs to comply with all applicable privacy and data protection laws.

- To track and oversee the project's progress, the team will employ the Agile Scrum methodology, which will also be utilized to handle role definition and meeting scheduling.

3. Agile Scrum Methodology

3.1. Introduction

The agile scrum methodology was chosen to carry out the development of this system. In this chapter we shall also discuss matters related to the Scrum Team, Minutes of meetings, Sprints, Product backlogs, User stories and display a burndown chart.

3.2. Methodology

Teams utilize Scrum, a management methodology, to self-organize and collaborate toward a common objective. It outlines a number of responsibilities, meetings, and resources for effective project delivery. Scrum techniques let teams learn from experience, be flexible, and self-manage. (AWS, 2023)

The scrum framework stipulates that the scrum team must provide features within predetermined intervals known as sprints. A Sprint Review Meeting is held to discuss progress after the team is given a set of goals to accomplish at the conclusion of the sprint. It should be mentioned that until the sprint is over, the team will not accept any modifications. (Sachdeva, 2016)

It is well known that the Scrum framework permits flexibility in the project development procedure. At any stage of the development process, the requirements of the system may change or be perceived differently. Scrum responds effectively to these developments since the team may incorporate them into the following sprint. (Sachdeva, 2016)

3.3. Scrum Team

The Product Owner, Scrum Master, and Development team make up the Scrum Team. The programmer, information architect, database designer, web designer, and tester make up the development team. (AWS, 2023)

3.3.1. Scrum Master

The scrum master facilitates sprint reviews, leads the team in leadership roles, and ensures that the team can work without interference from outside parties. To ensure that the sprint goes off without a hitch, the scrum master also assists the members as needed. The scrum master is also in charge of organizing the resources required for each sprint, presiding over other sprint activities and team meetings, spearheading the team's digital transformation, and liaising with the development team and outside organizations to resolve any problems the team may be encountering collectively.

3.3.2. Product owner

This person is in charge of facilitating communication between the user base and the development team. They are in charge of classifying needs, ranking them, and maintaining a record of the product backlog over time. This team member makes the decision about whether the product is finished or still requires work.

3.3.3. Development Team

The Product Owner's requirements serve as the basis for the product's development by the team. Every member is accountable for a certain duty.

Each team member was allocated one of the following roles:

Name	Banner ID	Team role
Abdul Qadir Moinuddin Patel	001355374	Scrum Master/Programmer
Shihab Mirza	001356993	Programmer/Database Engineer/Web designer
Chikondi Banda	001356376	Web Designer/Product Owner
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Kelvin Chaimakana	G17048(ZCAS)	Database Engineer

Table 1. Roles Assigned

3.3.4. Roles and responsibilities

- **Programmer:** This team member is in charge of giving the system its main functionality which is one of the most important and voluminous tasks of the project. In addition to creating UML diagrams that illustrate how the system functions, the members will need to build role-based security, email notifications, summary, and exception reports.

- **Information Architect:** This team member is in charge of structuring the content on the website to make it easy to navigate and utilize in general. The member is also expected to create sitemaps to provide simple navigation around the website.

- **Database Engineer:** This position was in charge of locating pertinent entities and characteristics from the coursework scenario and utilizing referential integrity rules to establish relationships between them. It is also necessary to create an entity relationship diagram that shows the entities, their properties, and the relationships that connect them. A data dictionary that lists the entities, attributes, and suitable data types for each attribute must also be created by the role.

- **Web Designer:** It is the duty of the web designer to create a responsive site design so that everyone may utilize it without any problems. They also need to make sure that the website is visually appealing and will draw visitors. The website should take into account accessibility guidelines so that people with varied abilities may use it without any restrictions.

- **Tester:** To thoroughly test the system, the tester must choose the relevant data and prepare test plans and logs. Additionally, test results must to be supplied as proof.

3.4. User Story

A requirement expressed from the viewpoint of the user is called a user story. The following format is utilized: As a <type of user>, I want to <action> so that <reason>.

3.4.1. Website Users

- As a website user, I want an ideas page to see all submitted ideas, so that I get a feel of what the university needs to improve on
- As a website user, I want to view statistical analysis of submitted ideas
- As a website user, I want to view the website on all my devices, so that I can access it easily
- As a website user, I want to create an account
- As a website user, I want to log into my account and know my last log in time and date, so that I know that no one else used my account
- As a website user, I want to report any inappropriate posts (e.g., swearing, libel)
- As a website user, I want to view a paginated list of all ideas
- As a website user, I want to filter ideas by popularity, views, and novelty of ideas and comments
- As a website user, I want to see a terms and conditions, so that I know the legal implications of using the platform

3.4.2. Staff

- As a Staff member, I want to be able to create a staff account, so that I can be identified by name, department and job type
- As a Staff member, I want to submit one or more ideas, so that I can be share my thoughts on how my department can be improved
- As a Staff member, I want to be able to post an idea anonymously, so that no one knows who I am.
- As a Staff member, I want to agree to terms and conditions before submitting ideas, so that I know the legal implications of posting their idea on the platform
- As a Staff member, I want to categorise my ideas before and after submission
- As a Staff member, I want to upload documents before submission, so that I can support my ideas with more evidence
- As a Staff member, I want to comment on ideas, so that I can give feedback on ideas that catch my interest

- As a Staff member, I want to thumbs up or thumbs down an idea only once, so that I can give feedback on ideas that catch my interest
- As a Staff member, I want to receive an email notification when my idea receives a comment
- As a Staff member, I want to contact the QA manager for assistance if I have issues with the platform

3.4.3. Quality Assurance Manager

- As a Quality Assurance Manager, I want to add new idea categories, so that I can better analyse the ideas
- As a Quality Assurance Manager, I want to download all the data after the final closure date in a CSV file, so that I can transfer it out of the system for further analysis
- As a Quality Assurance Manager, I want to download uploaded documents as a ZIP file
- As a Quality Assurance Manager, I want to hide all ideas and comments by a user, so that I can prevent unethical behaviour on the platform
- As a Quality Assurance Manager, I want to disable a user account, so that I can prevent unethical behaviour on the platform
- As a Quality Assurance Manager, I want to delete idea categories only if unused
- As a Quality Assurance Manager, I want to undo hiding all ideas and comments by a user
- As a Quality Assurance Manager, I want to undo disabling a user account

3.4.4. QA Coordinator

- As a QA coordinator, I want to send messages to my department member, so that I can encourage them to contribute ideas
- As a QA coordinator, I want to receive an email notification once an idea is posted

3.4.5. Administrator

- As an administrator, I want to maintain closure dates for each academic year, and staff details.
- As an administrator, I want the website to automatically disable idea submission after closure dates
- As an administrator, I want to view reports showing most viewed pages, user activity, and which browsers are being used

3.5. Product Backlog

The product backlog serves as both a boundary object and a model of the work that needs to be done to close the gap between the user story generation and functioning code creation processes. It results from coevolution, a cognitive process in which the team concurrently improves its comprehension of the issue context and nascent solution conceptions, and sensemaking, which is the team's attempt to make sense of the project environment. (T. Sedano, 2019)

Item #	User Story	Est	By	Priority
Must Have				
1	As a Quality Assurance Manager, I want to add new idea categories, so that I can better analyze the ideas	2	IA, PG	Must Have
2	As a Quality Assurance Manager, I want to download all the data after the final closure date in a CSV file, so that I can transfer it out of the system for further analysis	10	IA, PG	Must Have
3	As a Quality Assurance Manager, I want to download uploaded documents as a ZIP file	10	PG	Must Have
4	As a Staff member, I want to be able to create a staff account, so that I can be identified by name, department and job type	2	PG, DD	Must Have
5	As a Staff member, I want to submit one or more ideas, so that I can be share my thoughts on how my department can be improved	5	PG, DD	Must Have
6	As a Staff member, I want to be able to post an idea anonymously, so that no one knows who I am.	2	PG	Must Have
7	As a website user, I want an ideas page to see all submitted ideas, so that I get a feel of what the university needs to improve on	2	WD	Must Have
8	As a website user, I want to view statistical analysis of submitted ideas	10	WD, IA	Must Have
9	As a website user, I want to view the website on all my devices, so that I can access it easily	5	WD	Must Have
10	As a website user, I want to create an account	2	PG, DD	Must Have
11	As a website user, I want to log into my account and know my last log in time and date, so that I know that no one else used my account	3	PG, DD	Must Have
12	As a QA coordinator, I want to send messages to my department member,	5	WD,	Must

	so that I can encourage them to contribute ideas		PG	Have
Should Have				
13	As a Quality Assurance Manager, I want to hide all ideas and comments by a user, so that I can prevent unethical behaviour on the platform	2	WD, PG, DD	Should Have
14	As a Quality Assurance Manager, I want to disable a user account, so that I can prevent unethical behaviour on the platform	2	PD, DD	Should Have
15	As a Staff member, I want to agree to terms and conditions before submitting ideas, so that I know the legal implications of posting their idea on the platform	5	IA, WD	Should Have
16	As a Staff member, I want to categorize my ideas before and after submission	3	IA, PG, DD	Should Have
17	As a Staff member, I want to upload documents before submission, so that I can support my ideas with more evidence	5	PG	Should Have
18	As a Staff member, I want to comment on ideas, so that I can give feedback on ideas that catch my interest	3	PD, DD	Should Have
19	As a Staff member, I want to thumbs up or thumbs down an idea only once, so that I can give feedback on ideas that catch my interest	5	WD, PG, DD	Should Have
20	As a Staff member, I want to receive an email notification when my idea receives a comment	5	PG, TS	Should Have
21	As a website user, I want to report any inappropriate posts (e.g., swearing, libel)	5	PG	Should Have
22	As a website user, I want to view a paginated list of all ideas	2	WD	Should Have
23	As a website user, I want to filter ideas by popularity, views, and novelty of ideas and comments	3	WD	Should Have
24	As an administrator, I want to maintain closure dates for each academic year, and staff details.	10	PG, DD	Should Have
25	As an administrator, I want the website to automatically disable idea submission after closure dates	5	PG	Should Have
26	As an administrator, I want to view reports showing most viewed pages, user activity, and which browsers are being used	10	IA, PG, DD	Should Have
Could Have				
27	As a Quality Assurance Manager, I want to delete idea categories only if unused	3	PG, DD	Could Have
28	As a Quality Assurance Manager, I want to undo hiding all ideas and comments by a user	3	WD, PG, DD	Could Have
29	As a Quality Assurance Manager, I want to undo disabling a user account	3	PG, DD	Could Have
30	As a QA coordinator, I want to receive an email notification once an idea is posted	5	PG, TS	Could Have
31	As a Staff member, I want to contact the QA manager for assistance if I have issues with the platform	2	WD	Could Have
Would Have				
32	As a website user, I want to see a terms and conditions, so that I know the legal implications of using the platform	3	IA, WD	Would Have

Table 2. Product Backlog

DD - Database Designer

PG - Programmers

IA - Information Architects

WD - Web designer

TS – Tester

3.6. Sprints

A sprint is a brief, time-boxed period within which a scrum team strives to accomplish a certain amount of work. (Rehkopf, n.d.)

3.6.1. Sprint Logs

Below are tables that depict the sprints that were accomplished during the development of the system:

Database Design

Sprints	Deadlines	Done by	Status
Identify entities	16/10/23	Kelvin	Done
Create attributes	16/10/23	Kelvin	Done
Create an ERD diagram	16/10/23	Kelvin	Done
Create queries	16/10/23	Kelvin	Done
Create data dictionaries	16/10/23	Kelvin	Done
Implement the tables	16/10/23	Kelvin	Done
Update the database tables	17/10/23	Shihab	Done

Table 3. Database Design Sprints

Design and Development

Sprints	Deadlines	Done by	Status
Identify user functions	23/10/23	Shihab	Done
Create a login page	23/10/23	Shihab	Done
Connect login page to database	23/10/23	Shihab	Done
Submit ideas	23/10/23	Shihab	Done
Upload supporting document	23/10/23	Shihab	Done

Create a checkbox for agreeing to terms and conditions	03/11/23	Shihab	Done
Create a checkbox for contributing as anonymous	03/11/23	Shihab	Done
Comment on an idea	03/11/23	Shihab	Done
Like and dislike an idea	03/11/23	Shihab	Done
Statistical report	03/11/23	Shihab	Done
Email notification	03/11/23	Shihab	Done
Validate login page	23/10/23	Shihab	Done
Create closure data	07/11/23	Shihab	Done
Manage users	23/10/23	Shihab	Done
Download supporting document	07/11/23	Shihab	Done
Create category	23/10/23	Shihab	Done
Delete category	23/10/23	Shihab	Done
Edit Category	23/10/23	Shihab	Done
Create department	23/10/23	Shihab	Done
Download all the data	07/11/23	Shihab	Done
Create User Roles	23/10/23	Shihab	Done
Choose system colours and layout	20/10/23	Chikondi and Fatimah	Done
Create Draft design of the system	20/10/23	Chikondi	Done
Design the login Page	22/10/23	Chikondi and Fatimah	Done
Design sign-up page	22/10/23	Chikondi and Fatimah	Done
Design all other pages	01/11/23	Chikondi and Fatimah	Done
Design separate page for Terms and Conditions	01/11/23	Fatimah	Done
Style navigation bar for each user type	01/11/23	Chikondi and Fatimah	Done
Make the interface suitable for all devices	01/11/23	Chikondi and Fatimah	Done
Make Lists of Ideas paginated	01/11/23	Chikondi and Fatimah	Done
Page styling	01/11/23	Chikondi and Fatimah	Done
Use appropriate icons	01/11/23	Chikondi and Fatimah	Done
Make amendments	03/11/23	Chikondi and Fatimah	Done

Make amendments to margins	06/11/23	Fredrick	Done
Resolve padding issues	06/11/23	Fredrick	Done
Final ammendments made to site design	13/11/23	Chikondi	Done

Table 4. Design and Development Sprints

Testing

Sprints	Deadlines	Done by	Status
Test plan	13/11/23	Kombe, Bornwell and Abhinav	Done
Test log	13/11/23	Kombe, Bornwell and Abhinav	Done
Test user registration and login	13/11/23	Kombe, Bornwell and Abhinav	Done
Test staff functionality	13/11/23	Kombe, Bornwell and Abhinav	Done
Test QA Coordinator functionality	13/11/23	Kombe, Bornwell and Abhinav	Done
Test QA Manager functionality	13/11/23	Kombe, Bornwell and Abhinav	Done
Test Admin functionality	13/11/23	Kombe, Bornwell and Abhinav	Done

Table 5. Testing Sprints

Documentation

Sprints	Deadlines	Done by	Status
Introduction	17/10/23	Abdul and Bornwell	Done
Aims and Objectives	18/10/23	Abdul	Done
Assumptions	18/10/23	Abdul	Done
Agile Scrum Methodology	18/10/23	Abdul	Done
Methodology	18/10/23	Abdul	Done
Scrum Team	18/10/23	Abdul	Done
Product Backlog	19/10/23	Chikondi	Done
Make Assumptions	23/10/23	Abdul	Done
Analysis	23/10/23	Abdul	Done
Design	24/10/23	Abdul	Done
Database Design	24/10/23	Abdul	Done
Identification of Entities	24/10/23	Abdul	Done
Entity Relationship Diagram	25/10/23	Shihab	Done

System Design (Site Map)	13/11/23	Abdul and Bornwell	Done
Implementation	13/11/23	Abdul	Done
Testing	13/11/23	Abdul and Kombe	Done
Create sprints	13/11/23	Abdul	Done
Minutes for meetings	13/11/23	Abdul	Done
References	13/11/23	Abdul	Done

Table 6. Documentation Sprints

3.7. Burndown Chart

According to (Dalton, 2019), "A burn down chart is an information radiator that visually depicts a "value trajectory" of the sprint/iteration. Based on the number of story points an agile team is historically able to "burn down" during each sprint ("velocity"), the burn down chart helps the product owner, agile team, and leadership to understand whether or not they will deliver the desired business value and functionality that was identified in the forecast during sprint/iteration planning."

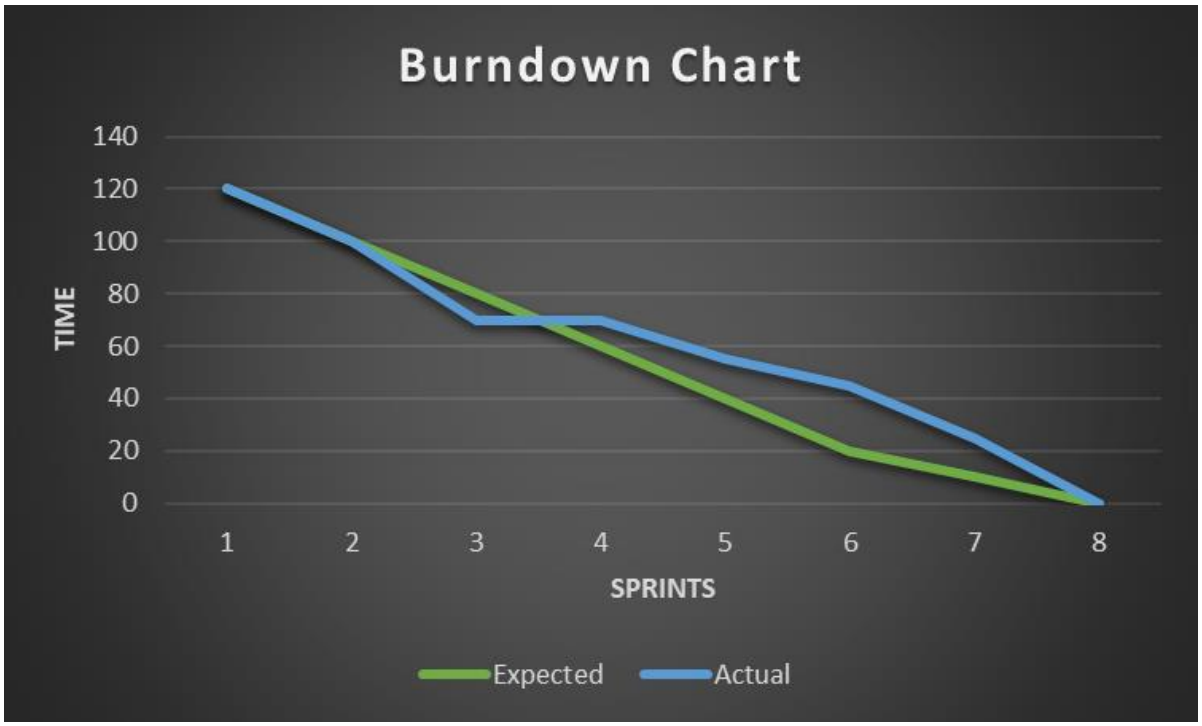


Figure 1. Burndown Chart

4. Analysis

In the analysis phase, information is gathered in order to gain an understanding of the problem at hand and the system that needs to be developed as a solution to these problems. This step explicitly specifies the functional user requirements in detail. These have been listed in the first chapter of this report.

4.1. UML Diagrams

UML Diagrams are used for graphically representing the complicated software systems' architecture, design, and implementation.

4.1.1. Use case diagram

A use case diagram shows the behaviour of the system and how the users interact with the system. It also helps describe the high-level functions of the system. Below is the use case diagram of the system that has been developed. It has all user types integrated to show the overall interaction of the system with all of its actors.

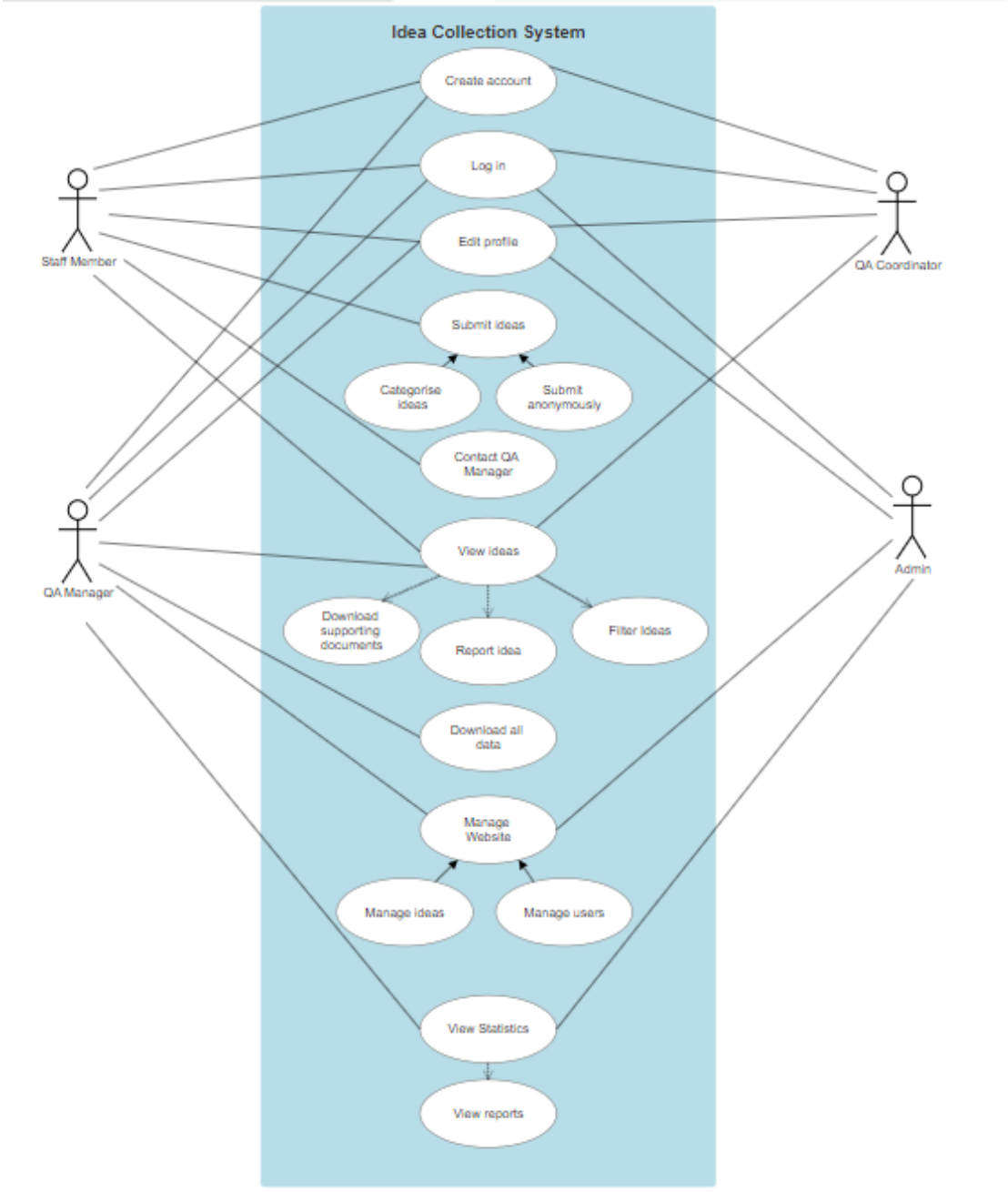


Figure 2. Use case diagram

5. Design

By incorporating structural and behavioural models and enlarging models, system design advances analysis. It takes into account previously ignored factors including software environment, quality indicators, and information architecture. Because agile development continuously identifies and improves needs, this step is repeated. There is still creation and

modification of formal design documentation. These are designs for databases and information architecture.

5.1. Database Design

There are conceptual, logical, and physical components to database design. This documentation includes a brief description of the system designs for brevity. Identification of important entities, connections, and characteristics is a necessary step in conceptual database design (Begg, 2015). The conceptual framework of the system is supported by an entity relationship diagram, data dictionary, and conceptual design process tables.

Logical design, according to Connolly and Begg (2015), is a representation of the data utilised in an organisation that is based on a particular data model and is not dependent on a certain DBMS or physical factors. A logical model describes security and efficiency gains for a database management system by applying the conceptual model to it.

Connolly and Begg (2015) claim that physical database design creates a summary of the database's secondary storage implementation, customises its logical structure to fit a particular database management system, and outlines ways to increase or attain security and efficiency.

5.1.1. Identification of Entities

The entities identified after analyzation of specifications are as follows:

- Ideas
- Comments
- Idea Categories
- Idea Documents
- Staff
- Staff Type
- Likes and Dislikes
- Departments
- QA Coordinators
- Reported Posts

5.1.2. Entity Relationship Diagram

An ERD is used to visualize the relationships between entities in a database and the attributes of these entities.

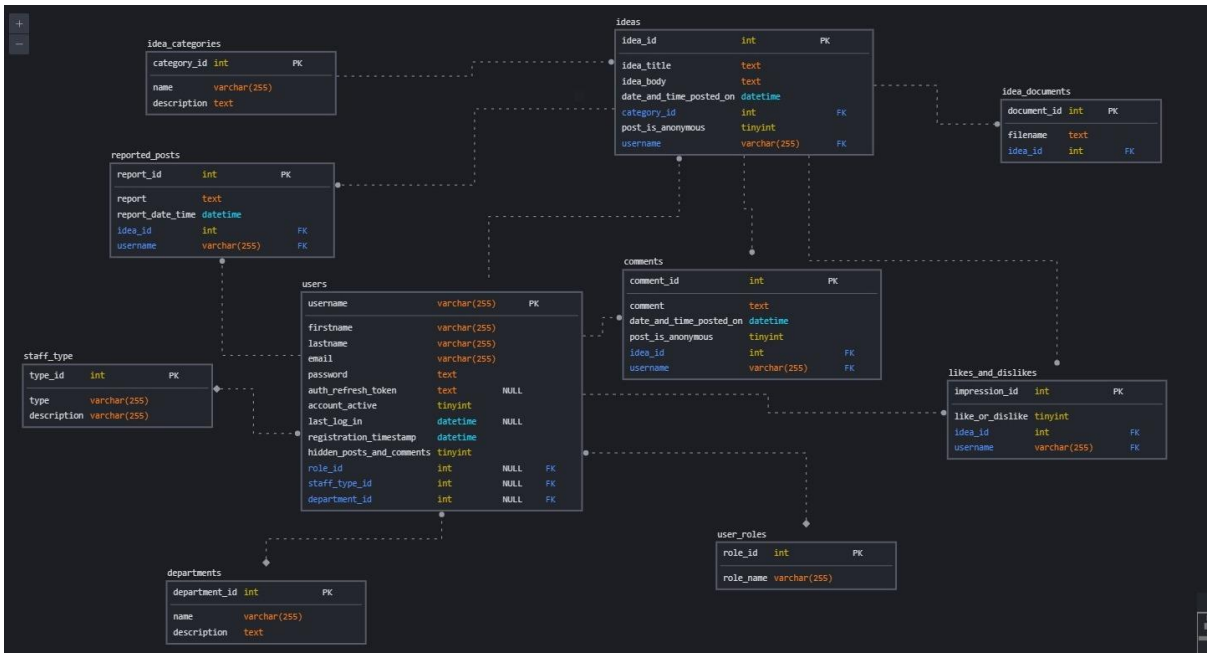


Figure 3. Entity Relationship Diagram

5.1.3. Data dictionary

Staff				
PK/FK	**Field Name**	**Data Type**	**Field Size**	**Description**
PK	staff_username	Varchar	255	ID to uniquely identify the user
	firstname	Varchar	255	User's first name
	lastname	Varchar	255	User's last name
	email	Varchar	255	User's email
	password	Text		User's Password
	dob	Date		User's Date of Birth
	auth_token	Text		A token given to certain users to authenticate their privileges
	account_active	tinyint		Shows the account activity status
FK	type_id	Int		ID to uniquely identify each type
FK	department_id	int		ID to uniquely identify each department
Comments				

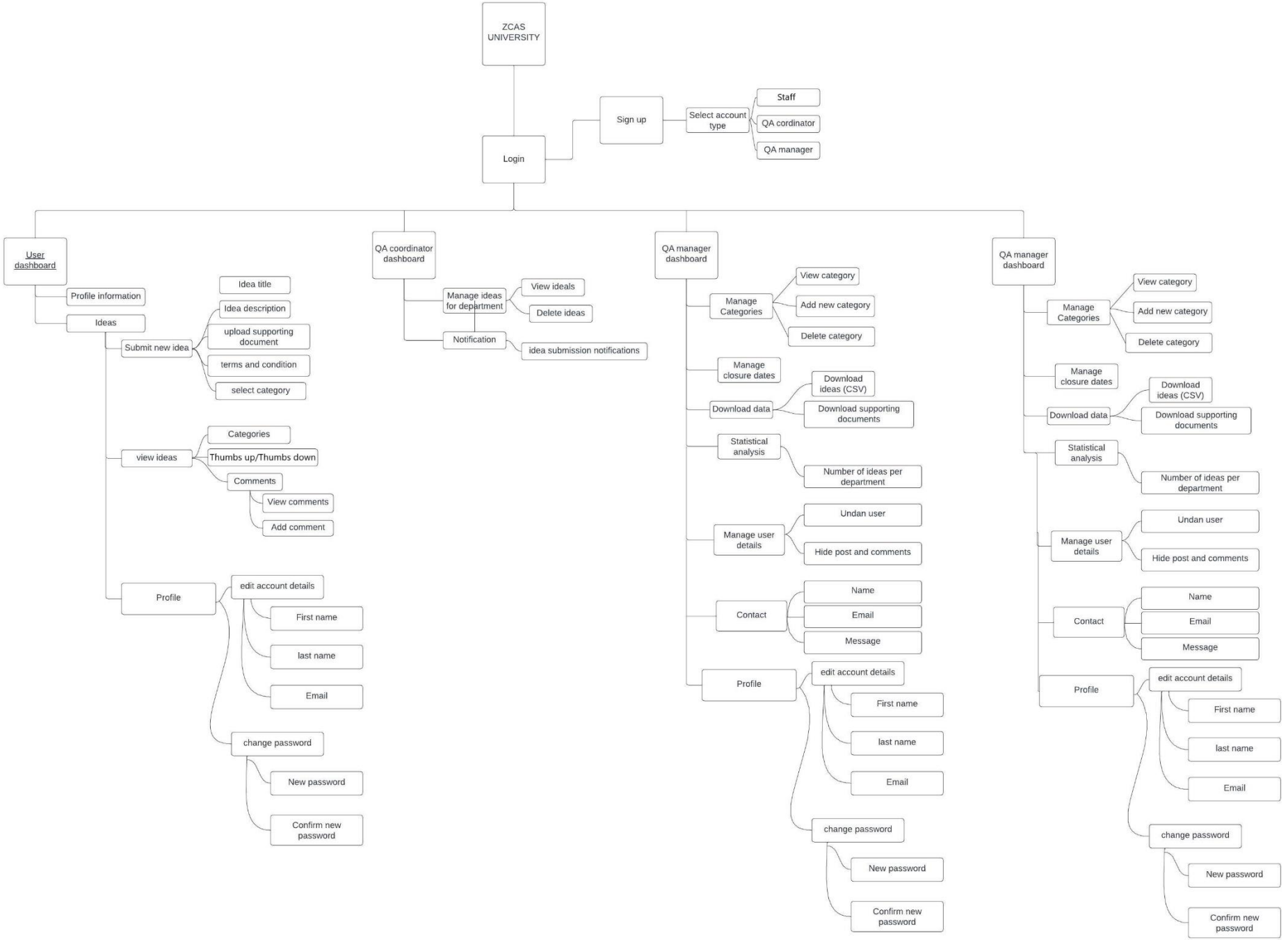
PK	comment_id	int		ID to uniquely identify each comment
	comment	text		Comment name/details
	date_posted	date		Date and time when the comment was posted
FK	idea_id	int		ID to uniquely identify each idea
Idea_documents				
PK	document_id	int		ID to uniquely identify each document
	document_uri	text		Used to identify file from host
FK	idea_id	int		ID to uniquely identify each idea
Likes_and_dislikes				
PK	impression_id	int		ID to uniquely identify each impression
	like_or_dislike	tinyint		To indicate the likes and dislikes on an Idea
FK	idea_id	int		ID to uniquely identify each idea
FK	staff_username	Varchar	255	ID to uniquely identify the user
Departments				
PK	department_id	int		ID to uniquely identify each department
	name	Varchar	255	Name of the department
	description	text		Description of the department
FK	coordinator_username	Varchar	255	ID to uniquely identify each coordinator
Ideas				
PK	idea_id	int		ID to uniquely identify each idea
	idea	text		Idea content
	date_and_time_posted_on	datetime		Date and time when the idea was posted
FK	staff_username	Varchar	255	ID to uniquely identify the user
FK	category_id	int		ID to uniquely identify the category
Idea_categories				
PK	category_id	int		ID to uniquely identify the category

	name	Varchar	255	Name of the category
	description	text		Description of the category
Staff_type				
PK	type_id	int		ID to uniquely identify the Staff type
	type	Varchar	255	Staff type
	description	Varchar	255	Description of staff type
Qa_coordinators				
PK	coordinator_username	Varchar	255	ID to uniquely identify each coordinator
	firstname	Varchar	255	Coordinator's first name
	lastname	Varchar	255	Coordinator's last name
	password	text		Coordinator's password
	date_of_account_creation	date		Date the account was created
	auth_token	text		A token given to certain users to authenticate their privileges
Reported_posts				
PK	report_id	int		ID to uniquely identify the report
	report	text		Report details
	report_date_time	datetime		Date and Time the report was made
FK	idea_id	int		ID to uniquely identify each idea
FK	username	varchar	255	The username of reported post

Table 7. Data Dictionary

5.1.4. Information Architecture

A sitemap provides details on the relationships between the pages, videos, and other assets on a website. The sitemap for this project is as follows:


ZCAS UNIVERSITY
Login
Sign up
Select account type
Staff
QA cordinator
QA manager
User dashboard
Profile information
Ideas
Submit new idea
Idea title
Idea description
upload supporting document
terms and condition
select category
view ideas
Categories
Thumbs up/Thumbs down
Comments
View comments
Add comment
Profile
edit account details
First name
last name
Email
change password
New password
Confirm new password
QA coordinator dashboard
Manage ideas for department
View ideals
Delete ideas
Notification
idea submission notifications
QA manager dashboard
Manage Categories
View category
Add new category
Delete category
Manage closure dates
Download data
Download ideas (CSV)
Download supporting documents
Statistical analysis
Number of ideas per department
Manage user details
Undan user
Hide post and comments
Contact
Name
Email
Message
Profile
edit account details
First name
last name
Email
change password
New password
Confirm new password
QA manager dashboard
Manage Categories
View category
Add new category
Delete category
Manage closure dates
Download data
Download ideas (CSV)
Download supporting documents
Statistical analysis
Number of ideas per department
Manage user details
Undan user
Hide post and comments
Contact
Name
Email
Message
Profile
edit account details
First name
last name
Email
change password
New password
Confirm new password

6. Implementation

After completing the design, the implementation process is carried out to turn the design into a working system that is built according to the requirements.

6.1. Technologies

In order to carry out the development of the secure web-based platform, the software and programming languages that were used were carefully chosen to enable the development team to produce the most optimum results efficiently. These languages are listed below in accordance with the N-Tier architecture:

Presentation layer	• HTML • CSS • JavaScript
Application layer	• Node.js • Express.js
Data layer	• MySQL

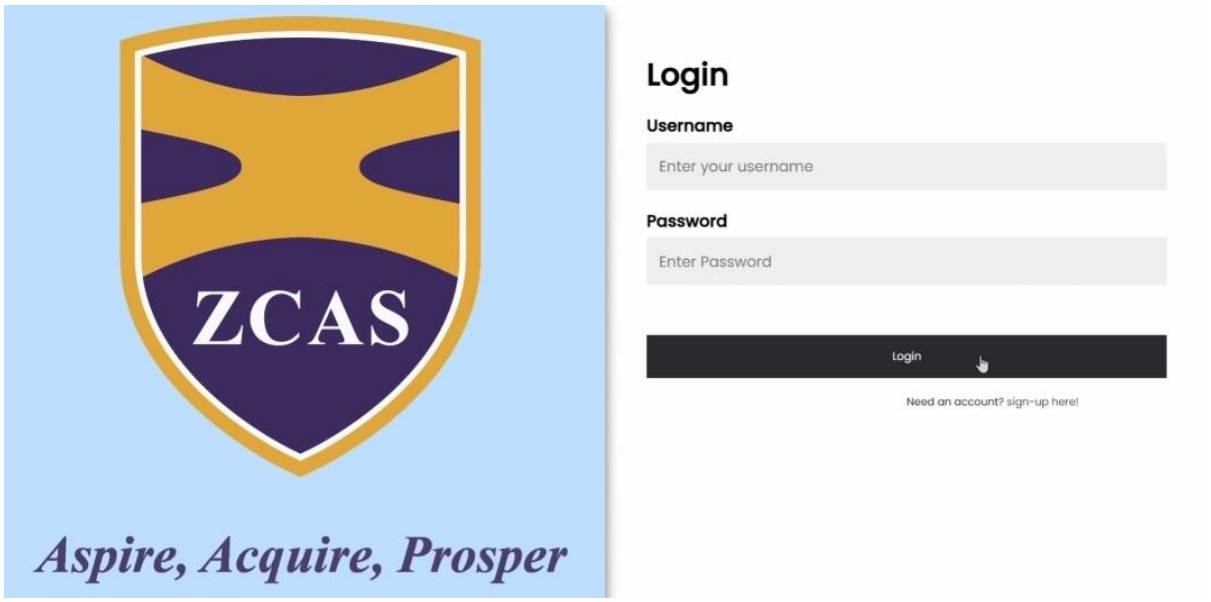
6.2. Roles

The roles of this role-based system are as follows:

- Staff (Academic or Support)
- Administrator
- Quality Assurance Manager
- Quality Assurance Coordinator

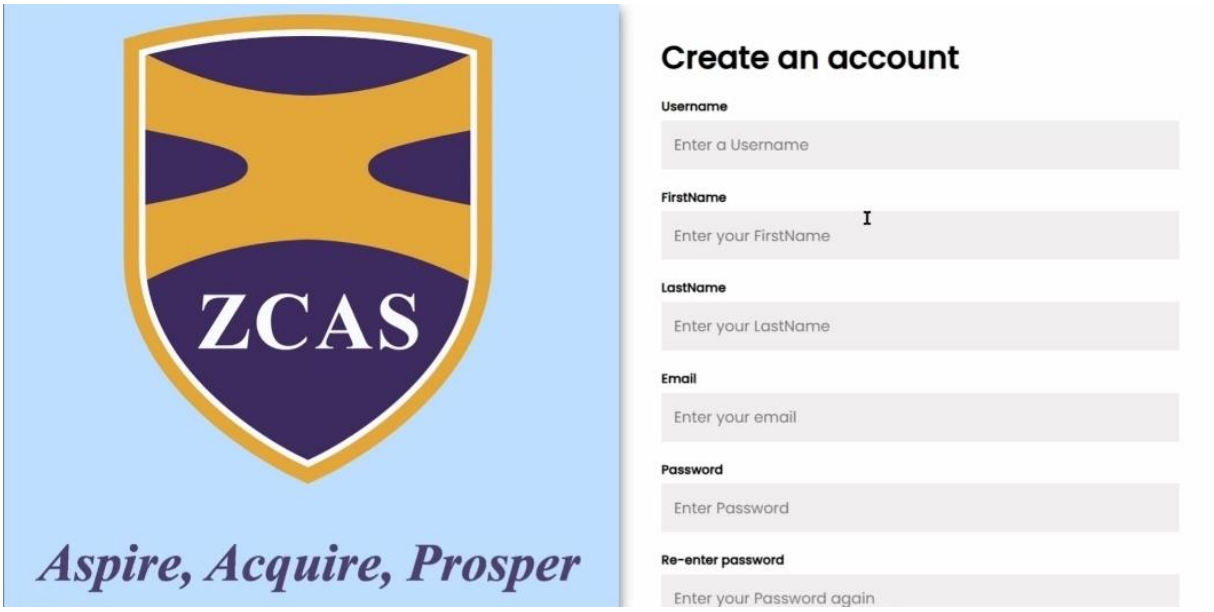
6.3. Product Wireframes

Login Page

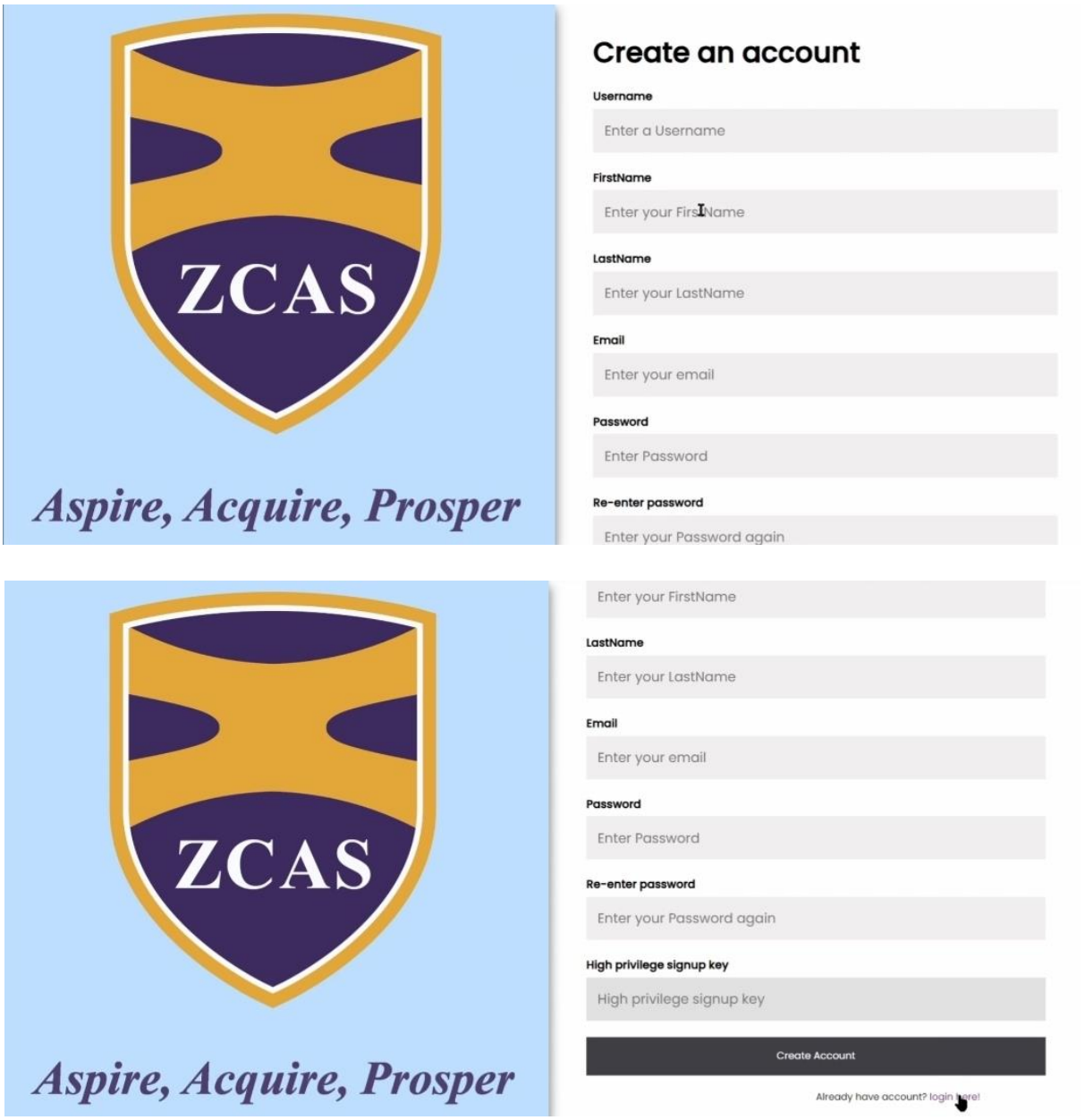


Account Type Page

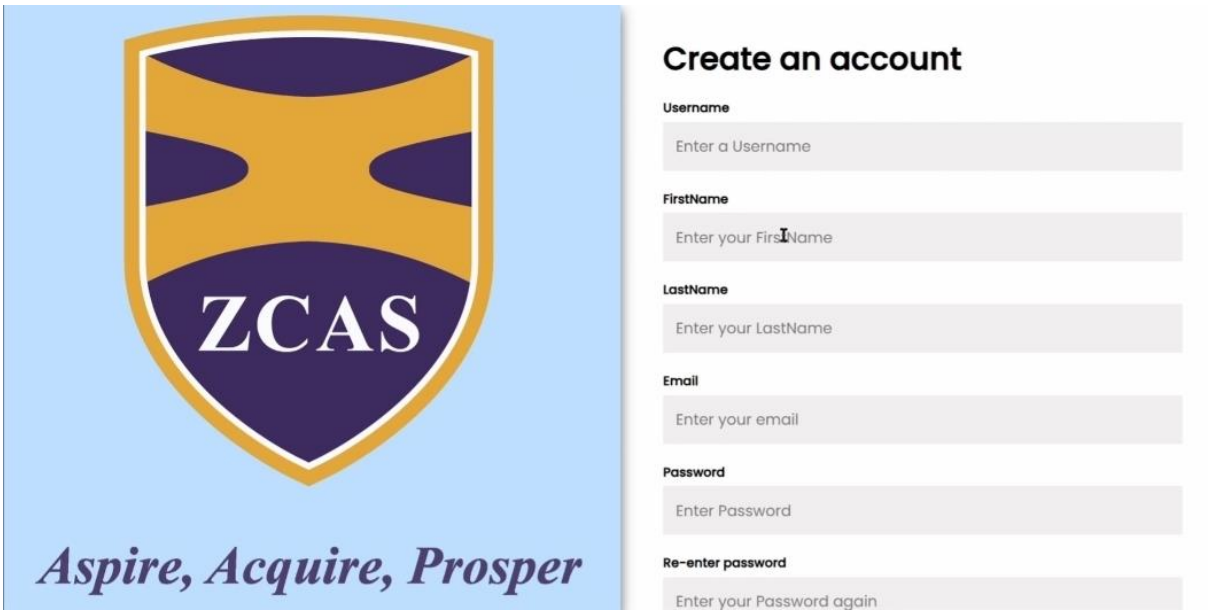
Create an account staff page

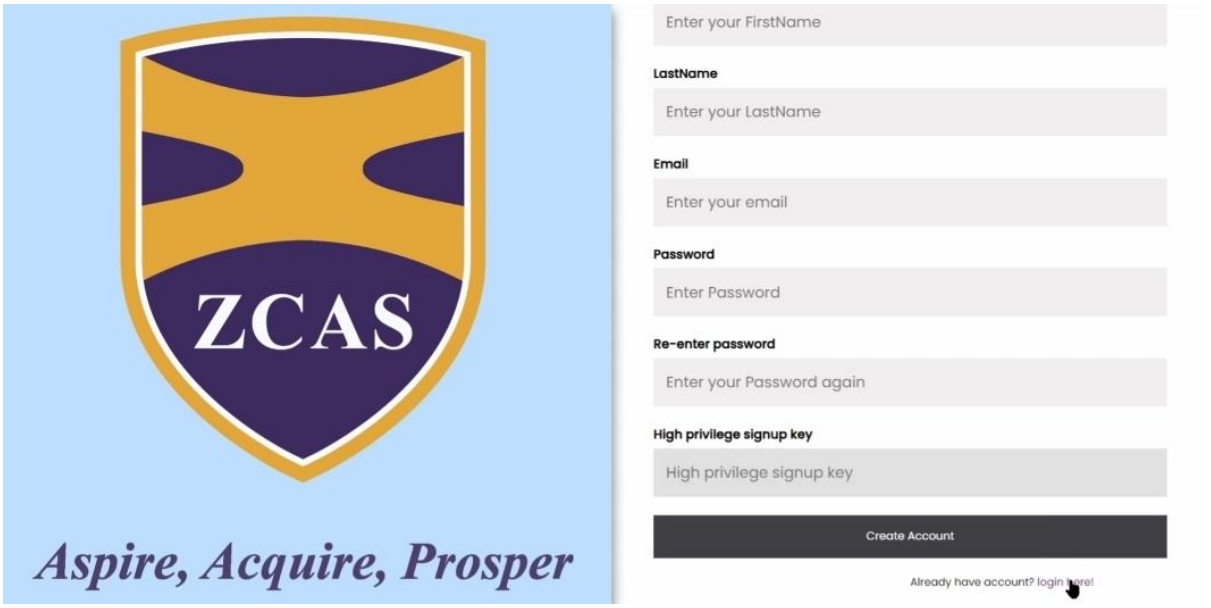


Create an account QA Coordinator page

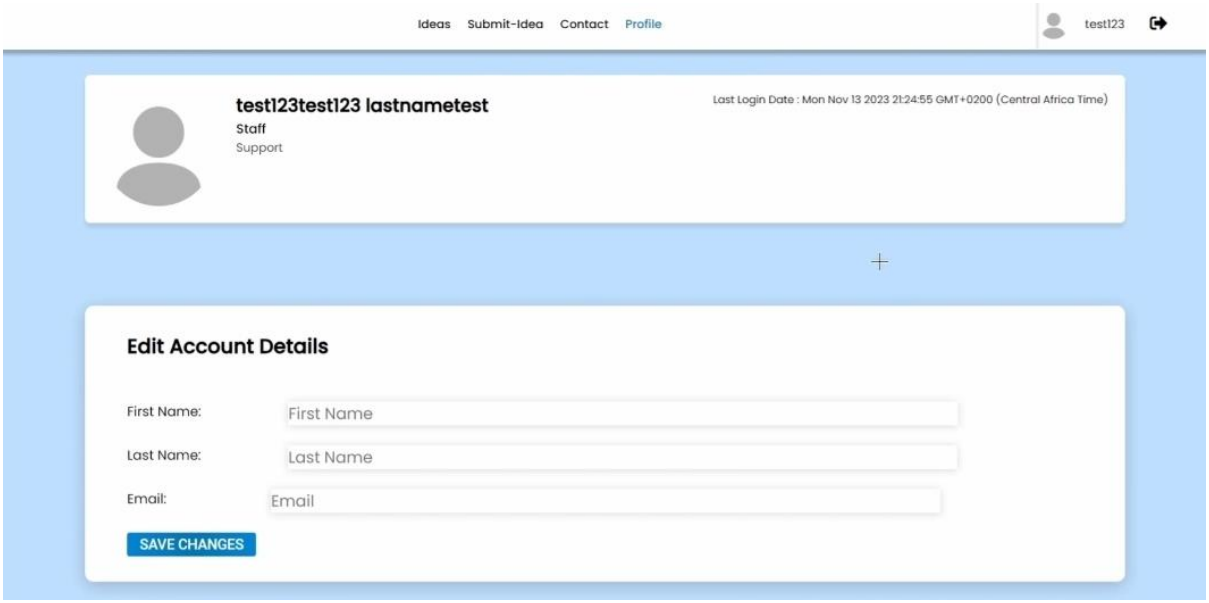


Create an account QA Manager page

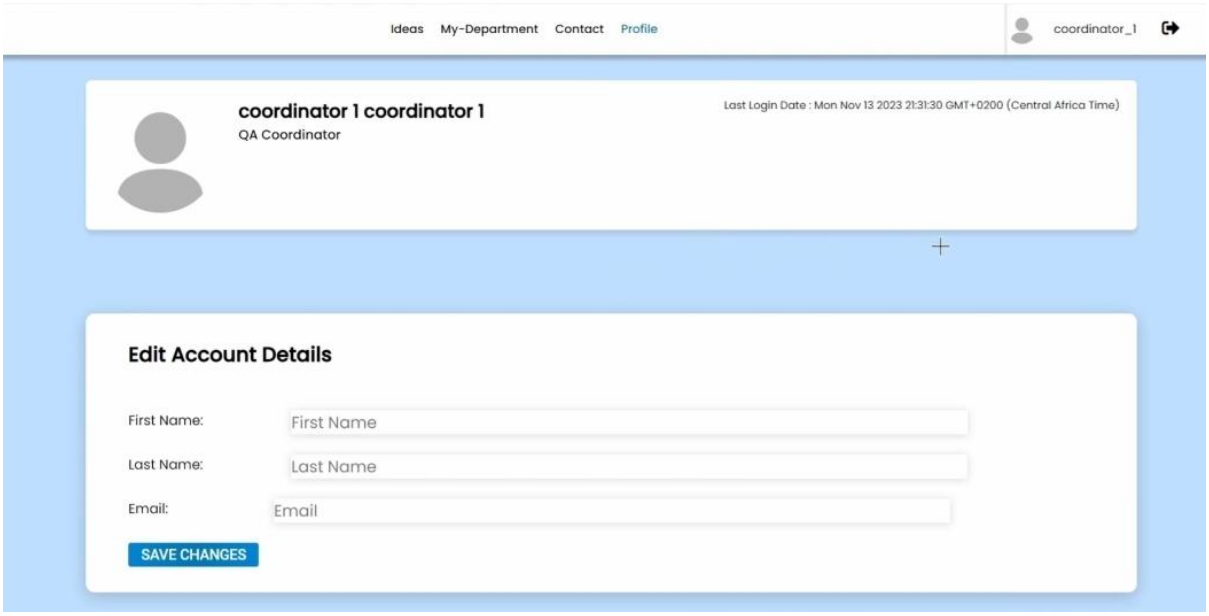




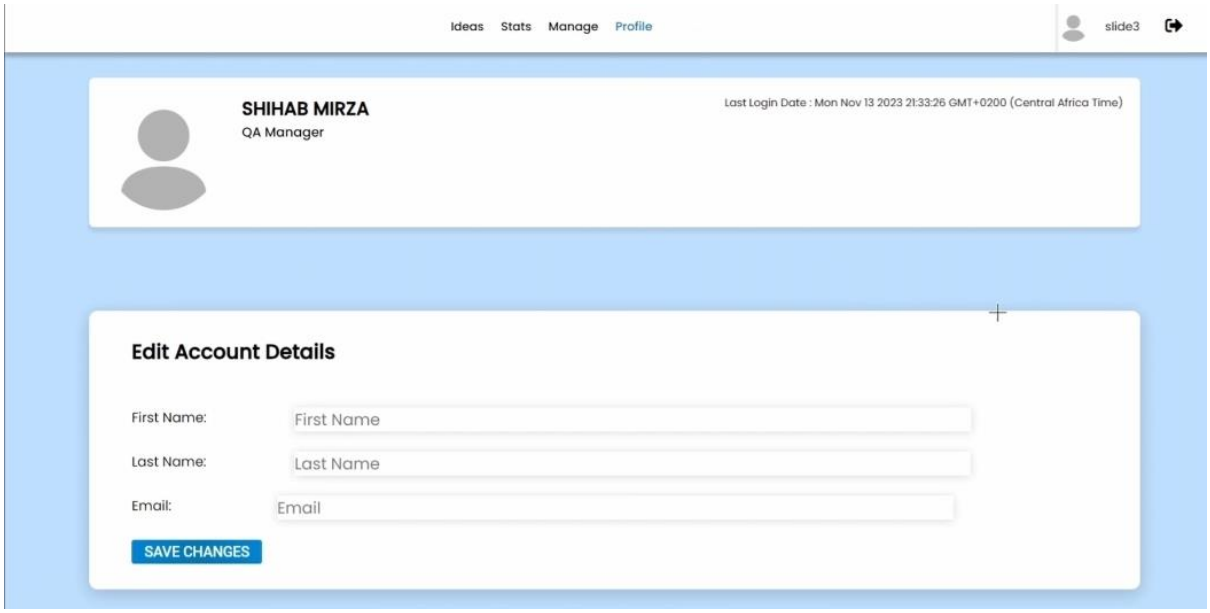
Staff Dashboard



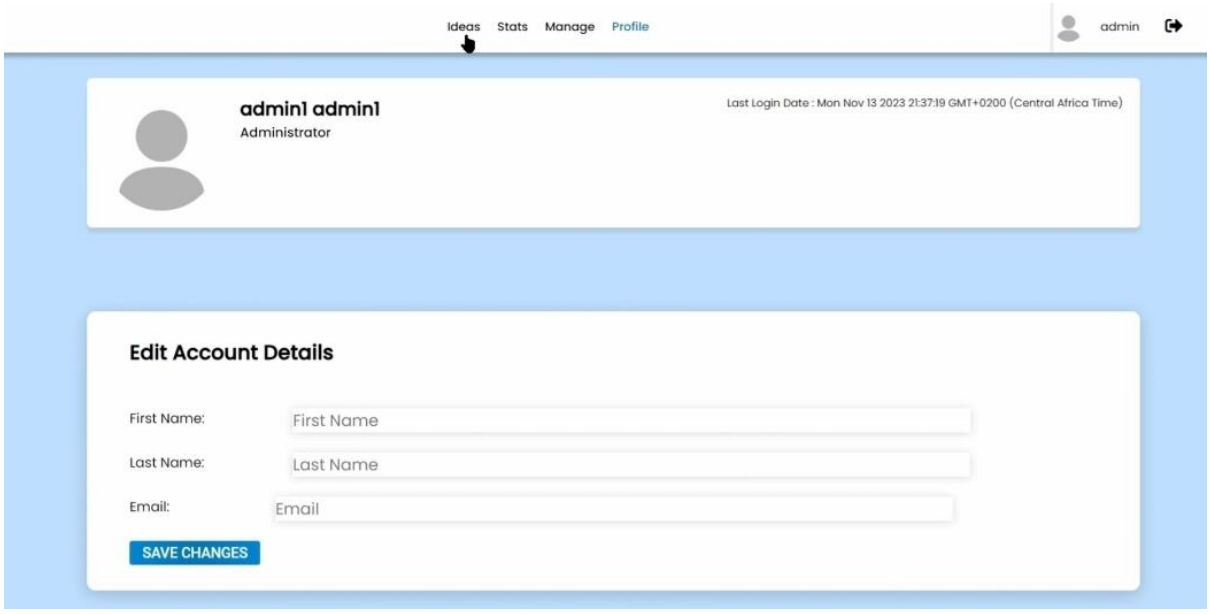
QA Coordinator Dashboard



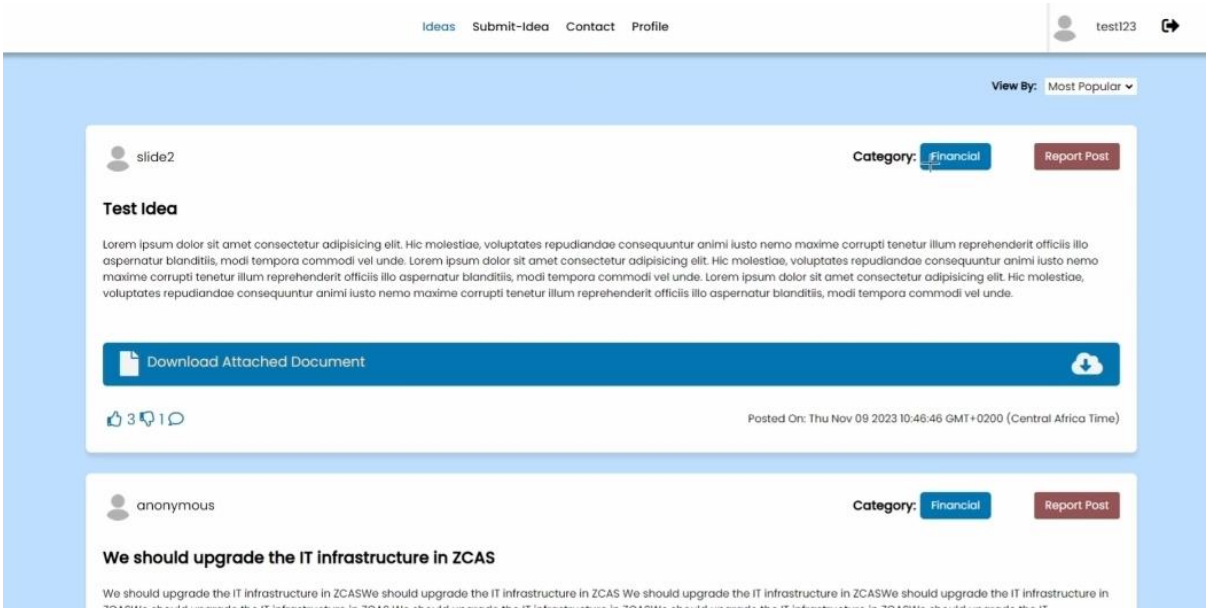
QA Manager Dashboard



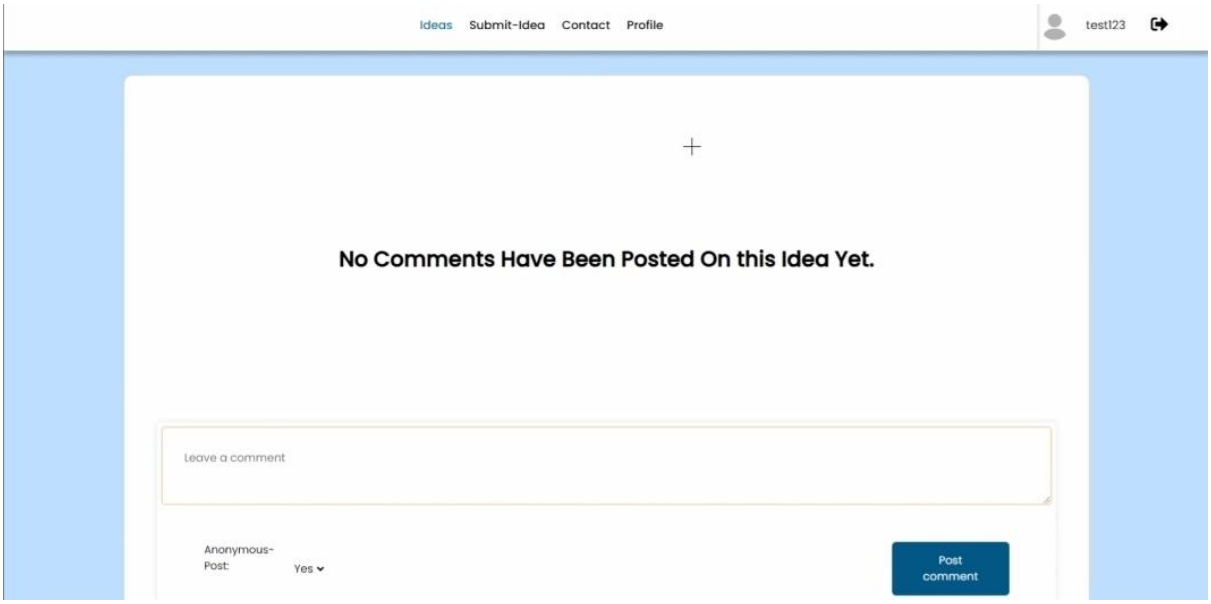
Admin Dashboard



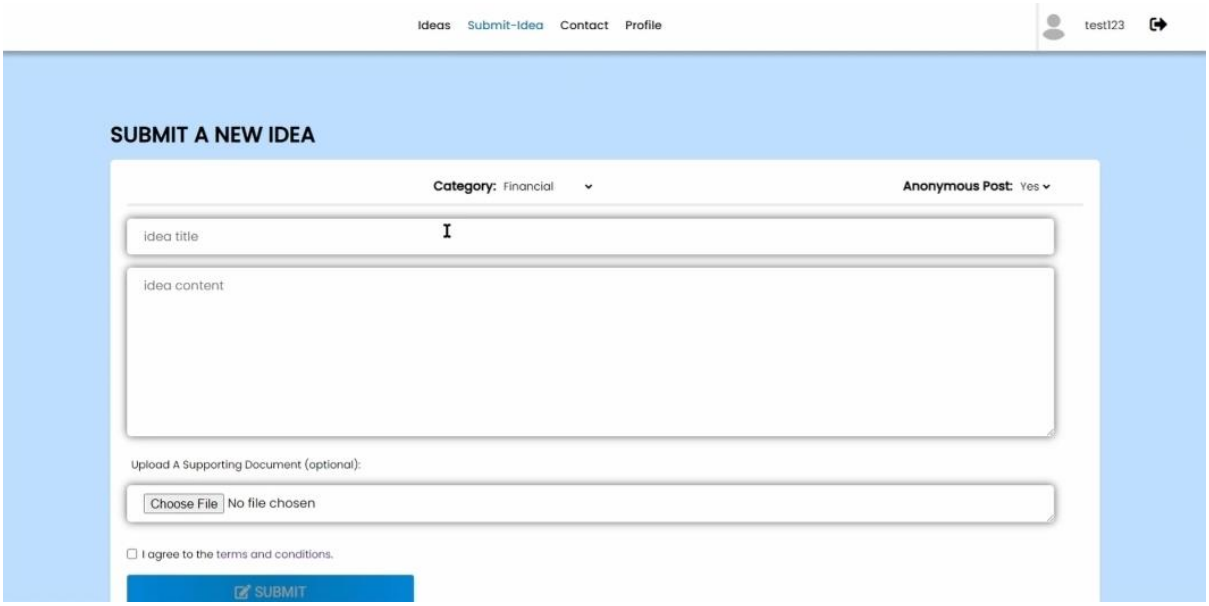
Ideas Page



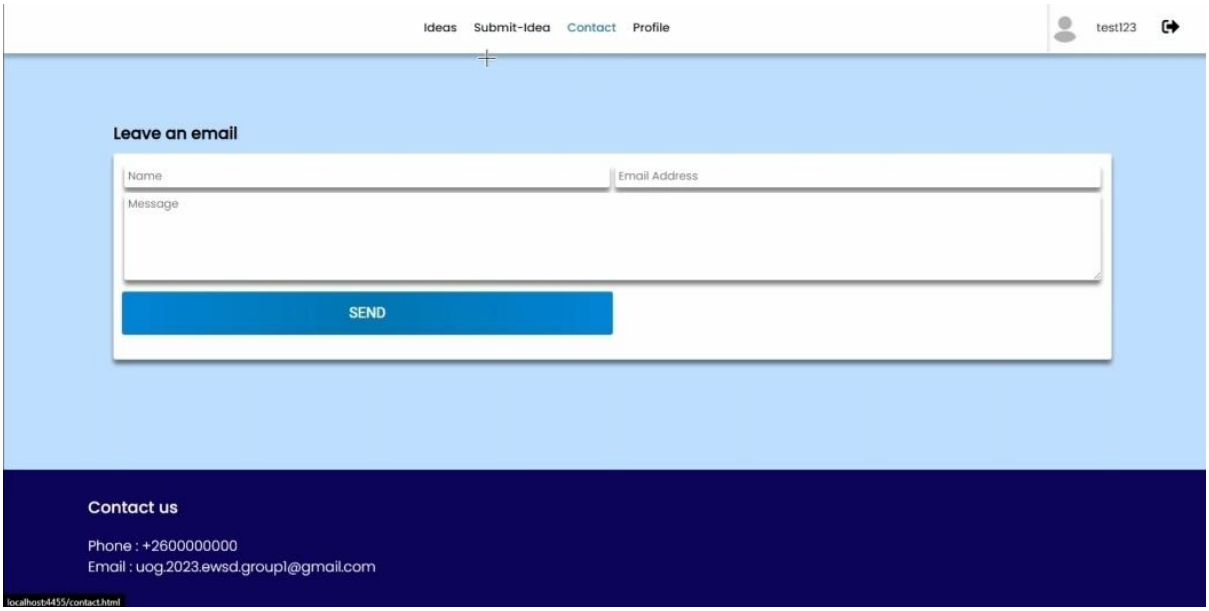
Comment Page



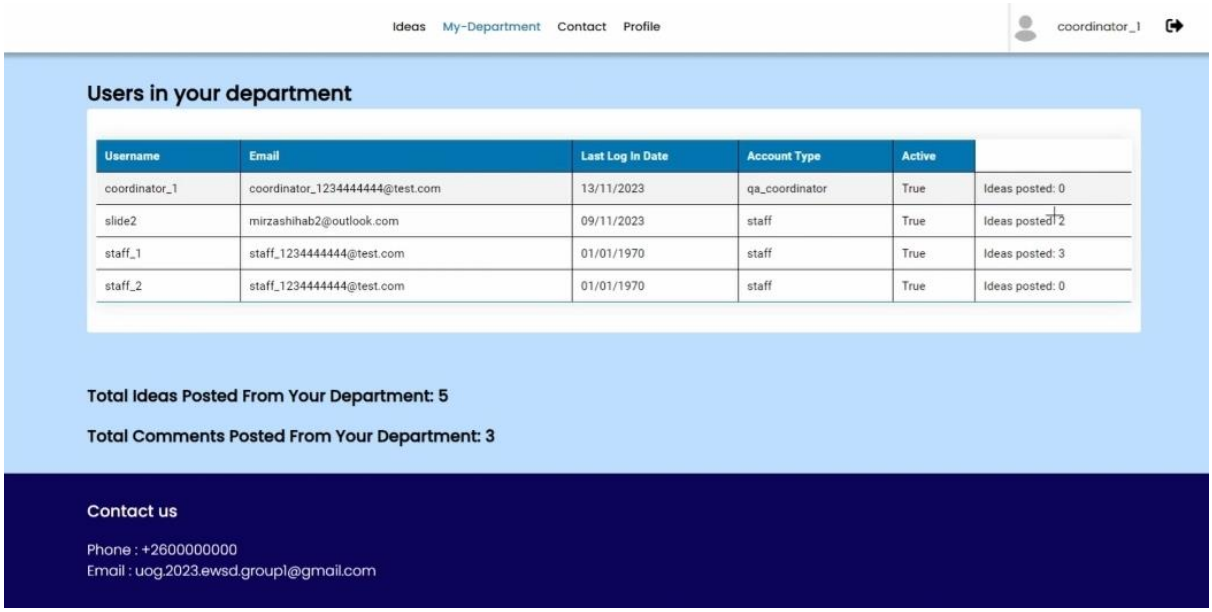
Submit-Idea Page



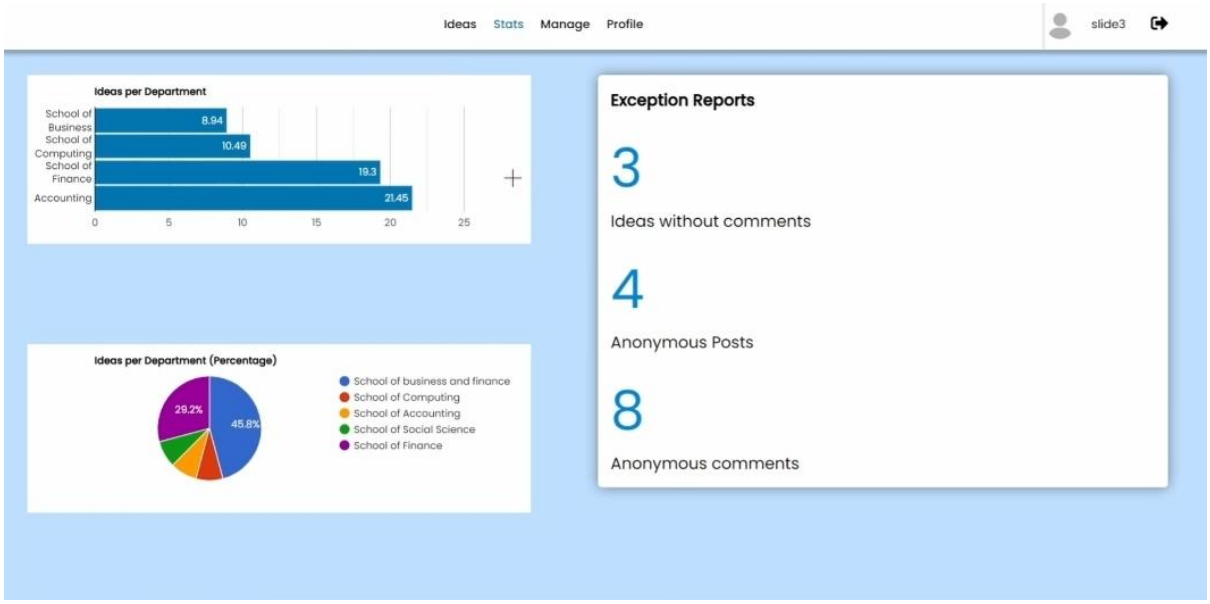
Contact Page



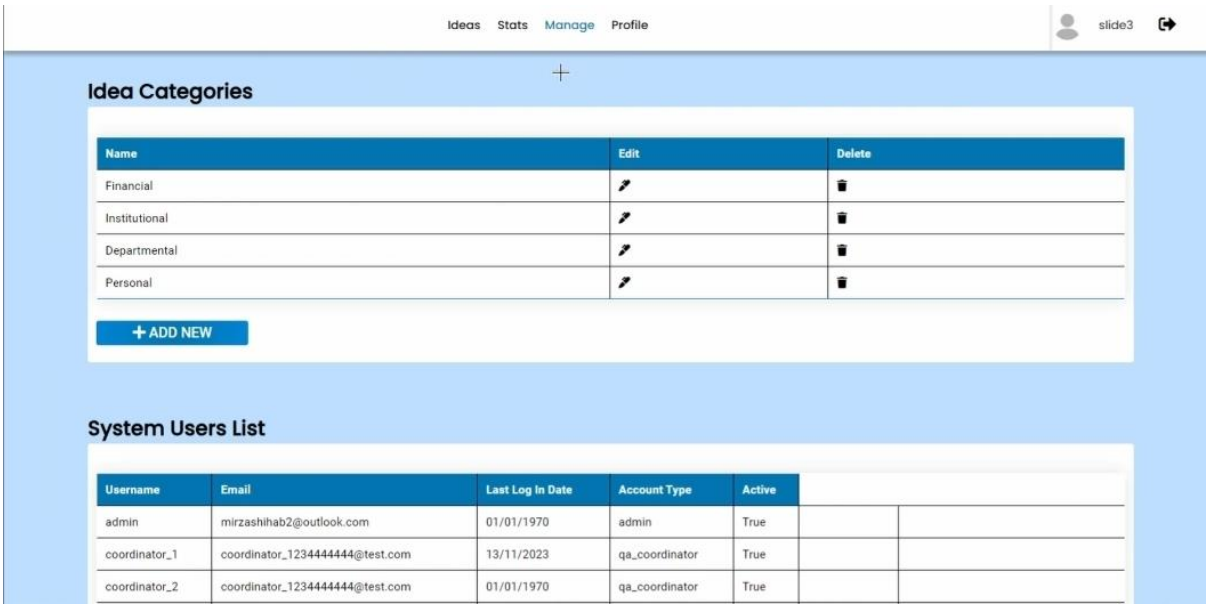
My department page (QA Coordinator)



Stats Page (QA Manager)



Manage page (QA Manager)



7. Testing

7.1. Test Plan

Test No	Test Scenario	Test Case	Test Steps	Test Data	Expected Result
1	Verify the login process.	entering a working password and username	1. Navigate to the login page. 2. Enter valid credentials. 3. Click the login button.	Username: password:	User should be redirected to the dashboard
2	Verify the login process.	entering a wrong password and username	1. Navigate to the login page. 2. Enter valid credentials. 3. Click the login button.		Login is unsuccessful
3	Sign-up function	Signing up as new stuff member using correct information	1. Navigate to the login page. 2. Click sign-up below login button 2. Enter valid credentials. 3. Click the create account button.		A new user account is created.
4	Role-Based Access Control	Verify that users have the correct permissions based on their roles	1. Log in as the University QA Manager, QA Coordinator, and a regular staff member. 2. Access features that are specific to each role.		Each role accesses speicified role features
5	Idea Submission	Test the process of submitting an idea	1. Log in as a staff member. 2. Navigate to the idea submission page 3. Submit an idea with an optional document upload. 4. Submit an idea with an optional document upload.		Idea should be successfully submitted, and documents should be attached.

6	Idea Categorization	Test the categorization of ideas	1. Log in as the QA Manager. 2. Add a new category. 3. Categorize an idea with the new category.		Category should be added, and the idea should be successfully categorized.
7	Commenting and Thumbs Up/Down	Test the commenting and rating functionalities	1. Log in as a staff member. 2. Comment on an idea and give Thumbs Up or Thumbs Down.		Comment and rating should be recorded for the idea.
8	Email Notifications	Verify that email notifications are sent correctly	1. Submit an idea as a staff member. 2. Check the email for the QA Coordinator and idea author		QA Coordinator and author should receive email notifications.
9	Data Export	Test the data export functionality	1. Log in as the QA Manager. 2. Export all data to a CSV file. 3. Export documents to a ZIP file.		Data should be exported successfully.
10	Statistical Analysis	Test the generation of statistical reports	1. Log in as the QA Manager. 2. Access statistical analysis for the number of ideas per department.		Statistical analysis report should be generated.
11	Last Login Reminder	Test the last login reminder	1. Log in as a user. 2. Log out and log in again.		User should be reminded of the last login date.
12	Reporting Inappropriate Posts	Test the reporting of inappropriate posts	1. Log in as a user. 2. Report a post as inappropriate.		Report should be submitted successfully.
13	Blocking and Hiding User Content	Test the QA Manager's ability to block, hide, and undo actions	1. Log in as the QA Manager. 2. Block a user, hide their content, and then undo these actions.		User should be blocked, content should be hidden, and actions should be reversible.
14	Editing Profile Page detials	Test the ability of a logged in user to change their account details and password	1. Login as any user 2. Go to profiles page 3. Edit the account details and account password		Account details and password should be successfully changed

Table 8. Test Plan

7.2. Test Log

Test Case No	Test Objective ID	Test Case	Expected Result	Actual result	Grade	Date
1	Verify the login process.	entering a working password and username	User should be redirected to the dashboard	User was directed to dashboard	**PASS**	13/11/2023
2	Verify the login process.	entering a wrong password and username	Login is unsuccessful	login was unsuccessful and user wasn't taken to dashboard	**PASS**	13/11/2023
3	Sign-up function	Signing up as new stuff member using correct information	A new user account is created.	A new user account was created	**PASS**	13/11/2023
4	Role-Based Access Control	Verify that users have the correct permissions based on their roles	Each role accesses specified role features	Each role was able to access their specified features and not features they weren't supposed to access	**PASS**	13/11/2023
5	Idea Submission	Test the process of submitting an idea	Idea should be successfully submitted, and documents should be attached.	ideas and documents were not submitted successfully	**PASS**	13/11/2023
6	Idea Categorization	Test the categorization of ideas	Category should be added, and the idea should be successfully categorized.	idea was successfully categorised in selected category	**PASS**	13/11/2023
7	Commenting and Thumbs Up/Down	Test the commenting and rating functionalities	Comment and rating should be recorded for the idea.	Comment and rating were recorded ideas that were sent.	**PASS**	13/11/2023
8	Email Notifications	Verify that email notifications are sent correctly	QA Coordinator and author should receive email notifications.	QA Coordinator and author did receive email notifications.	**PASS**	13/11/2023
9	Data Export	Test the data export functionality	Data should be exported successfully.	Data was exported successfully.	**PASS**	13/11/2023
10	Statistical Analysis	Test the generation of statistical reports	Statistical analysis report should be generated.	Statistical analysis report was successfully generated	**PASS**	13/11/2023
11	Last Login Reminder	Test the last login reminder	User should be reminded of the last login date.	User could visibly see their last login date	**PASS**	13/11/2023
12	Reporting Inappropriate Posts	Test the reporting of inappropriate posts	Report should be submitted successfully.	Report was exported as successfully sent to QA manager	**PASS**	13/11/2023
13	Blocking and Hiding User Content	Test the QA Manager's ability to block, hide, and undo actions	User should be blocked, content should be hidden, and actions should be reversible.	User was successfully blocked, content was successfully hidden, and actions were reversible.	**PASS**	13/11/2023
14	Editing Profile Page details	Test the ability of a logged in user to change their account details and password	Account details and password should be successfully changed	Account details and password were successfully changed	**PASS**	13/11/2023

Table 9. Test Log

8. Conclusion

In conclusion, the system was developed successfully and has met all the requirements. This includes the additional requirements that were later on added to the project. Just as any project would have, this development of this project also experienced its issues and conflicts among team members. However, ultimately, the entire team worked together to make this project a success and deliver it on time.

During the meetings that were organized and led by the scrum master, it was difficult to communicate effectively as some members of the team would miss certain meetings due to personal reasons or obligations. However, the scrum master took initiative to make sure that each member is notified of any updates regarding the meetings even if a member was unable to attend.

The use of the Scrum agile methodology greatly aided in the smooth operation of the project. It enabled the team adapt to change and helped all members to constantly learn and improve. It overall assisted in delivering the system quickly and efficiently.

9. References

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Begg, C. &. (2015). *Database Systems.* Pearson Education Limited.

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T. Sedano, P. R. (2019). The Product Backlog. In *The Product Backlog* (pp. 200-211). Montreal: IEEE/ACM 41st International Conference on Software Engineering (ICSE), Montreal, QC, Canada, 2019 doi: 10.1109/ICSE.2019.00036.

Appendix – Credentials

Staff

username : slide2

password: slide2slide2

QA Manager

username : slide3

password: slide3slide3

Admin

username : admin

Password : slide3slide3

QA Coordinator

Username : coordinator_1

Password: coordinator_123

A high privilege sign-up key is stored in the back-end and provided to QA Managers and QA Coordinators in order to provide further security for roles of higher authentication.

Further information on how to run the system/project is available in the repository.