KILIFI COUNTY BURSARY APPLICTION WEB SYSTEM

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BSIT/272J/2019

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Research Project Submitted in Partial Fulfillment for the Degree of Science in Information Technology.

November 2023

DECLARATION

I declare that this is my original work and has not been submitted for the award of Degree in any other academic institution.

NAME: .....

REG. NO.: .....

SIGN: .....

DATE: .....

APPROVAL

This research project has been submitted to the Technical University of Mombasa with my approval as the institute supervisor.

SUPERVISOR NAME: .....

SIGN: .....

DATE: .....

DEDICATION

I would like to dedicate this project to my family and close friends who constantly encouraged and supported me to completing this project.

ACKNOWLEDGEMENT

I would like acknowledge the Almighty God for giving me the gift of life and the care protection He gave me from my early education to this level. Special thanks to my supervisor for the guidance and advice throughout the project. Much thanks to my family for the financial support towards my course completion and making my project. May God bless you all abundantly.

ABSTRACT

The purpose of this study was to develop Kilifi County Bursary Application System to aid students in Kilifi county to remotely apply for bursaries, keep records of the applicants and automate the whole process of bursary application and awarding. The problem with the current system is that, one has to attach verification documents from where he/she studies to the application form and physically submit it within a short period of time disadvantaging those studying away from their constituencies of origin and whose parents or guardians are working or are away from their constituency/ward of origin. Also this current system is time consuming, spacious and difficult to back-up applicant's data. The main objective of the project was to design and develop a system which will effectively automate the whole bursary application and awarding in Kilifi county. The specific objectives were: analyze the current bursary application system to come up with requirements, design and develop a system based on the requirements found, code and test the system and test the system with students from Kilifi county. The study will adopt Agile Scrum methodology to build the system. Data was gathered through interviews and questionnaires. The system adopted spiral software development strategy. Tools used to develop the system are: HTML, CSS and JavaScript for front-end, MySQL and Python for back-end on a Django framework. On implementation the system aims to automate the bursary application and awarding in Kilifi county.

TABLE OF CONTENTS

LIST OF TABLES.

LIST OF FIGURES

LIST OF ACRONYMS AND ABBREVIATION.

ICT: ……. Information Communication Technology
NG-CDF: ……..... National Government-Constituency Development Fund
MCA: ……. Member of County Assembly
MP: ……. Member of Parliament
HTML: ...…….... Hypertext Markup Language
CSS: ……... Cascading Style Sheet
MySQL: ……. My structured Query Language
UI: ……..... User Interface
UX: ..... User Experience
KCBAWS: ……..... Kilifi County Bursary Application System
NGOs: …… Non-Governmental Organization
XSS: ……..... Cross Site Scripting
UAT: ……... User Acceptance Testing

DEFINITION OF KEY TERMS.

Disbursement: process of distributing the bursary funds to the selected applicants, often directly to their educational institution.

Class of study: the level of study which an applicant is, that is, form or academic year.

Financial Year: the accounting period of a bursary.

CHAPTER ONE: INTRODUCTION

1.1 Introduction

This chapter provides a background to the problem of bursary application in Kilifi County. The chapter also includes statement of the problem, purpose of the study, objectives of the study, research questions, significance of the study, limitations of the study, scope of the study and organization of the study.

1.2 Background Information

Bursary is one of the education financing options that has been used globally to pay the cost of education at different levels. It has been used to reduce the fee burden from parents and guardians in order to facilitate effective participation by learners in education. Since independence, Kenya has spent large sums of money on education. According to estimates of Revenue and Expenditure for the 2020/2021 Financial Year by the Parliamentary Service Commission, Parliamentary Budget Office, the education docket was allocated the biggest share of the budget at 28%, Energy, Infrastructure and ICT came second at 23%, followed by governance, justice, law and order 11%, 4 health sector 10%, national security 9%, parliament 2%, judiciary 1% and finally other sectors were allocated 20%. The budgetary allocations to the education ministry reveal how much the government has invested in this very important course. The bursary allocation process in most if not all cases is broken down into three main stages (Titus, 2011) as follows:

The first stage involves all the interested parties applying for bursaries and all the applications being gathered to the county headquarters. The eligibility of applicants is then determined through a process of public participation where the staff interact with the applicants to ascertain their financial capability of the applicants as well as other factors that are key to being awarded bursaries.

The second stage involves the staff members grouping the applicants according to their respective wards and sub-locations. Applicants are then categorized into: boarding

schools, day Schools, polytechnics, colleges and universities where each category gets a different amount of money per applicant. The total funds allocated by the county are first divided equally within the wards present in the county, then equally within the sub-locations depending on the number of sub-locations present in a given ward. The money is then distributed to eligible applicants within that particular sub-location. At this point it is inevitable to note some of the errors which come up. Wrong amounts emerge as a result of manual computation, a factor that contributes to the long delay between applications closure and disbursement of the funds. Time wastage tends to frustrate many as there is an exponential need for faster, accurate and timely information dissemination mechanisms (I-Hub Research, 2012) in delivering Government services to the people. Other errors generated from the overall process include but not limited to wrong entry of school names, which leads to lots of cheques being cancelled, and wrong capturing of student admission and registration numbers.

The third and final stage involves the disbursement of these funds to the schools of the awarded applicants. The Kilifi County Bursary Application System is designed to provide financial assistance to deserving individuals who demonstrate academic excellence, financial need, and a commitment to personal and professional growth. The system recognizes the importance of education in fostering societal development and aims to ease the financial assistance application to students who face financial barriers in pursuing their educational goals. However, challenges are faced in applying for this bursaries to cushion the poor and vulnerable students in Kilifi county.

1.3 Problem Statement

The Kenyan government through the NG-CDF offers financial aid to students whom their parents or guardians are unable to afford their school fees. Most of the application for the bursaries in Kilifi County are done manually through the MCA ward office or the respective MP's office. Students studying outside their ward or constituency of origin mostly don't get this financial assistance as one is required to avail official documents

from where he/she studies for verification purposes within a short period of time. Due to this, an online platform where students can apply for the bursaries despite where they are being needed.

1.4 Objectives of The Study

1.4.1 General Objective

The main objective of the study was to come up with a system which will automate the bursary application in Kilifi county.

1.4.2 Specific Objectives

The project's specific aim is to:

i. Analyze the current bursary application system to come up with requirements.
ii. Design and develop a system based on the first objective requirements.
iii. Code and test the system using Django framework, HTML, CSS, JavaScript and postgreSQL.
iv. Test the system with students from Kilifi County.

1.5 Research Questions

For the success of the study, crucial questions listed down were raised and needed to be answered correctly.

i. What are the strengths and weaknesses of the current bursary application system, requirements to be addressed in order to improve the system and challenges faced by applicants and administrators in the current system?
ii. What are the essential features and functionalities that should be included in the bursary application system to address the identified requirements?
iii. What are the best practices for coding and testing the system to ensure maintainability, functionality, reliability and compatibility across different devices and browsers?
iv. What improvements or adjustments can be made based on the feedback received from the students to enhance the system's performance and user experience?

1.6 Significance of The Study

The study is important in that the findings and recommendations would inform those responsible in offering bursaries, that is, Kilifi county and other organizations, on effective bursary application system that focus on efficient and effective way for applying the bursaries to enable the less privileged members of the society in the access to secondary and higher education. Comprehensive data would be documented for further reference and this would be helpful for future research studies related to the study topic. Weaknesses detected in studies related to the research would form a basis for forming knowledge gaps. The study findings would provide ways forward on improved bursary application system in fund disbursement. The learners in Kilifi County would get the privilege to apply for the NG-CDF bursaries remotely provided they are connected to the internet.

1.7 Justification

This proposed web based Kilifi County Bursary Application System will allow students to apply for bursaries from the Kilifi County government will provide a number of benefits to both students and the county government. The system is justified in that: the current system for applying for bursaries is manual requiring students to submit application papers to the respective MPs or MCAs' office within a short period of time locking out those students studying outside their ward or constituency of origin. The web-based system will allow students to apply for bursaries online, which will make them avoid being locked out of disbursement for missing to submit the required documents. The web-based system will allow the county government to track applications more easily and make decisions more quickly. The current system for applying for bursaries is vulnerable to fraud and errors. The web-based system will be more secure and reliable, thanks to features such as password protection and data encryption.

1.8 Limitations of The Study

The system's reliance on document submission and verification may present challenges in ensuring the authenticity of submitted information. Delays in document verification can impact the timely processing of applications and fund disbursement. One of the significant limitations the study identified is the digital divide, wherein students from economically disadvantaged backgrounds may lack access to digital devices and reliable internet connectivity. This limitation can hinder their ability to apply through the online system, thereby excluding some eligible applicants from accessing the bursary program. The effectiveness of the system may be limited by inadequate awareness and outreach efforts. Some eligible students may not be aware of the bursary application process or the availability of financial assistance, resulting in underutilization of the system.

1.9 Scope of The Study

The study will examine the process of applying for bursaries, including the required documentation, eligibility criteria, and application submission procedures. It will explore the current challenges and limitations of the application process and propose improvements to enhance its efficiency and accessibility.

The research will focus on the design and development of a new bursary application system based on the identified requirements. It will involve conceptualizing the system architecture, user interface design, database structure and functionality to address the limitations of the current system.

The study will primarily focus on the bursary application within a specific geographic area, Kilifi County, will involve testing the system with students from Kilifi County to gather their feedback and evaluate its effectiveness in that particular context.

The study will focus on the current state of the bursary application system and its impact at the time of the research, consider the available resources, data, and technological capabilities as of the research period.

1.10 Organization of the Study

This study was organized into five chapters with Chapter One, the introduction, providing highlights on background to the study, statement of the problem, significance of the study, limitation and delimitation, basic assumptions, theoretical and conceptual framework, and definition of operational terms as used in the study.

Chapter Two provided a review of literature related to the study by identifying study gaps to be filled by the study. It showed the work of various writers who had conducted research and gave their views on bursary scheme.

Chapter Three gave methodological orientation of the study by giving details on the research design, the location of the study, the target population, sample selection and sample size, the sampling procedure, data collection instruments and procedure, details of the pilot study, reliability of the research instruments, validity of the data collected, data collection and analysis methods, and the logical and ethical considerations that the researcher took into account.

Chapter Four provides analysis, presentations and discussions of findings of the study according to the objectives that guided the study which were to analyze the current bursary application system to come up with requirements, design and develop a system based on the first objective requirements, code and test the system using Django framework, HTML, CSS, JavaScript and MySQL and Test the system with students from Kilifi County.

Chapter Five presented a summary of the study, conclusions, recommendations, and finally suggestions for further research on bursary application systems in Kilifi county and Kenya at large.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

In this chapter, literature related to the study was reviewed under the following subthemes: theoretical literature, similar systems and critical review and research gap identification.

2.2 Theoretical Literature

Studies have been conducted at global levels on education financing through bursaries. The studies have shown that countries apply various approaches in dealing with financing of education. Apart from most states sponsoring education for students within certain age brackets and class, what seems to be shared in common is the aspect of sponsoring education for the sake of individual and national development.

A study by Andrew & Baxter (2005) on bursaries and students' success in education compared the experience of students receiving bursaries and those without bursaries in the United Kingdom and found out that students with bursary awards were most likely to be retained in schools than those without such subsidy. The study also found out that the students with bursary awards are more stable in terms of attendance, continuity and completion of education programs as compared to those without bursaries. The study realized a significant role played by the bursary provision to the needy students.

Boston-based organization, Jenzabar, partnering with higher education institutions worldwide, carried out a study in California and Latin America on education financing and revealed that the tuition voucher system and cash transfers were dominant and targeted university and college students. The basic education school levels were sponsored by the governments such that bursary intervention mostly captured private institutions and career-oriented areas. The voucher system was created in Latin America and targeted learners from low income 23 backgrounds since 1991. They revealed that twelve states in Columbia used voucher systems and school fees for children in private schools was subsidized in order to reduce the education costs and enable even those from poor families to access and participate in high quality education.

In Britain, education is fully financed up to secondary level by the government and cost-sharing exists at higher education level (Moon & Mayes, 1994) while in Mexico financial subsidy programs focus on the most disadvantaged states. A study finding by Gitau et al. (1993) informed that bursary applications in western countries were mostly received online and responses communicated adequately.

2.2.1 Requirements Gathering

Different stakeholders are involved in the bursary application process including students, parents, school officials, parents and bursary administrators. Conducted surveys and interviews with the stakeholders gathered qualitative and quantitative data about their needs, preferences, and challenges in the current bursary application process. A review of the current bursary application system was done to understand its strengths, weaknesses and areas of improvement. The study identified functional requirements such as applicant registration, document submission, eligibility verification, application review, award disbursement, and applicant support for the bursary application system. As the system involves a large number and data of people, UI/UX requirements, security and data privacy requirements, and technical requirements such as technology stack, database requirements were determined. The Kilifi County Bursary Application System can be designed and implemented to address the specific needs and challenges by effectively gathering these requirements.

2.2.3 Coding

The Kilifi County Bursary Application System is coded with Django, CSS, MySQL, and JavaScript. The backend, responsible for handling the data and logic of the system will be written in Django, the frontend, responsible for the user interface of the system will be written in HTML, CSS, and JavaScript and the database to store the data for the system will be a MySQL database.

The code for the system can be tested using a variety of methods. Unit tests can be used to test individual functions and methods. Integration tests can be used to test the interactions between different components of the system. System tests can be used to test the entire system end-to-end. Once the code has been tested and debugged, it is deployed to a production environment for students to apply for bursaries.

2.2.4 Testing with Users

Testing the Kilifi County Bursary Application System with users is an important step in ensuring that the system is user-friendly, efficient and meets the needs of the users. The testing included usability testing, focusing on how easy the system is to use, functional testing, focus on whether the system meets the requirements and performance testing, focus on how well the system performs under load. System testing was done online with users including students from different schools, academic levels, and technological proficiency, parents and bursary officers in a group of 5-10 members for each testing round. The feedback from users was collected through surveys, interviews, and observation to improve the system until it meets the needs of the users. It is important to note that the testing process was iterative.

2.3 System Review

The Kilifi County bursary application system is similar to other systems in terms of its functionality and purpose.

2.3.1 Case Study One, TEVET Bursary System.

In Zambia, Lusaka Province have its own bursary application system to assist students in accessing education. The system need the applicant submit or upload a letter from the village elder which is a challenge to those studying away from their villages. This proposed tends to get away with this requirement to make the system more convenient to all the applicants.

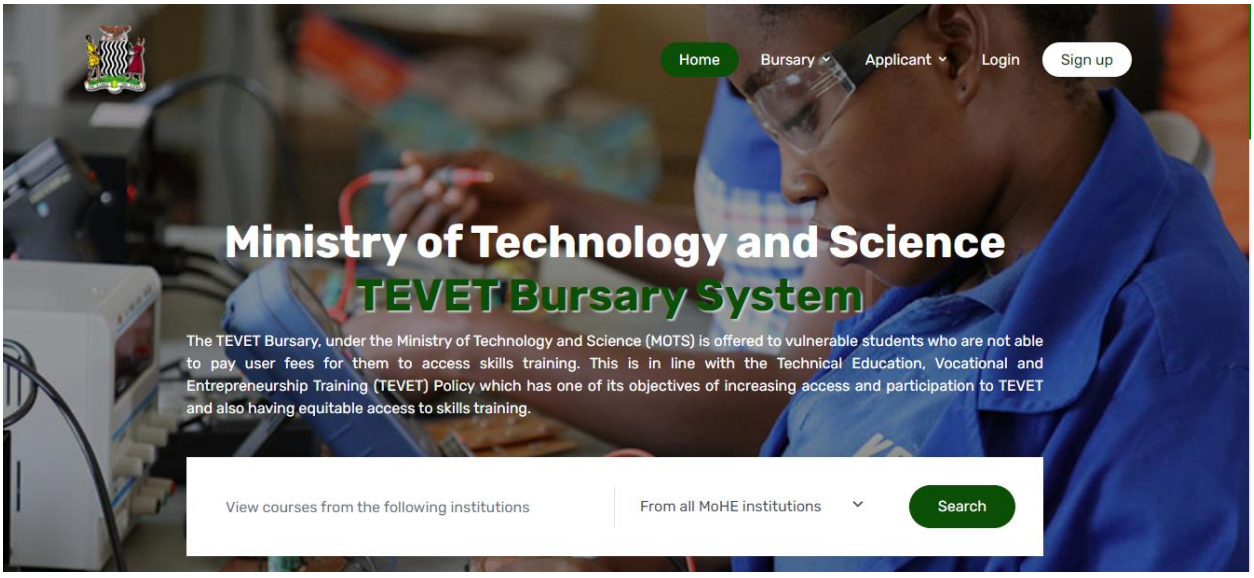

Figure 1 TEVET Bursary System, source: tevetbursary.mots.gov.zm

2.3.2 Case Study Two, Embu County Bursary and Scholarship Management System.

The county government of Embu developed a web based system for students to apply for bursaries to aid those in need of financial assistance in their studies. This proposed system will be efficient than the Embu county bursary management system in the way that it won't be a requirement for one to download the online filled form and submit it with the other required documents to the ward administrator's office.

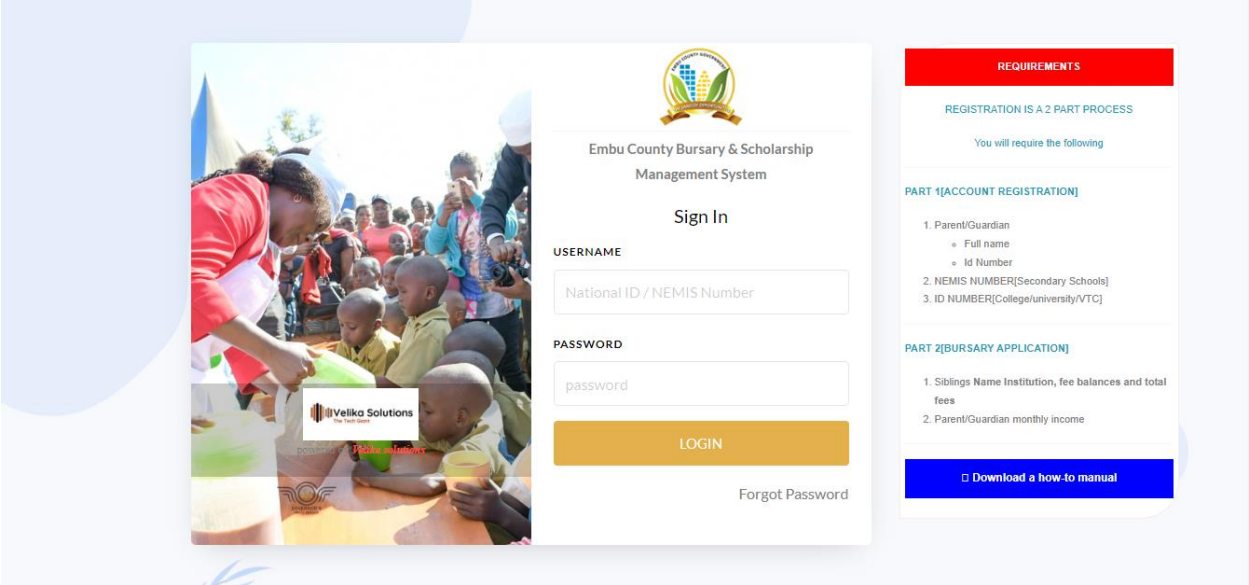

Figure 2 Embu Bursary and Scholarship Management System, source: bursary.embu.go.ke

2.3.3 Case Study Three, Higher Education Loans Board.

The Higher Education Loans Board is a statutory body which provides financial assistance to students in colleges, polytechnics and universities in form of loans. The system requires one to upload signed documents from his/her local sub-chief or chief. The proposed system will make this manual verification electronically where one will provide contact details of this leaders so they could be contacted by the bursary administrators over the internet.

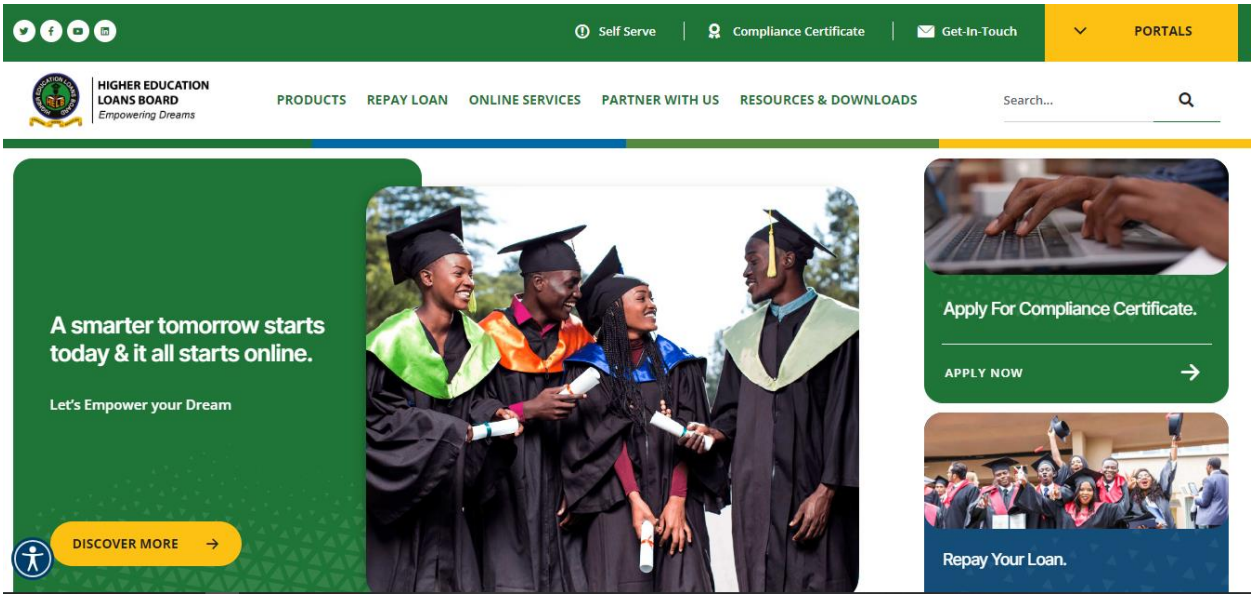

Figure 3 HELB, source: helb.co.ke

2.4 Critical Review and Research Gap Identification

Undoubtedly, the NG-CDF in Kilifi County has served as a valuable initiative in providing financial assistance to deserving students from economically disadvantaged backgrounds. However, a critical review of the system reveals several areas for improvement and identifies research gaps that can be addressed to enhance its effectiveness and impact.

The Kilifi County Bursary Application System is a manual system requiring students to submit application papers to the respective MPs or MCAs' office within a short period of time locking out those students studying outside their ward or constituency of origin. The application process is time-consuming and inefficient, and it can be difficult for students to track their application status. Additionally, the manual system is susceptible to errors, which can lead to delays in the disbursement of bursaries.

There is a significant research gap in the area of bursary application systems in Kilifi county. There is limited research on the effectiveness of manual bursary application systems, and there is no research on the development of an online bursary application

system for Kilifi County. I believe that the implementation of an online bursary application system would improve the efficiency and transparency of the bursary application process in Kilifi County. It would also make it easier for students to apply for a bursary and track the status of their applications. Additionally, an online bursary application system would be more inclusive and accessible to all students.

I believe that the implementation of an online bursary application system would improve the efficiency of the bursary application process in Kilifi County. It would be remotely accessible to all students, make it easier for students to apply for a bursary and track the status of their applications. Additionally, an online bursary application system would be more inclusive and transparent.

2.5 Chapter Summary

In this chapter, the discuss majorly based on the issues and background information that led the researcher to come up with the idea of developing an online bursary application system.

CHAPTER THREE: METHODOLOGY

3.1 Introduction

In this chapter, the study gives the methods and approaches used in the system development. It consists of six sections namely; Introduction, Research design, System development methodology, System requirement, Database design, Testing design and chapter summary.

3.2 Research Design

This study employed a qualitative method where a systematic investigation of phenomena is done by gathering quantifiable data and performing statistical, mathematical, or computational techniques. It is conclusive in its purpose as it tries to quantify the problem and understand how prevalent it is by looking for projectable results to a larger population. The in-depth design used is a descriptive survey and experimental design sampling techniques. In a descriptive research design, a researcher is solely interested in describing the situation or case under his/her research study. It is a theory-based research design which is created by gather, analyze and presents collected data. Experimental design refers to how participants are allocated to the different conditions (or IV levels) in an experiment. Descriptive and experimental design is regarded as the most appropriate research design to measure perceptions of the respondents in a study. It enables the researcher to collect a cross-sectional data important for comparative analysis. In addition, they are advantageous in terms of cost, extensiveness, flexibility, dependability among others.

3.2.1 Target Population

KCBAWS target population consists of individuals who are seeking financial assistance to support their education and meet the eligibility criteria set by the Kilifi County Government. Specifically, the system is designed to serve economically disadvantaged

students in Kilifi County, Kenya, who require financial aid to pursue their studies. The key components of the system's population are:

i. **Students:** These are the primary beneficiaries of the bursary application system in various educational institutions within Kilifi County. Includes students from secondary schools, technical and vocational institutions, and tertiary institutions.
ii. **Guardians or Parents:** The system is also relevant to the guardians or parents of eligible students who are responsible for applying for the bursary on behalf of their children or wards.
iii. **Educational Institutions:** Schools, colleges, and universities located within and outside of Kilifi County are also part of the target population. They facilitate the application process, verifying student information, and support the implementation of the bursary program.
iv. **County Officials and Administrators:** County officials and administrators responsible for managing the bursary program, evaluating applications, and disbursing funds are an integral part of the target population. They will use the application system to streamline the process and ensure effective administration.
v. **Stakeholders:** Other stakeholders, such as community leaders, NGOs, and organizations involved in education and social welfare activities, may also be part of the target population, as they may collaborate with the county government in supporting the bursary program.

3.2.2 Sample Size

It is demanding, costly and time consuming to carry out the study with whole stakeholders in the bursary application system in Kilifi county, a sample size of 80% will be used. This sample size includes all the stakeholders in the whole bursary application process. The sample size data will be vital in developing of the system.

3.2.3 Data Collection Procedure & Instruments.

The research will use primary data, employing well pre-designated structured questionnaires and interviews to collect the data. Other relevant methods of collecting data such as experiments, relevant books and the internet is also considered. Graphs, tables, and charts to be used for data measurement, analysis, storage and presentations for the study.

3.2.3.1 Interviews

A purposeful discussion between two or more people, or a form of questioning characterized by the fact that verbal questioning is used as its principle technique of data collection (Spradley, 2016). Face-to-face interviews will be used to collect data from the target population as it provides a clear and explanatory information. Data collected by interviews will be recorded using an audio recorder with permission and consent from the interviewees.

3.2.3.2 Questionnaires

Questionnaire is a set of printed or written questions with a choice of answers, devised for the purpose of survey or statistical study (Brace, 2018). Questionnaires to be administered will contain closed questions and hand-delivered to the target group. This method best suits because most students, school staffs and bursary administrators will only spare a short time to complete the questionnaire and since they do have a tight schedule. A questionnaire sample is provided in the appendix.

3.3 System Development Methodology

KCBAWS will be designed using the Agile Scrum methodology. Agile Scrum is lightweight, iterative, and incremental approach to software development and is chosen as the design methodology because it is flexible and adaptable. The Agile Scrum design methodology will be executed in the following phases:

i. **Project Planning:** The developer, along with stakeholders, will create a product backlog, a prioritized list of features and functionalities needed for the bursary application system. The system developer will estimate the effort required for each item in the backlog.

ii. **Sprint Planning:** System developer will select a set of high-priority items from the product backlog to be developed during the first sprint. It will include defining specific tasks, setting sprint goals, and estimating the time required for completion.

iii. **Sprint Development:** The developer will work on the selected items from the product backlog, focusing on delivering a potentially shippable increment by the end of the sprint.

iv. **Sprint Review:** At the end of each sprint, a sprint review meeting will be conducted to stakeholders and gather feedback. Adjustments to the product backlog may be made based on this feedback.

v. **Sprint Retrospective:** The developer will hold a sprint retrospective meeting to reflect on the previous sprint's processes and identify areas for improvement enhance the efficiency of the development process.

vi. **Iterative Development:** Steps 3 to 5 will be repeated for subsequent sprints, with the system developer continuously adding new features and improving the system based on stakeholder feedback.

vii. **Release and Deployment:** Once the essential functionalities are developed and tested, the system can be released for use, even if it does not include all planned features. Subsequent sprints will add more features and improvements in subsequent releases.

3.3.1 Methodology Justification.

Agile scrum methodology is chosen because if its adverse advantages in system or software development. Agile Scrum embraces change and allows teams/developer to adapt quickly to evolving requirements and priorities. Iterative nature of Scrum enables frequent inspection and adaptation, ensuring the project remains responsive to customer

needs. The methodology places a strong emphasis on customer collaboration throughout the development process, regular feedback and involvement from stakeholders will help ensuring that the final product meets the actual needs of the users.

3.4 System Requirement Analysis.

It refers to the process of determining user's expectations for a new or modified product. Requirement's analysis involves frequent communication with system users to determine specific feature expectations, resolution of conflict or ambiguity in requirements as demanded by the various users or groups of users, avoidance of feature creep and documentation of all aspects of the project development process from start to finish. Requirements are of two types, functional and non-functional requirements.

3.4.1 Functional Requirements.

i. **Applicant registration**: The system must allow applicants to register for the bursary program. This includes providing basic personal information, such as name, address, and contact details.

ii. **Application submission:** The system must allow applicants to submit their applications for the bursary program. This includes providing information about their academic qualifications, financial need, and other relevant factors.

iii. **Bursary awarding**: The system must automatically award bursaries to eligible applicants. This is typically done by matching applicants' data with the bursary program's eligibility criteria.

iv. **Disbursement tracking**: The system must track the disbursement of bursaries to eligible applicants. It includes keeping track of the amount of money disbursed, the date of disbursement, and the beneficiary's details.

v. **Reporting**: The system must generate reports on the bursary program, such as the number of applications received, the number of bursaries awarded, and the amount of money disbursed.

3.4.2 Non-Functional Requirements.

i. **Security**: The system must be secure and protect the confidentiality, integrity, and availability of data. This includes protecting personal information, financial information, and application data.

ii. **Scalability**: The system must be scalable and able to handle a large number of applications and bursaries. This is especially important during peak periods, such as the application deadline.

iii. **Performance**: The system must be efficient and able to process applications and disburse bursaries in a timely manner. It is important for ensuring that applicants do not have to wait too long for their applications to be processed.

iv. **Accessibility:** The system must be accessible to all users.

v. **Maintainability:** The system must be easy to maintain and update. This is important for ensuring that the system can be kept up-to-date with changes to the bursary program or the law.

vi. **Reliability:** The system must be reliable and available 24/7. This is important for ensuring that applicants can submit their applications and track the status of their applications at any time.

3.4.3 Unified Modelling Language.

This is a general purpose, developmental and modelling language in the field software engineering that is intended to provide a standard way to visualize the design of a system.

3.4.2.1 Use Case Diagram.

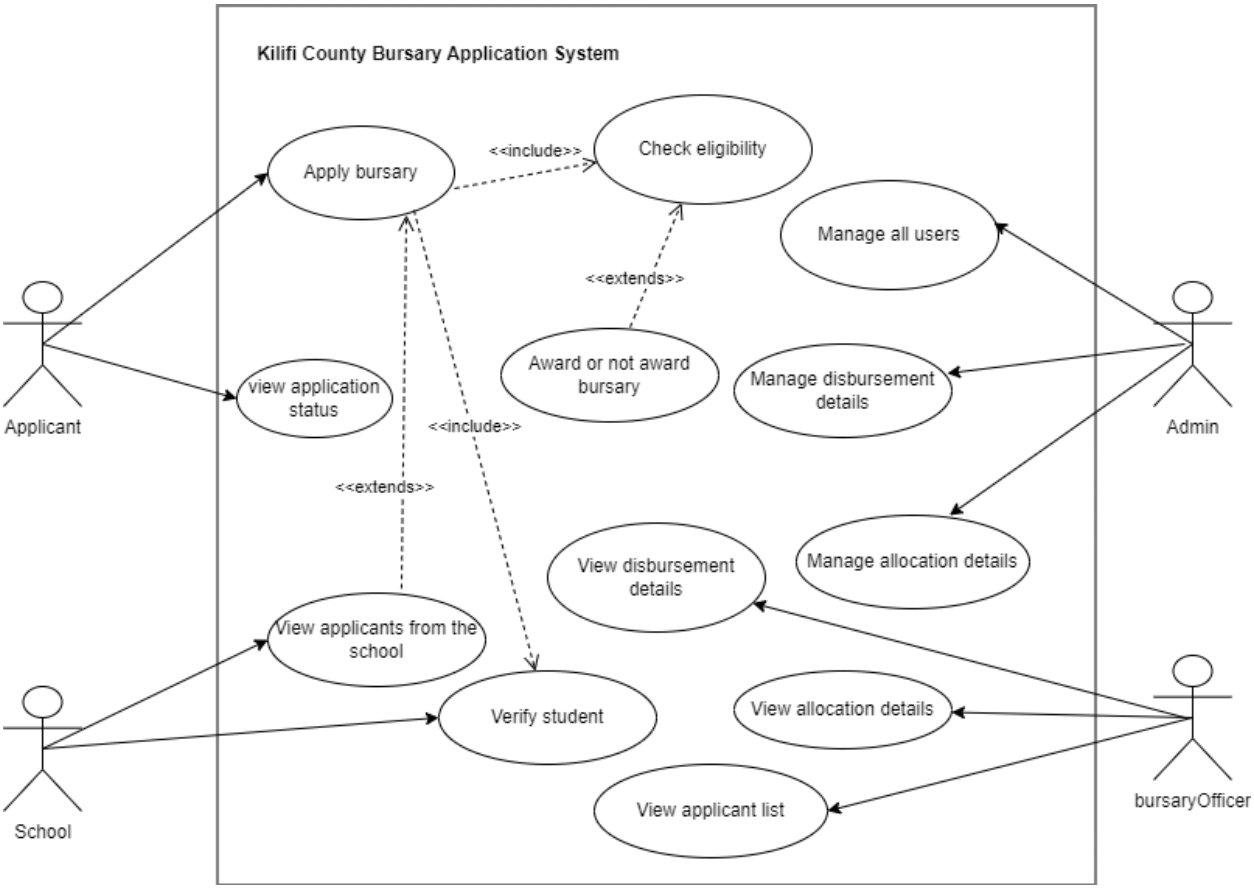

Figure 4 Use Case diagram, source: draw.io

3.4.2.2 Activity Diagram.

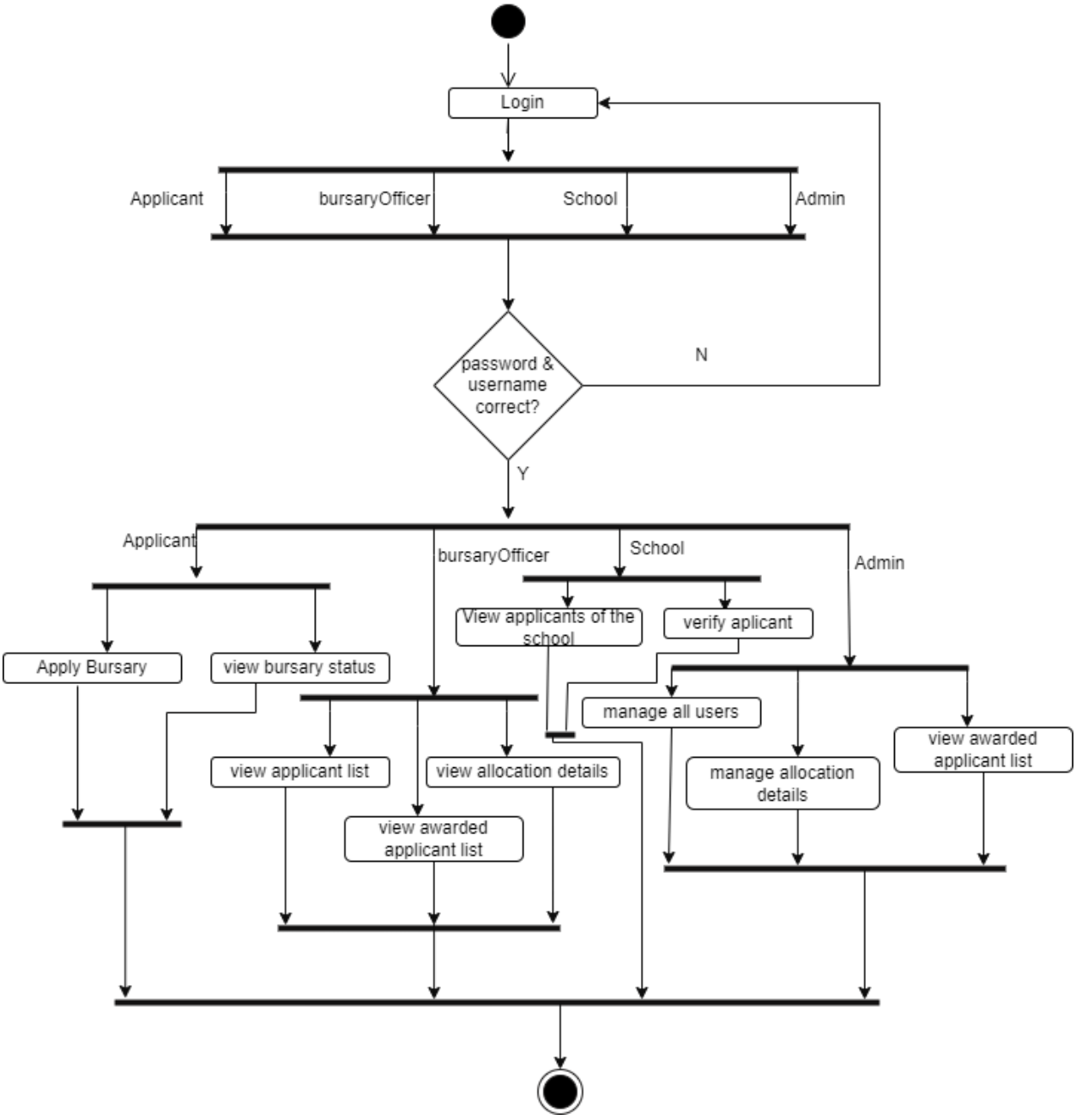

Figure 5 Activity Diagram, source: draw.io

3.4.2.3 Sequence Diagram.

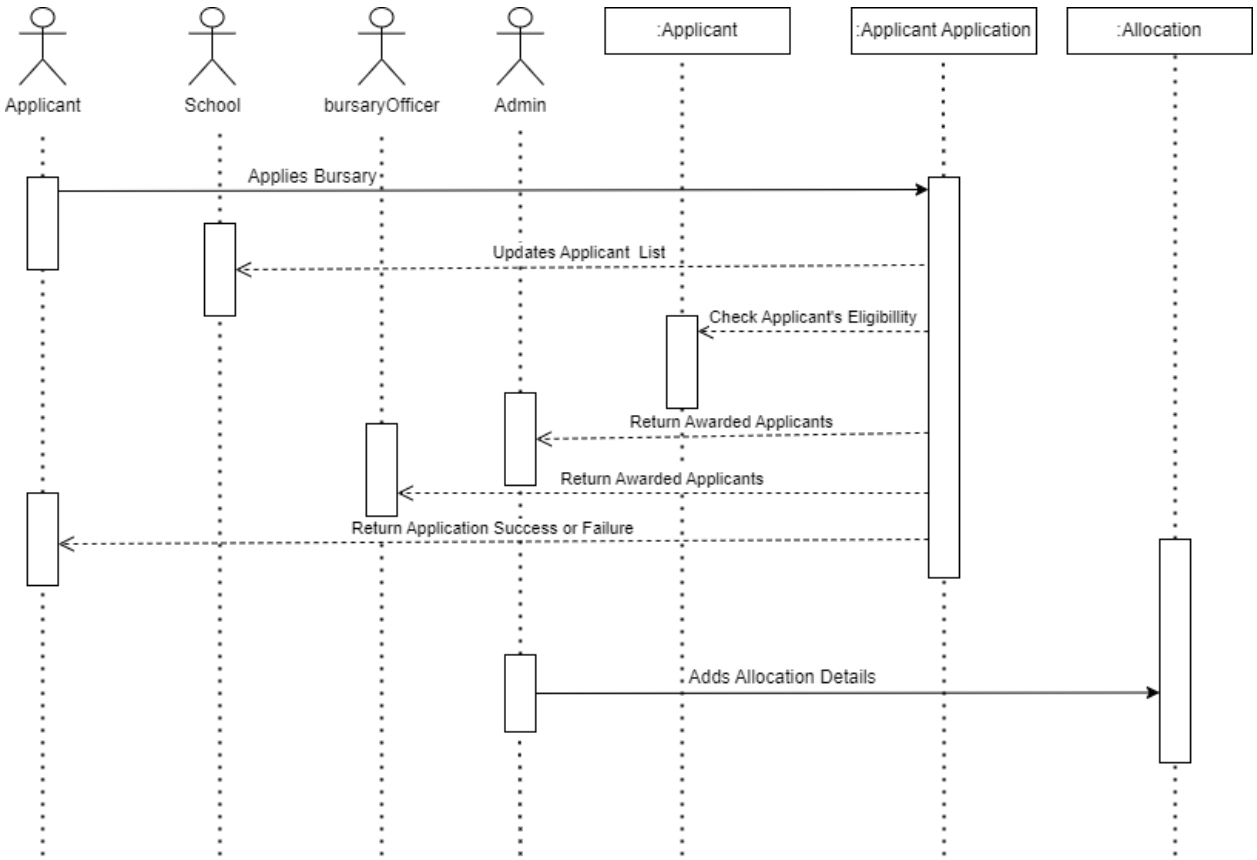

Figure 6 Sequence diagram, source: draw.io

3.4.2.4 Class Diagram.

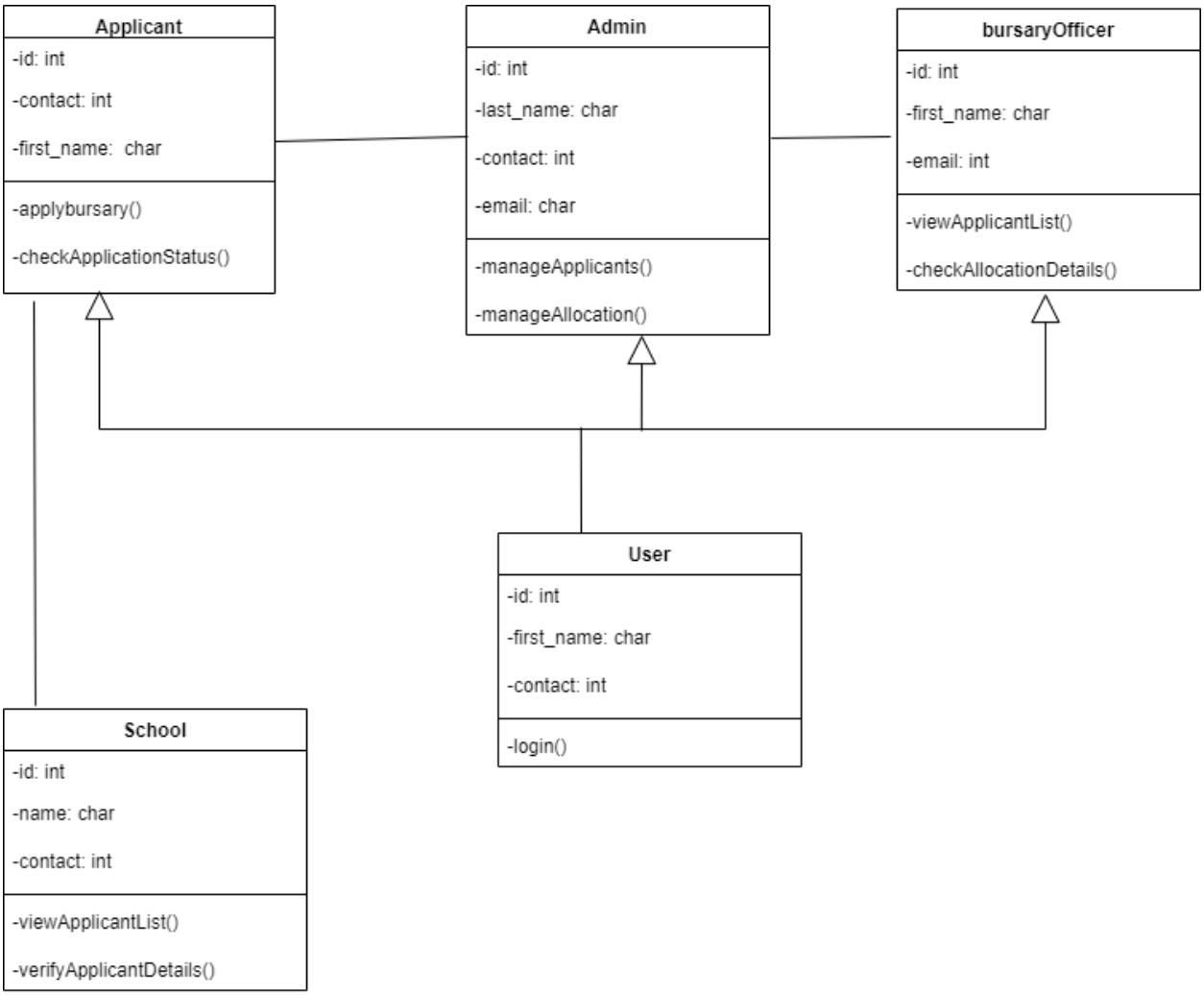

Figure 7 Class diagram, source: draw.io

3.4.2.5 Deployment Diagram

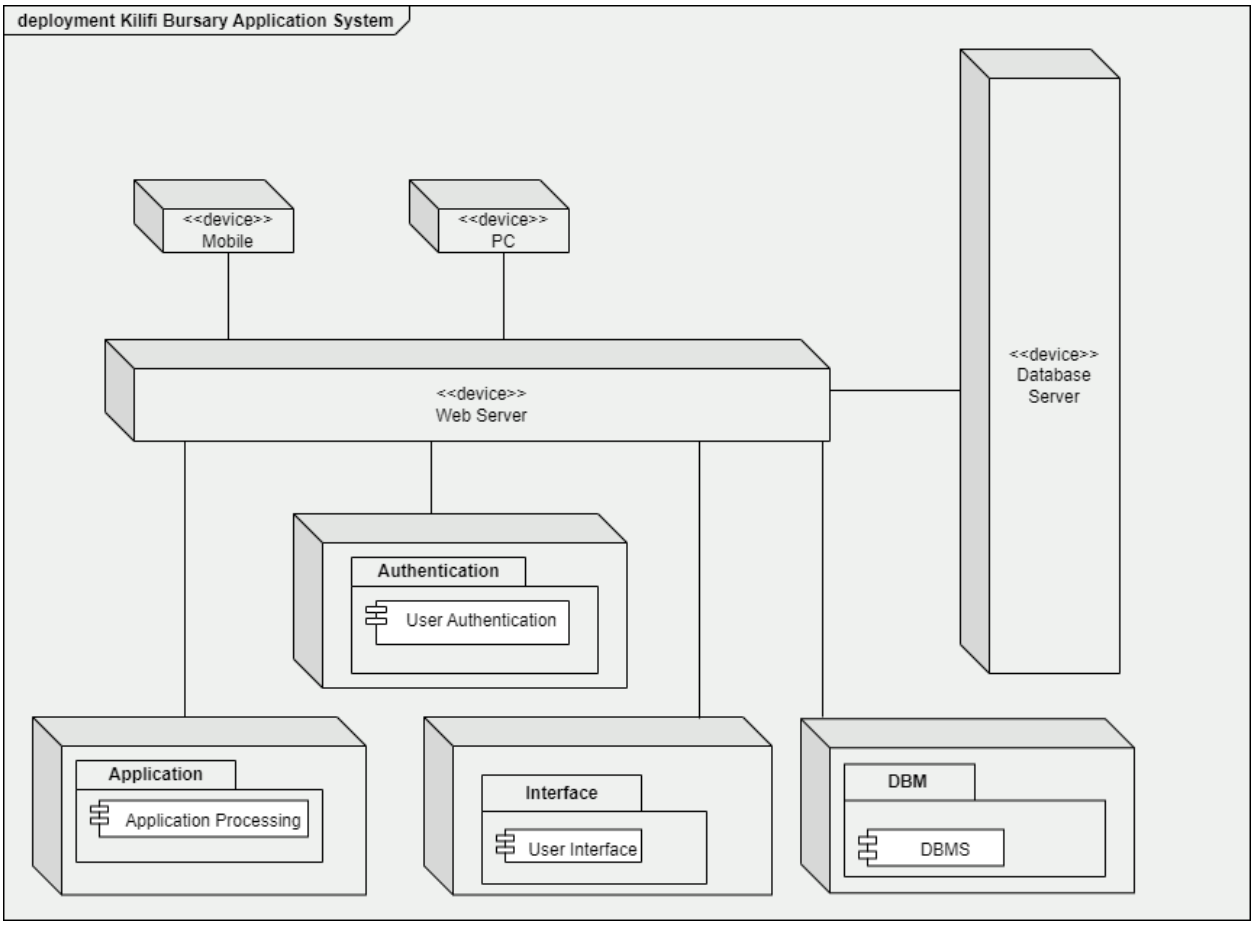

Figure 8 Deployment diagram, source: draw.io

3.5 Database Design

This is the organization of data according to database model. It determines how the data elements interrelate and how the data must be stored.

3.5.1 Table Design

Table design involves arranging related data in a table format within a database. A table consists of rows and columns; they have specific number of columns but can have any number of rows.

3.5.1.2 Ward table

This table stores the details of a ward in the database.

FIELD NAME	DESCRIPTION	FIELD TYPE	FIELD SIZE
Id	Primary Key	Int	
wardName	Name of the Ward	Char field	100
constituency	Foreign Key	Int	50

Table 1 Ward table

3.5.1.3 Constituency Table

This table stores the details of a constituency in the database.

FIELD NAME	DESCRIPTION	FIELD TYPE	FIELD SIZE
Id	Primary Key	Int	
constituencyName	Name of the Constituency	Char field	100

Table 2 Constituency table

3.5.1.4 Institution Table

This table stores the details of a school in the database.

FIELD NAME	DESCRIPTION	FIELD TYPE	FIELD SIZE
ID	Primary Key	Int	
institutionName	Name of the institution	Char field	100
institutionLevel	Level of the institution	Char field	50
institutionStatus	Status of the institution	Char field	50

Table 3 Institution table

3.5.1.5 Applicant Table

This table record applicant's details into the database of the system.

FIELD NAME	DESCRIPTION	FIELDTYPE	FIELD SIZE
Id	Primary Key	Int	
firstName	Applicant first name	Char field	100
middleName	Applicant middle name	Char field	100
lastName	Applicant last name	Char field	100
gender	Gender of the applicant	Choice field	100
email	Applicant's email	Char field	100
DOB	Date of birth of applicant	Date field	50
guardian	Foreign key	Int	100
institution	Email of the applicant	Int	100
constituency	Name of the school	Int	100
admNo	School Registration Number	Char field	100
contact	Contact details of the applicant	Int	100
ward	Foreign key	Int	100

bursary	Many To Many field	Int	100
studyLevel	Level of education	Choice field	60
studyYear	Current form or year of study	Int	50
course	Course of the applicant	Char field	50
user	One To One field	Int	50

Table 4 Applicant table

3.5.1.6 Guardian Table

Table for the applicant's guardian details.

Field Name	Description	Field Type	Field Size
Id	Primary key	Int	
guardianName	Name of the guardian	Char field	
guardianContact	Contact of the guardian	Int	13
guardianGender	Gender of the guardian	Choice field	20
guardianID	National ID/Passport of the guardian	File field	
guardianOccupation	Occupation of the guardian	Char field	50

Table 5 Guardian table

3.5.1.7 Bursary Table

Table for the bursaries

Field Name	Description	Field Type	Field Size
Id	Primary key	Int	
category	Category of the bursary	Choice field	50
bursaryAmount	Amount of the bursary	Int	40
financialyear	The account year of the bursary	Char field	30
batchNumber	Batch number of the bursary	Char field	30
status	Bursary's status	Choice field	70
dateCreated	Bursary's creation date	Date field	
deadline	Bursary's deadline date	Date field	
ward	Foreign key	Int	
constituency	Foreign key	Int	

Table 6 Bursary table

3.5.1.8 CustomUser Table

This table inherits the user table which comes with Django for authentication purposes.

Field Name	Description	Field Type	Field Size
profileContact	Contact of the user	Int	13
ProfilePicture	Profile picture of the user	File field	

Table 7 CustomUser table

3.5.1.9 User Login Table

Applicant table records the login details an applicant when logging into the system.

Field Name	Description	Field Type	Field Size
username	Name for login	Char field	100
password	User Password	Char field	100

Table 8 User login table

3.5.2 3NF Normalized Form

Id	email	Password
2	ricky123@gmail.com	#12Thdg10G
4	moris56@gmail.com	$sign1010
6	dan56@gmail.com	R2022-785
7	kenoigo@gmail.com	Kai29

3.6 Test Design.

Involves designing a testing strategy for the bursary application system to ensure it works as intended and meets the requirements of the stakeholders. Testing approaches to be considered:

i. Unit Testing:

Test individual components of the system in isolation to verify their correctness. Focus on testing functions, methods, and modules to ensure they behave as expected. Use mocking or stubbing to simulate external dependencies.

ii. Integration Testing:

Test how different components of the bursary application system work together. Verify that data flows correctly between modules and subsystems. Identify and address any issues with system interfaces.

iii. Functional Testing:

Verify that the system functions according to the specified requirements. Test the application's core features such as registration, application submission, document upload, and bursary awarding process. Ensure that all user roles (applicants, administrators) have their functionalities tested.

iv. Usability Testing:

Evaluate the user-friendliness and intuitiveness of the system's interface. Involve real users (applicants and administrators) to perform tasks and gather feedback. Identify and address any usability issues to enhance the user experience.

v. Security Testing:

Assess the application for vulnerabilities and potential security risks. Check for SQL injection, XSS and other common security issues. Ensure that sensitive data (e.g., personal information) is properly protected.

vi. Performance Testing:

Evaluate the system's performance under various load conditions. Measure response times, server resource usage, and database performance. Identify and address potential bottlenecks and scalability issues.

vii. Regression Testing:

Re-test previously working functionality after making changes or bug fixes. Ensure that new updates or fixes do not introduce new issues in the system.

viii. Load Testing:

Assess how the system performs under expected and peak loads. Measure the system's response time and scalability when a large number of users access the system simultaneously.

ix. UAT:

Involve actual end-users (applicants and administrators) to test the system in a real-world environment. Gather feedback from users and validate if the system meets their needs and expectations.

x. Compatibility Testing:

Verify that the bursary application system works on different browsers and devices. Test on various operating systems and screen sizes to ensure cross-platform compatibility.

3.6.1.1 Test Case One:

The system should allow a student to submit a bursary application.

Input: Valid student information, valid bursary type, and valid amount.

Expected Output: The bursary application is successfully submitted.

3.6.1.2 Test Case Two:

The system should not allow a student to submit a bursary application if they are not a registered student.

Input: Invalid student information.

Expected Output: The bursary application is not submitted.

3.6.1.3 Test Case Three:

The system should allow a student to view the status of their bursary application.

Input: The student's id and the bursary type.

Expected Output: The status of the bursary application is displayed.

3.6.1.4 Test Case Four:

The system should allow a student to update their bursary application.

Input: The student's id, the bursary type, and the new information.

Expected Output: The bursary application is successfully updated.

3.6.1.5 Test Case Five:

The system should allow a bursary administrator to approve or reject a bursary application.

Input: The bursary application id, the approval or rejection status, and the reason for the decision.

Expected Output: The bursary application is updated with the new status.

3.7 Chapter Summary.

The methodology chapter in this thesis outlined the research design and approach used to conduct the study. It outlines the methods, procedures, and techniques employed to collect and analyze data and system development methodology.

CHAPTER FOUR: RESEARCH FINDINGS AND DISCUSSION

4.1 Introduction.

This chapter captures presentation of research findings mostly in screenshots of the system. Screenshots of both the user interface and the code.

4.2 Presentation of Findings.

Findings corresponding to each specific objective outlined in Chapter One. The research objectives and their corresponding findings are discussed as follows:

4.2.1 Objective 1: Analyzing the current the bursary application system to obtain requirements.

Objective One was to analyze the current bursary application system used by the county of Kilifi, need to come up with an online system to upgrade the current system which had many defects for the applications was seen.

4.2.2 Objective 2 and 3: Design and Develop the System

Objective Two aimed to develop an online system for bursary application.

System Homepage

This the homepage of the system for both authenticated and unauthenticated applicants.

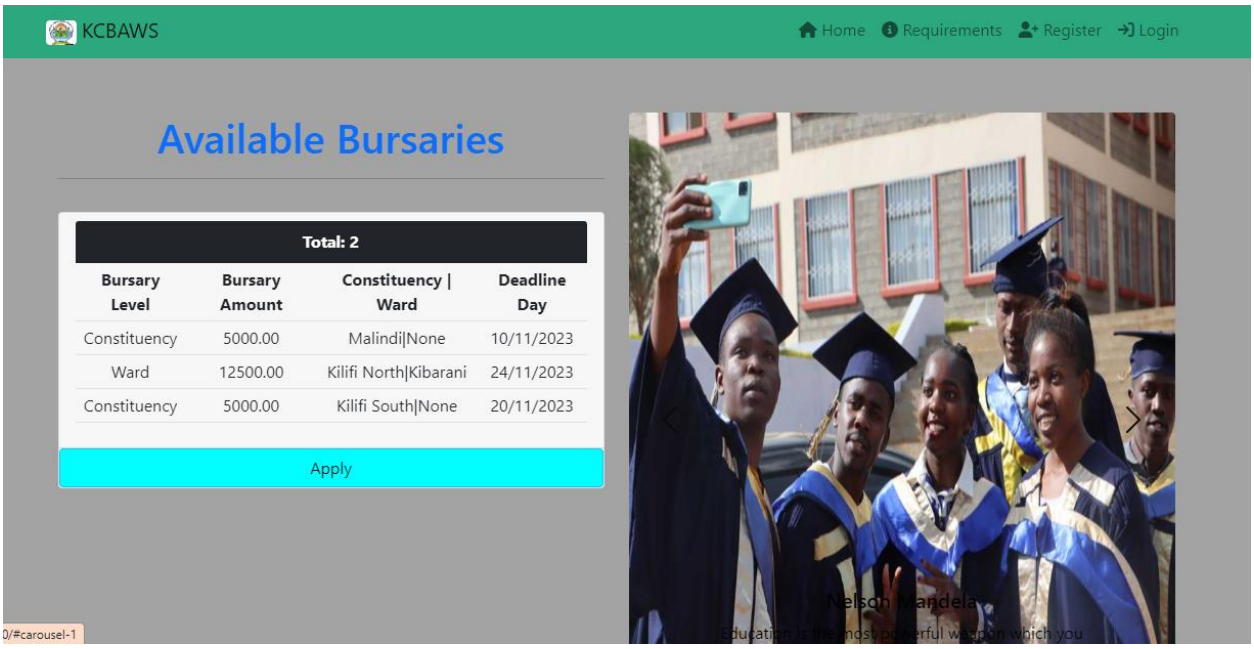

Figure 9 Homepage Screenshot

User Login

Applicants and admin use this page to login into the system.

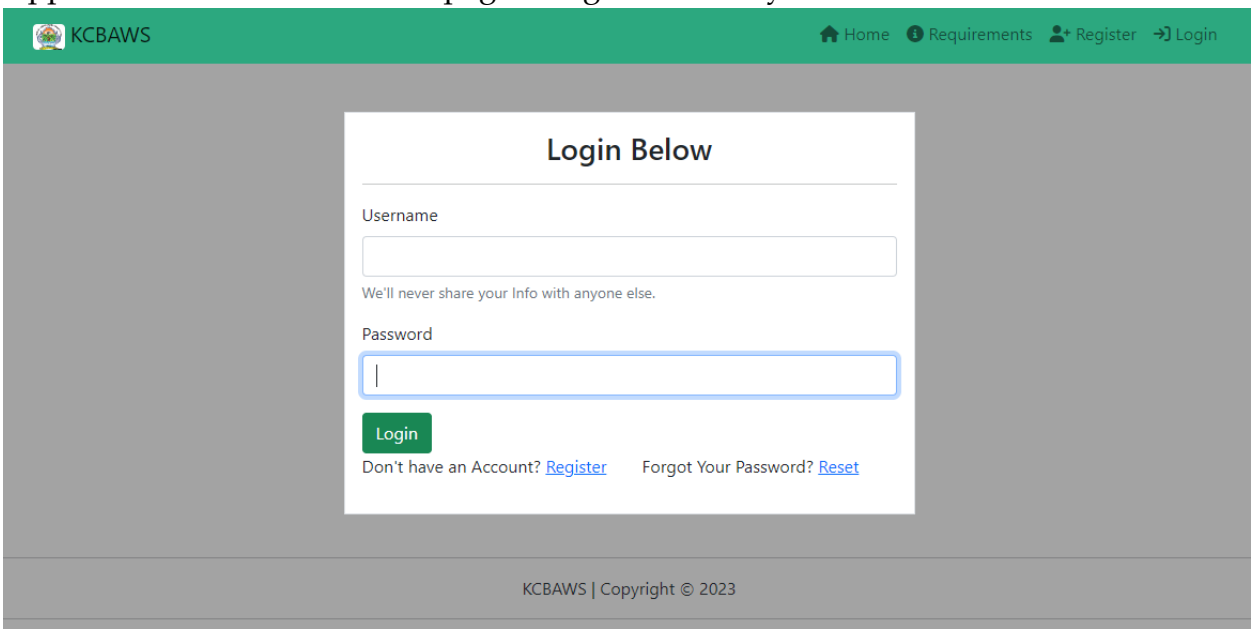

Figure 10 Login Page screenshot

Applicant Filling Details

An applicant fills his/her own details used when applying for a bursary

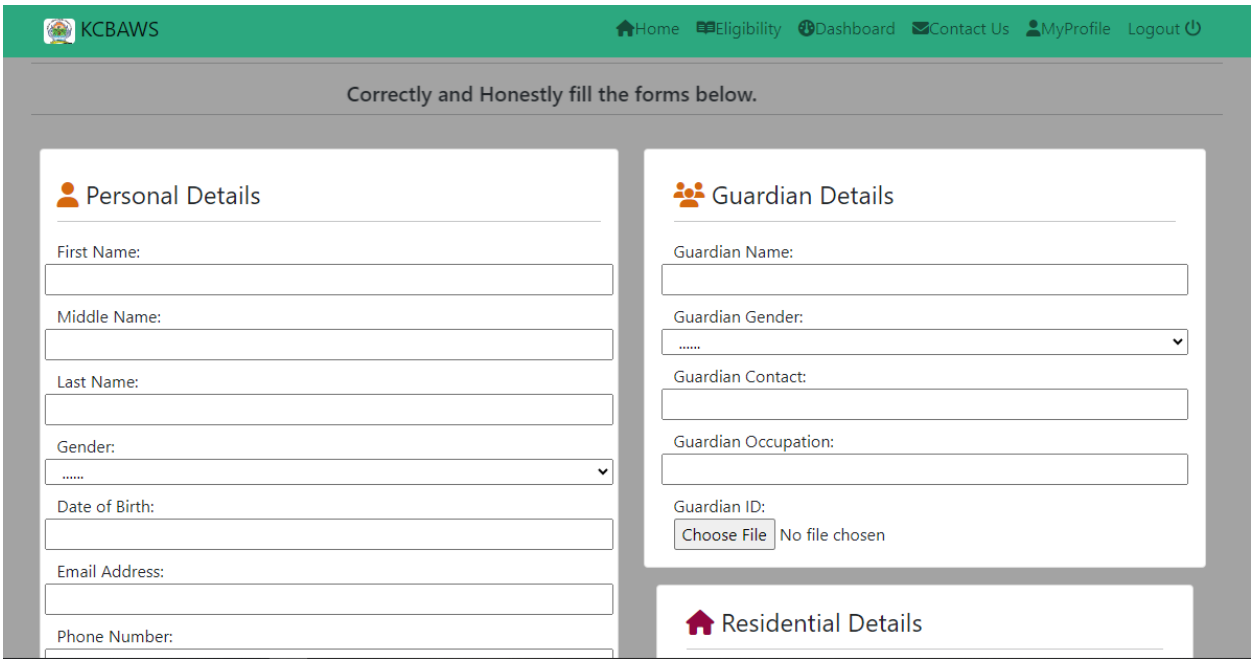

Figure 11 Applicant filling details form screenshot

Applicant Dashboard

On successfully log in this is an applicant's dashboard.

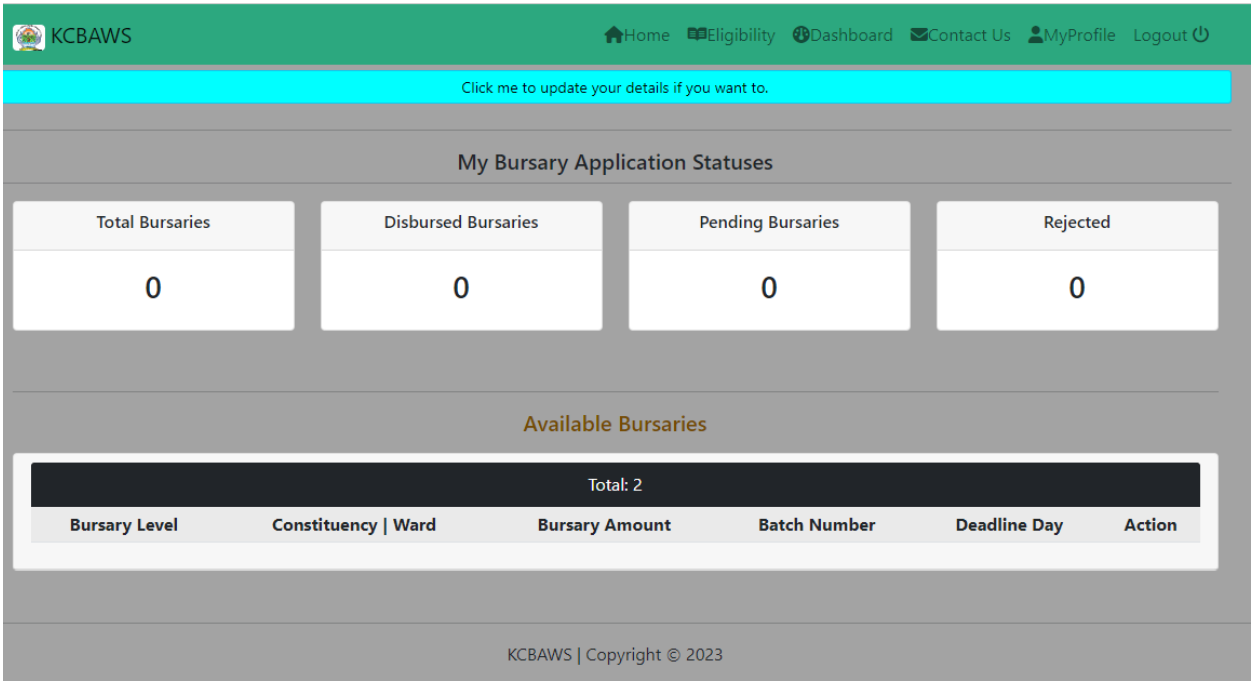

Figure 12 Applicant dashboard screenshot

Admin Dashboard

The admin interface where he/she interacts with bursaries, applicants and institutions.

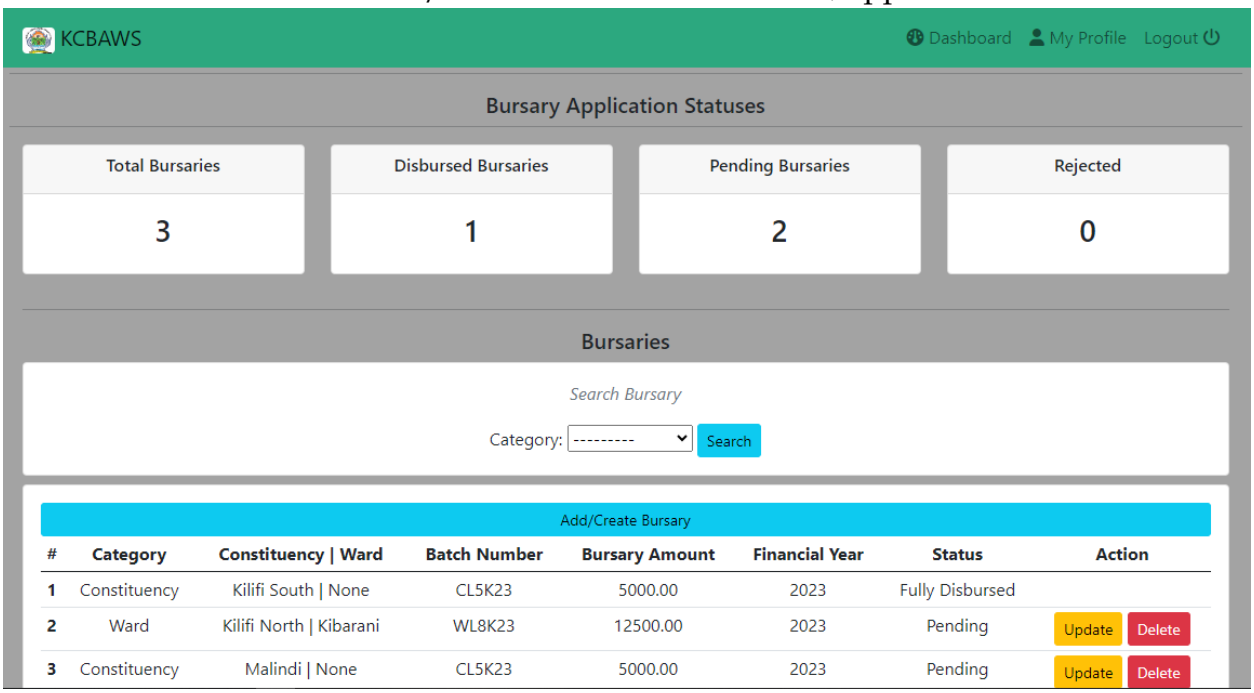

Figure 13 Admin dashboard screenshot

Query Output

This screenshot shows a query and its output on Bursary table/model.

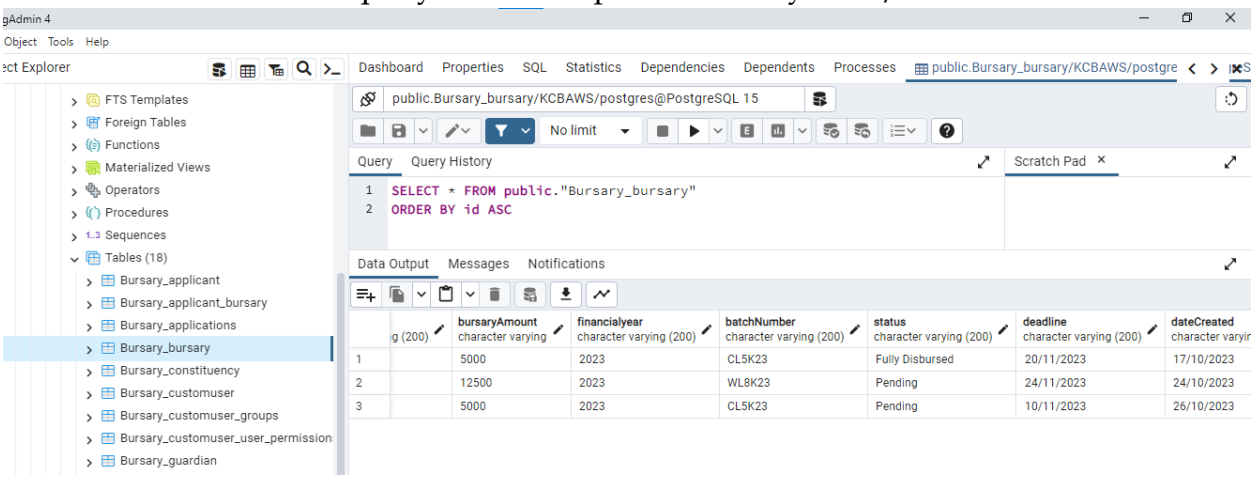

Figure 14 Query output screenshot

Admin Updating a Bursary

Admin updating an existing bursary with the form having the bursary instance.

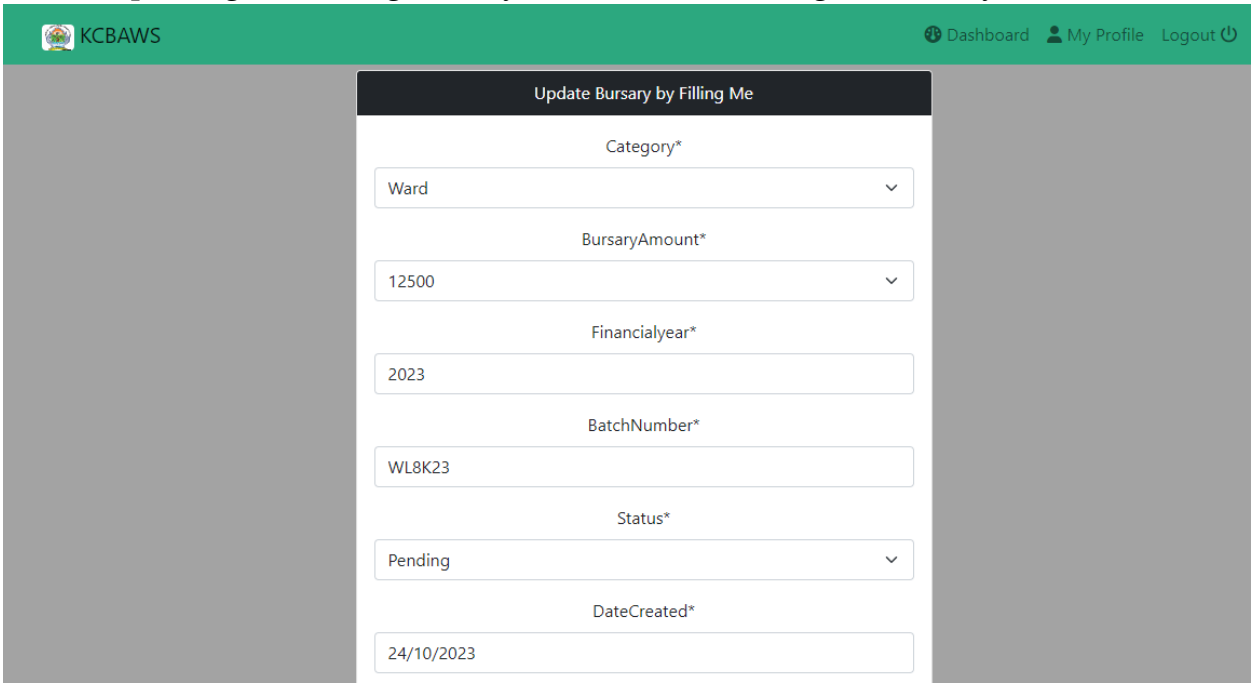

Figure 15 Admin update bursary screenshot

Applicant Applying Bursary

An applicant only applies a bursary from his/her constituency or ward.

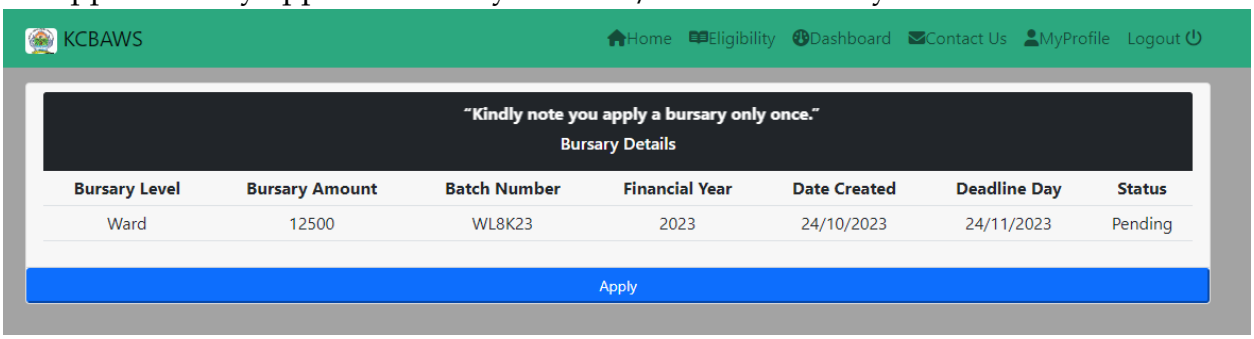

Figure 16 Applicant apply bursary screenshot

4.2.3 Objective 4: Testing the System

The system was tested with students from different constituencies and wards. The students used in testing the system were also of different study levels, that is, high school, college or university. Different tests produced different results resulting to improvements and error correction to improve the system's efficiency.

4.3 Chapter Summary

In this chapter several screenshots of the system are provided to prove that the objectives were achieved.

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

In this final chapter, we present a summary of the key findings and outcomes of our project, draw conclusions based on the research and implementation of the new bursary application system, and provide recommendations for the way forward. This chapter serves to bring together the insights gained throughout the project and offer guidance for future actions in the context of bursary application systems.

5.2 Summary of Findings

The transition from a manual to an automated bursary application system has the potential to significantly improve efficiency and transparency. Users, including students, found the new system to be more convenient and user-friendly.

The use of Django, HTML, CSS, JavaScript, and PostgreSQL ensured a robust and secure system.

Collaboration with students from Kilifi county helped identify and address user-specific issues, leading to a more tailored and effective system. The new system has the potential to streamline the bursary application process and enhance the overall experience for both applicants and administrators.

5.2.1 Objective one: Analyze the current bursary application system.

The current bursary application system is manual and paper-based. Users, mainly students, find it time-consuming and cumbersome to fill out paper forms. Manually submitting the bursary forms to the respective offices disadvantages students who study away from their county, constituencies or ward.

The system lacks transparency and efficiency in processing applications.

5.2.2 Objective two: Requirements for the new system.

Stakeholder interviews and surveys identified the key requirements for the new system. Key requirements included online application submission, document upload, and real-time status tracking.
The system had to user-friendly, accessible, and secure. Integration with an existing database for student records was required.

5.2.3 Objective three: Design and development of the system

The new bursary application system was developed using Django, an efficient web framework. The design included user-friendly interfaces, forms for application submission, and a dashboard for administrators and applicants.

Development involved coding using HTML, CSS, JavaScript for the frontend, and PostgreSQL for the database. Security measures such as encryption and user authentication were implemented.

5.2.4 Objective four: Testing of the System

Rigorous testing was conducted to ensure the system's functionality and reliability.
Unit tests and integration tests were performed on the Django framework and database components.
User acceptance testing involved students from Kilifi county from different constituencies and wards to assess usability and identify any issues.
Feedback from testing was used to make necessary improvements.

5.3 Conclusions

The conclusion of this project revolves around the transformation of the bursary application system from a manual, paper-based process to an automated, user-friendly, and efficient online system. Based on the research, development, and testing carried out, the following conclusions can be drawn:

Enhanced Efficiency and Transparency: The transition to the new online bursary application system has the potential to significantly enhance efficiency and transparency in the application and disbursement process. Applicants can now submit their requests digitally, reducing the administrative overhead required for manual data entry and verification. Real-time tracking of application status ensures greater transparency for both applicants and administrators.

User-Friendly Interface: The user-centric design of the new system, with its user-friendly interfaces and online forms, has made the application process more accessible and convenient for students and applicants. Feedback from user testing indicated a high level of satisfaction with the system's usability.

Security and Data Management: By utilizing the Django framework, HTML, CSS, JavaScript, and PostgreSQL, the system is equipped with robust security measures to protect sensitive data. Encryption and user authentication have been implemented to ensure data integrity and privacy.

Stakeholder Collaboration: Engaging with students from Kilifi county during the testing phase has proven invaluable. Their feedback led to adjustments and improvements, ensuring that the system caters to the specific needs of the end-users.

5.4 Recommendations

After development of this system, I strongly recommend the following:

Training and Capacity Building: To ensure the successful implementation and continued use of the new bursary application system, it is recommended that relevant stakeholders, including administrators and applicants, receive training on system usage. This will maximize the benefits of the new system and reduce potential user issues.

Continuous Monitoring and Improvement: The system should be subject to ongoing monitoring and evaluation to identify any issues or areas for improvement. Regular updates and maintenance should be carried out to keep the system current and secure.

Scale and Expansion: Consider expanding the use of this system to other counties or regions. Its success in Kilifi county suggests that it can be a model for other areas seeking to modernize their bursary application processes.

Data Backup and Disaster Recovery: Implement robust data backup and disaster recovery procedures to ensure the integrity and availability of bursary application data in case of unforeseen events or technical failures.

Periodic Security Audits: Conduct periodic security audits and assessments to identify and mitigate vulnerabilities. Cybersecurity should be a continuous concern to protect sensitive applicant information.

Mobile Application Development: Develop a mobile application that mirrors the functionality of the web-based system. The mobile app should be available on major platforms (iOS and Android) to further enhance accessibility and convenience for users, especially in regions with high mobile device penetration. It should be designed with a user-friendly interface, ensuring that it aligns with the same high standards of security and user experience as the web-based system.

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APPENDICES.

APPENDIX A: TIME FRAME

The project involved all the activities involved in the Software Development Lifecycle.

These activities are summarized in the Gantt chart below:

Week's activity	**May**	**June**	**July**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Problem definition								
Requirement identification								
Analysis								
Design								
Implementation Testing								
Documenting								

Table 9 Timeframe Gantt chart

APPENDIX B: QUESTIONNAIRE

1. **How do needy students apply for bursary funds from the county?**

   ☐ Online Platform ☐ Manual Form Filling

2. **What criteria do you use to award bursaries?**

   ☐ First come first serve policy ☐ Using student specific details ☐ Other means

If other means, please specify in brief

3. **How long does it take to process the applications and award successful applicants?**

☐ 1 – 3 months ☐ 3 – 6 months ☐ More than 6 months

4. **Do you keep bursary records for past financial years for future reference?**

☐ Yes ☐ No

5. **Do you in any way analyze the data after awarding of bursary? (Finding correlation or relativity within the bursary records)**

☐ Yes ☐ No

6. **What are your current methods of auditing and generating reports after disbursements?**

☐ Board /Panel members ☐ An automated system

7. **In a scale of 1 – 10, with 1 being very poor and 10 very good, how would you rate the current bursary processing approach?**

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10

8. Have you ever interacted with an automated system as far as bursary processing is concerned?

☐ Yes ☐ No

9. Would you want to have a system that automatically awards applicants as opposed to the current approach?

☐ Yes ☐ No

APPENDIX C: BUDGET

Hardware	**Cost (Kshs)**
Laptop	30,000
Ethernet Cable	200
Wi-Fi Adapter	3,500
Software	**Cost**
Linux/Windows OS	Free
Python Interpreter	Free
Test Editor	Free
Browser	Free
Total	33,700

Table 10 Project budget table