KTDA-SACCO: A Mobile-based Loan Application for Calculating and Processing Loans.

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An Information System Project Project 2 this project developed submitted to the Faculty of Information Technology in partial fulfilment of the requirements for the award of the Bachelor's Degree in Business Information Technology of Strathmore University

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Declaration

I declare that this work has not been previously submitted and approved for the award of a Bachelor's degree by this or any other University. To the best of my knowledge and belief, the project developed

contains no material previously published or written by another person except where due reference is made in the project developed itself.

Student's signature:

……..…….. [*Signature*]

……..…….. [*Date*]

Abstract

Savings and credit cooperative organizations(SACCO) provide savings, financial products, and services, maximize return savings to stakeholders, investments, and applying for a loan. Kenya Tea Development Agency(KTDA) is an organization that has a SACCO that mostly helps Kenya Tea farmers in their financial life. The Kenya Tea Development Agency needs to no inorder to improve the members of the Sacco's financial life they require an improved SACCO system. KTDA Sacco's current loan application system is web-based. This system is very challenging because its inefficient and time-consuming requires paperwork to be processed manually. This project developed aims to solve the problem by coming up with a technologically efficient solution. This is through a loan mobile-based application system that will assist KTDA associates to condense time consumption and aid to store information using modern technology. Current systems such as loan system based on a smart card which uses a combination of blockchain and smart card technology reviewed in this project developed but doesn't solve the problem. Besides, a web-based loan application system that uses software as a service was also reviewed although it does not solve the problem of the project developed at hand. The methodology to be used is rapid application development this is because it allows quick iterations that decrease development time and speed up delivery. An object-oriented approach will be taken towards the step of development of the solution. The designs used are the use case diagram, sequence diagram, database schema, and Gui designs and mock-ups. Tools to be used in this project development would include, java programming language, firebase database tools among other development platforms. The system testing techniquesthat were used to ensure the system meets the specified requirements was black box testing which enabled the development of test cases and results of the project developed. The system developed was a loan sacco application that enables KTDA members to apply for a loan and calculate their loans and also solving their current loan application process.

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Acknowledgments

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List of Abbreviations

KTDA – Kenya Tea Development Agency

Holdings **RAD -** Rapid Application Development

SACCO - Savings and Credit Cooperative Organisation

Chapter 1:Introduction

1.1 Background

There are different types of loans that are divided to secure and unsecured loans. Mortgages, house equity loans, home equity lines of trust, or automotive loans are examples of secure loans while individual loans, private lines of credit, student loans, or credit cards are examples of unsecured loans. In this project, the loan that is being focused on is the unsecured loan.

Kenya Tea Development Agency Holdings is a private company that offers broad services for small tea farmers such as inputs and agri-extension, transportation, processing, marketing, and access to funding. The current loan application process of this company is done on their website. This meaning when a farmer, staff, or any member wants to apply for a loan he or she is required to go to the Chai Savings and credit cooperative organization website and download the loan application form or fill in the form online. If the member decides to download he or she will print the form to fill in the application form. After filling the form the member sends the copy to their Sacco to the financial management in which behind the copies of required documents. The finance manager will check if the member fulfilled all KTDA loan requirements if yes the loan is approved. If approved the finance manager gives a go ahead for the loan to be given his or her loan and the member can monitor their loans online.

The challenge with this method is that data can easily get lost or manipulated and it still time-consuming. Therefore, interfere with other programs of the company making its business move slowly hence the company gains small profit and more losses. Therefore, the project developed mobile application will be very efficient for this conundrum.

1.2 Problem Statement

Loan aspirants are constrained to the ability to provide loan application documents by use of the machine but some are not. The procedure of those with electrical means is typically handled in a manner that requires reinterpretation of new documentation obtained. This includes matching the document gotten to the relevant customer account and loan application details. This process also depends significantly on the withdrawal of user document submissions from emails and

manually linking those documents to specific unique identifiers to facilitate review and approval of the loan applications (Payne, 2019) .The current loan application process for members of the KTDA SACCO is found to be very challenging. Research conducted by Payne proved that the existing loan application process is inefficient and time-consuming, requires paperwork to be processed manually. Therefore, a necessity for a more highly computerized and integrated platform is required when lending a loan (Hsieh, 2019).

1.3 Aim

To address the problem identified in section 1.2, this project developed aims to develop a loan mobile-based application system that will assist KTDA associates to condense time consumption and aid to store information using modern technology. The system solves these challenges through a mobile application system where information will be stored on modern databases and applying for a loan will take a few minutes.

1.4 Objectives

I. To investigate the current approaches used in applying for a loan in KTDA. II. To review available loan application information systems. III. To develop a mobile application that will ease the application process. IV. To test the project developed an information system using a mobile platform

1.5 Justification

The Kenya Tea Development Agency Holdings stands to benefit from this project because it will reduce the time wastage, compresses data redundancy, and improves data security. The challenge of current loan application systems offering inadequate functionality recognized by (Payne, 2019). Therefore, the project developed a mobile application system that will be the best solution to solve this challenge.

1.6 Scope and Limitations

This project is set to involve all the bases of the specific objectives. That is the project developed will help establish a mobile application system that will store information on modern databases and take less time in applying for a loan within

KTDA. The hypothesis in this project is that all KTDA fellows SACCOs in Kenya apply for a loan using the same method.

The system allows all members to register into the mobile application and also the admin to see users who have applied for a loan.

Since this project is taking place during the pandemic of COVID-19, gathering information from members of the SACCO will be a challenge. Additionally, the project would be a mobile application those users with no smartphones will be affected by this project.

Chapter 2: Literature Review

2.1 Introduction

This project developed intends to create a loan mobile-based application system that will assist KTDA SACCO members to reduce time wastage and help to store information using modern technology. To attain this the chapter will review on the following;

2.1.1Sacco Concepts

International Cooperative Alliance states that a saving and credit cooperative society(SACCO) is a monetary group formed in classification, owned, controlled, used, and democratically directed by members themselves to address the predominant economic, social, and cultural needs (Alliance, 2016). Members of that collection decide to save their money and make loans to each other at reasonable rates of interest. They also choose how their currency will be used for the advantage of every individual. The main objective of the SACCO is enabling members to save through mobilization, disburse credit, and ensure long-period sustainability through sensible financial practices (Karanja, 2019). Thus helping in battling poverty in the community.

2.1.1Description Of Current SaccoLoan Application Process At KTDA Affiliates of this organization use the following URL "https://www.chai sacco.co.ke/index.php/downloads/sacco-forms" to get the loan application form. The member can decide to download the form or print the form to fill details on the application form. After filling the form the member sends the copy to their Sacco to the financial management in which behind are attached copies of required documents which are also found on the website. The finance manager will check if the member fulfilled all KTDA loan requirements if this is fulfilled the loan is approved. If approved the finance manager gives a go-ahead for the loan to be given his or her loan and the member can monitor their loans online.

2.2Challenges faced in the current loan application system in KTDA The biggest encounter faced in this organization loan application process is that that data can easily get lost or manipulated and it wastes time. Time wastage occurs when the member has to physically go to their SACCO to submit their credit application

form. Losing information occurs when a member submits the loan application form and its misplaced.

2.3A Review Of Presently Used Loan Application Information Systems Various systems used different techniques to make the process of the loan application process to be easily manipulated. These include the following; **Loan System Based On Smart Card**

This system is a combination of blockchain and smart contract technology that is divided into three categories; smart codes, smart legal contracts, and smart alternative contracts. This is how the system works a user should have an account on the Ethereum wallet. The user account is captured in the smart contract-based lending system and automatically contracts the system for a loan contract. A user logs in to their account and can borrow a loan by filling in the required details in a form and submitting it as a request. This loan request is received by a lending contract that makes a full-network broadcast so that each account in the Ethernet can receive the borrowed broadcast request. The lender who is interested in the loan request provides the corresponding loan amount and loan interest and then submits these to the loan contract. The borrower receives the lenders' contract then analyses the user request, selects, and submits a loan relevant to him or her. The loan contract will add the loan amount to the borrowers' account (Yang, 2019). The advantage of this system is information in the approach is supervised and the transaction process is improved.

Web-Based Method For Loan Application

This system uses software as a service for the web-based loan application. Therefore, in just one click, the system automatically gathers personal data of a loan applicant from internal and external data sources and auto-fills a candidate's information into a mortgage application template. Additionally, the loan application is also processed and the lending decision is sent to the applicant. Therefore, enabling users to apply for a loan in a fast and easy way (Kay, 2016) . This is one of its advantages Moreover, its other advantage is that it automates loan processing for a user who has never applied for a loan.

2.3.1Gaps In Present Loan Application Information Systems

The challenge experienced in the Smart card system is that it does not require any third-party institution. If the project developed system uses this system there will be a collection

of inaccurate data. This is because the project developed requires a third party

institution that is the guarantor in the loan application process.

The Web-based system has its downfall this is when a user logs in and his or her information is not readily available on the website then data needs to be filled from manually through the integration of one-click in legal platforms. This will waste the user's time in cases where the loan is required urgently.

2.4Conclusion

Time consumption and inaccurate data can be solved using a mobile application system. The mobile application will have forms where all required data will be filled and also the application process will be quick. Mobile gadgets occupy an increasingly prominent niche in the evolving marketplace (Macciola, 2018). Therefore, KTDA will be having an added advantage through the project developed loan mobile system.

2.5Conceptual Framework

The conceptual diagram below shows how the project developed system functions will work.

The project developed system will be accessed only through mobile devices. The user can then go the project developed loan mobile application on the phone to use the app. All users in the Chai Sacco will have to register so that their information is stored in the online database. Then after there will be able to log in and apply for a loan.

Admin feeds Info. to system

Admin can see the number of users who have applied for a loan

The user of the system will be notified by the system if the eligible to apply for a loan

Figure 1.1: Conceptual diagram

Information is keyed to the system by admin to the database

Database

Internet

User applys for a loan through the internet and obtains information keyed in by the admin through data or wifi

Chapter 3: System Development Methodology

3.1 Introduction

System Development Methodology is implied as to the stages that are used to form, plan, and control the process of developing an information system (Ngabaro, 2016). This chapter will cover the following areas: methodology to be used, analysis, functional,non-functional requirements, design, tools and techniques, the domain of execution, project developed modules, and system architecture.

3.2 Rapid Application Development

The project documentation system will use the above methodology because it involves minimal planning, unlike other methodologies that take planning as a phase indicating that it's thorough. RAD also allows for the incorporation of changes with the development process which in turn makes iteration possible in all the phases. Requirements in this methodology are mostly information from people which is similar to how the project acquires its requirements. Reuse of processes, an advantage that is important for application development to reduce implementation time is also available in RAD at the application generation phase. Many of the factors are focused on using minimal time in the whole process which best fits this project. The familiarity of the methodology by a large group also makes it easy to solve any challenges experienced within the phases.

This model includes four phases as illustrated in figure 3.1

include: ***3.2.1 Definition of Project Requirements***

The objective of this phase is to define project goals, expectations, timelines, and budgets.

3.2.2 Prototype

The goal of this stage is the actual development of the project. This includes the creation of prototypes with different features and functions. These prototypes are then shown to the clients who decide what they like and what they don't. ***3.2.3 Receive Feedback***

This part entails feedback on what's good, what's not, what works, and what doesn't is shared. Thus prototyping continues and these two steps are repeated until a final product can be realized that fits both the developers' and client's requirements.

3.2.4 Implementation

This is the last segment is concerned with features, functions, and interface of the software are finalized with the user. Areas such as stability, usability, and maintainability are checked before presenting it to the user.

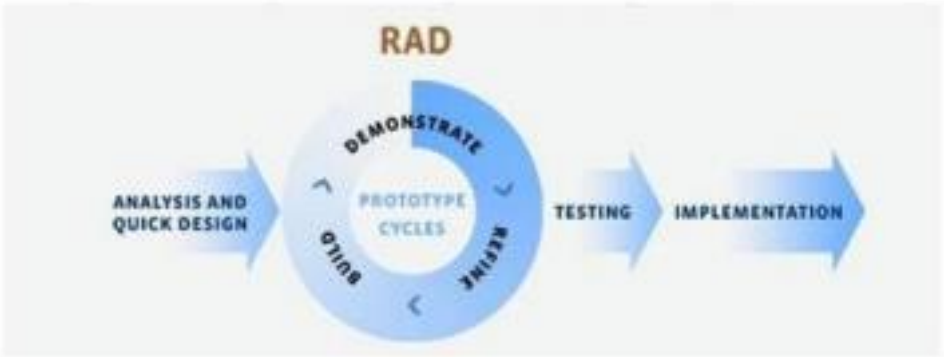

Figure 3.1: Rapid Application Development diagram represented by (Signh, 2019).

3.3 Analysis

This project developed will apply the Object-Oriented Analysis and Design approach because it will capture the structure and behavior of the project developed system requirements and make them into various modules. Other advantages of the project developed the system using this approach are that it promotes the recycling of components and simplifies the problem of integrating modules to configure a large system.

3.4 Functional Requirements

This refers to what a system should do (Sommerville, 2011). The project developed system will have the following functional requirements;

1. **Authentication –** the admin and members of KTDA SACCO are required to register and registered users to login with their credentials to the system. 2. **Authorization-** the user and admin can easily see their sides without any interference.
3. **Administrator functions –** the admin can be able to generate reports on members who applied for a loan and also modify loan details.
4. The system should allow members to view loan details.
5. **Loan application-** members can apply for a loan.
6. **Loan calculation -**members calculate their loans depending on the interest,loan amount and duration.

3.5 Non-Functional Requirements

These are requirements that are not precisely affected by the specific services delivered by the system to its users. They include the following; • **Performance -** The project developed system should be able to perform its tasks efficiently.

- **Security –** This refers to the data of the system should be protected against attacks.
- **Availability -** The project developed system should be available to all KTDA SACCO members.
- **Usability –** The project developed system should be easy to use by the members.

3.6 Design

This project developed system will use an object-oriented perspective which helps implement the specified requirements. The following are diagrams required when using object-oriented analysis, use case diagram will be used to show various access levels in the system. The class diagram will show the different modules that will be used in the project developed system. The sequence diagram will help indicate how the information will be shared. Database schema will illustrate how the project developed database will look like and how the tables in the database will relate. Gui designs mockups will show a visual draft of the project developed a loan application system.

3.7 System Development Tools and Techniques

Tools and techniques that will be used in the project developed system are as follows;

Java Programming Language. The project developed system is developed using an object-oriented tactic hence this language will help in achieving the goals and objectives of this system.

The project developed system will use the firebase database because it gives real time updates without google cloud messageing. It is super easy and quick to implement. It has built in support for authentication services like facebook, google and twitter.

An integrative development environment (IDE) will be used to provide the platform to code on Android studio 3.4.0.0.

Techniques to be used to demonstrate the project documentation system include Use case diagrams, class diagram, database schemas, sequence diagram, and GUI designs

and mockups.

3.8 Methods to be used to test the developed system

The project developed system will use black-box testing. This is because of the following, it is a testing method used by developers, it focuses on the functionality of this system, it also tests whether the functional requirements of this project developed system have been met and it considers acceptance testing(this testing ensures the system developed can be used in the real environment). **3.9 Domain of Execution**

The project developed system will be implemented through a mobile application. This is because it will perform tasks quicker such as applying for a loan. The user will be filling in the loan application form on the app. Besides, members spend more time on various applications therefore having this mobile loan application will make it easier for them.

3.10 Project Developed Modules and System Architecture

The following modules will be found in the project developed system, the administrator module will enable the admin to view various types of loans and make changes to charges when necessary. Also, the user module that will allow members to apply for a loan, there will find message confirmations if they were able to receive the loan or not.

Chapter 4: System Analysis and Design

4.1 Use Case Diagram

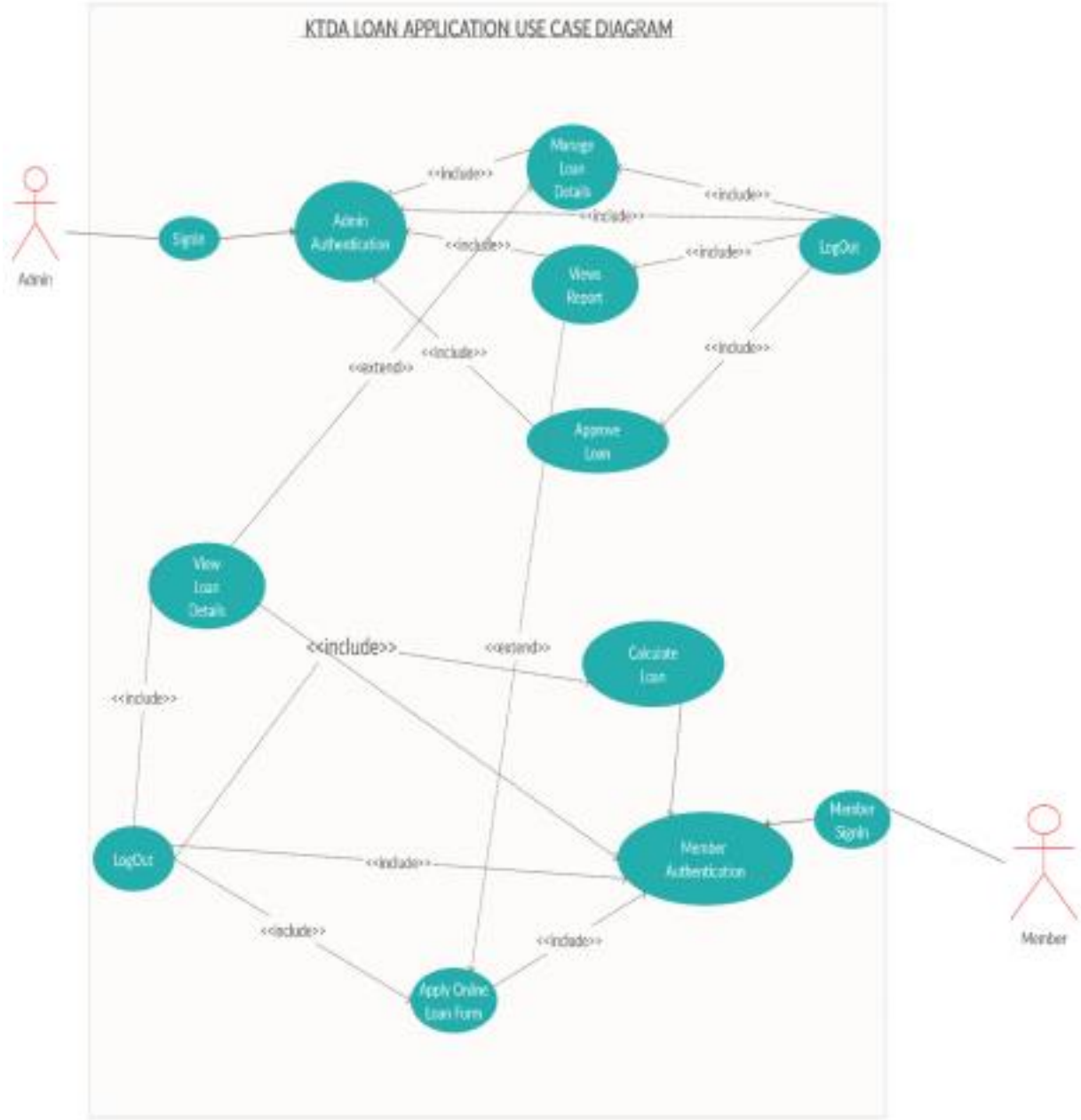

Figure 4.1.1 Use case diagram for KTDA loan app

4.2 UML Class Diagram

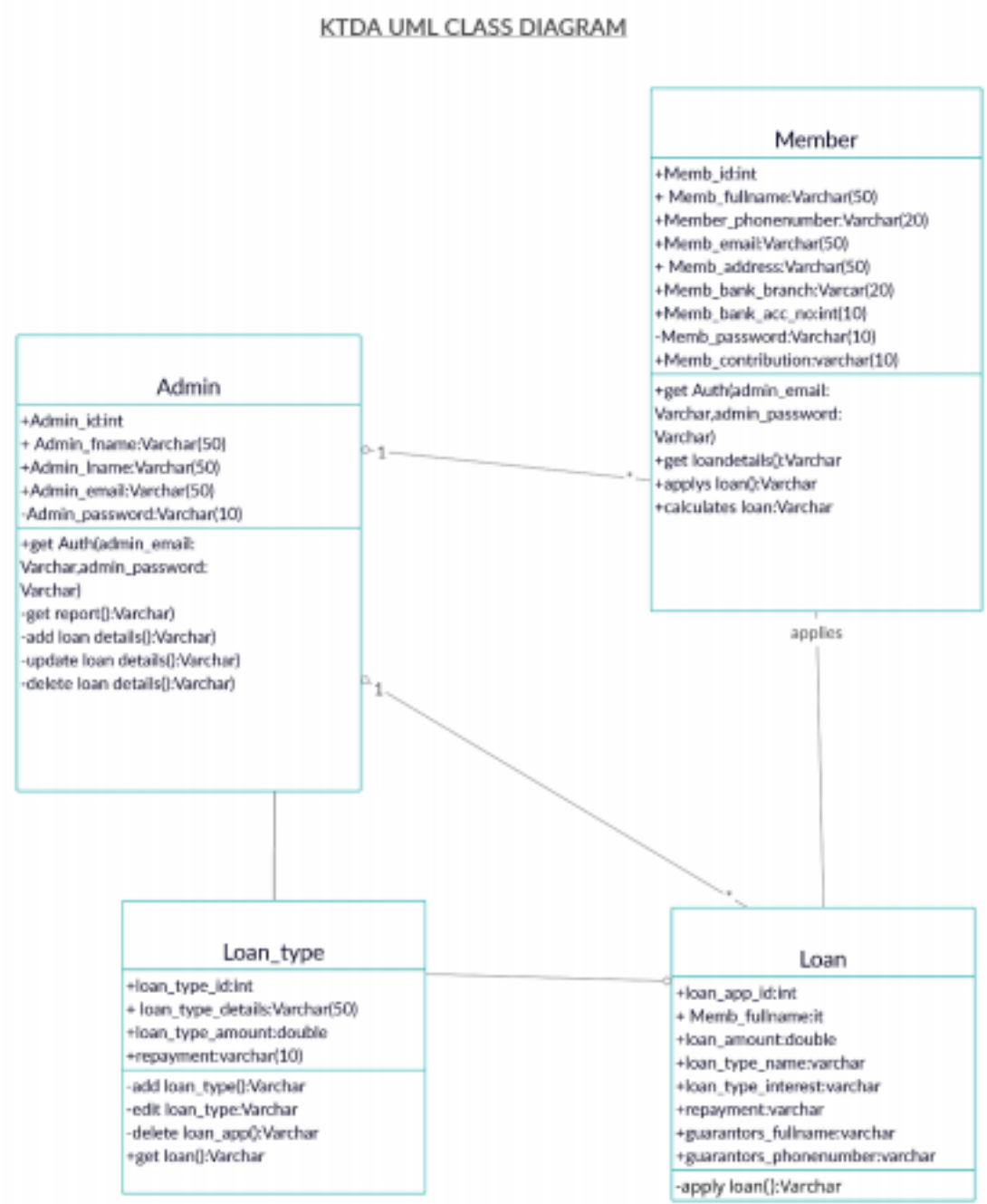

Figure 4.1.2 UML diagram for KTDA loan app

4.3 <u>Sequence Diagram</u>

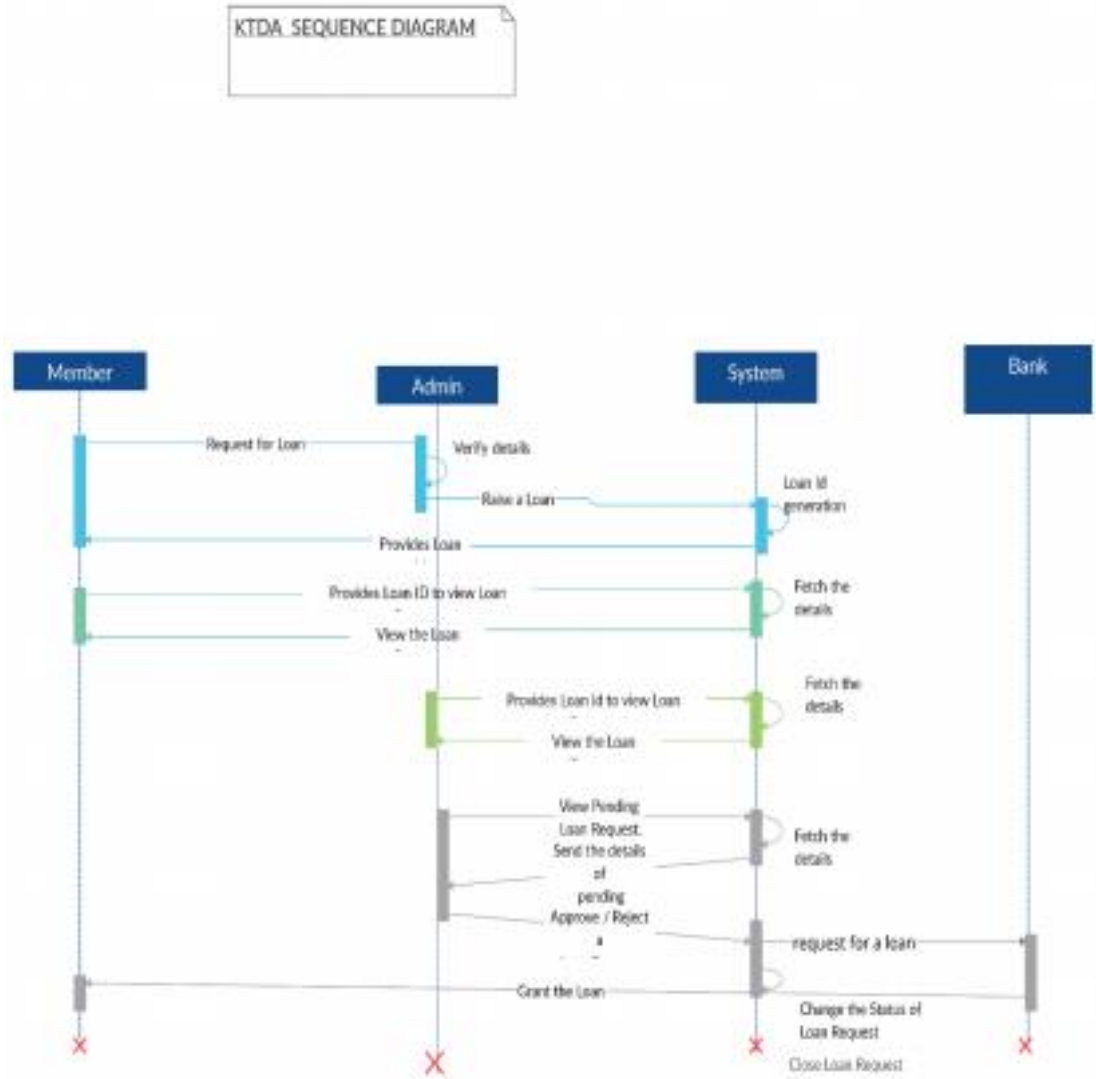

Figure 4.1.3 Sequence diagram for KTDA loan app

4.4 Database Schema

Figure 4.1.4 Database diagram for KTDA Loan App.

4.5 ERD Diagram

Figure 4.1.5 ERD diagram for KTDA Loan App

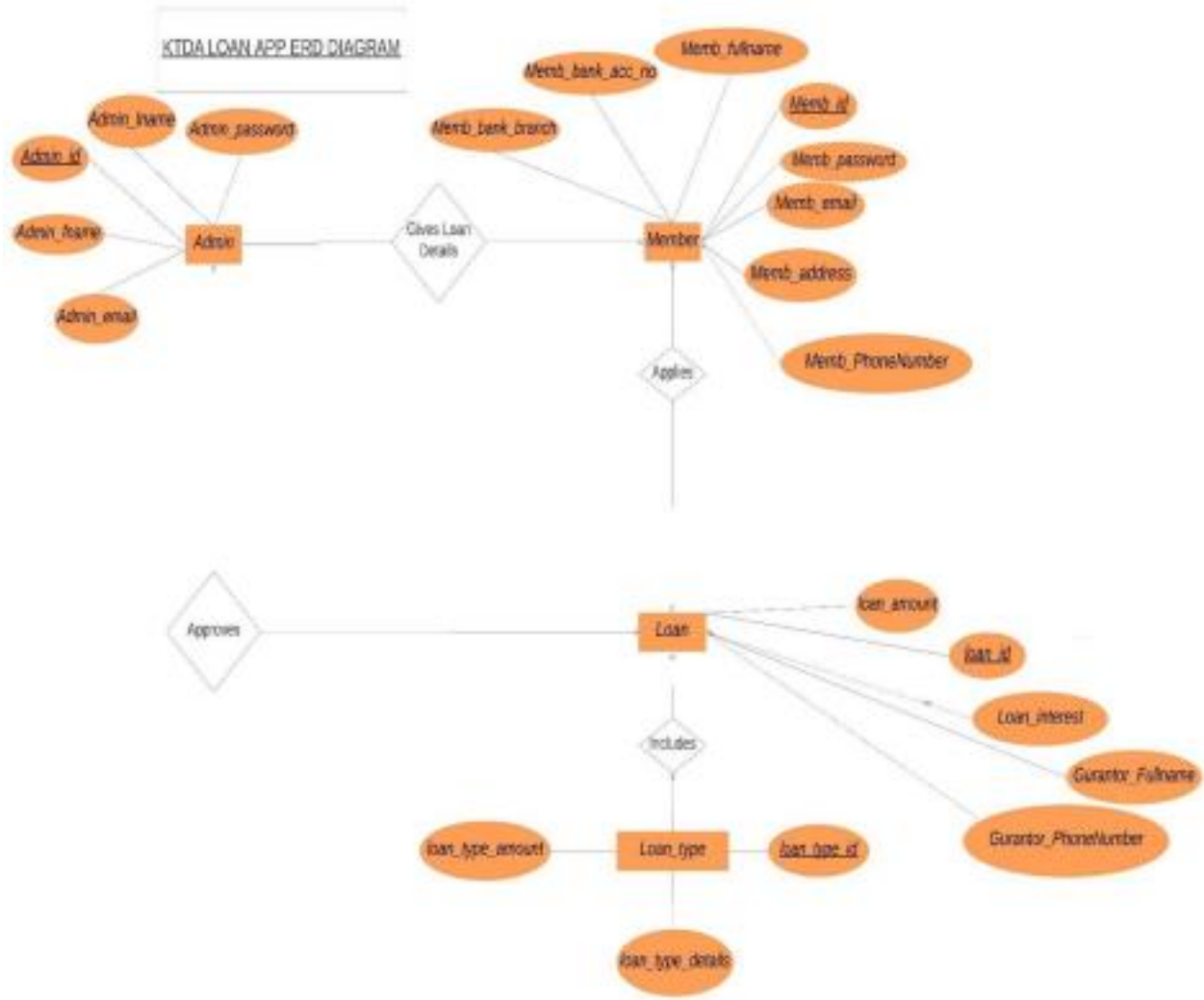

Figure 4.2.5 ERD diagram for KTDA Loan App

Chapter 5: System Development, impelementation and

Testing 5.1 Introduction

This chapter aimed to focus on how the system was developed; the algorithm applied to build the different parts of the system. Furthermore, this chapter describes how the system was tested to ensure that the functional and non-functional requirements were met.

5.2 System impelementation

This system was built according to the system analysis and design that was cited in chapter 4. From this in the uses case diagram, two actors were identified. That is the admin and the member. To create and develop the system the following was required to be implemented.

5.2.1 Installation Of Andriod Studio

This installation will work on Windows 10. To be able to download android studio go to the link https://developer.android.com/studio#downloads on any web browser. Then I clicked download android studio for windows 64-bit on a green button. Once the downloading was done I clicked on the .exe file to launch the installation process. The installer will respond by presenting the android studio set up the dialogue box shown in the diagram below;

Figure 5.2.1.1 Set up for Android Studio

I clicked on next which will take you to the following panel that prompts one to accept or decline to install an android virtual device. I kept the default settings and click on next because this will allow one when running the app from android studio to configure your android phone characteristics for example if it's a phone or tablet.

The next step is the configuration settings panel where it asks you to choose where you want to install android studio. I kept the default installation location and clicked

next, and saw the choose start menu folder panel. I kept the default setting and clicked install. When installation finished, the installation complete panel. After clicking Next, the installer presented the Completing Android Studio Setup panel. The first time Android Studio runs, it presents a complete installation dialogue box that offers the option of importing settings from a previous installation. I chose not to import settings (the default selection) and click OK, and was rewarded with the following splash screen:

Figure 5.3.1.2 Android Studio's splash screen

At this point, Android Studio presented the android studio setup Wizard dialogue box. I clicked next, and the wizard invited me to select an installation type. I kept the default standard setting. I was then allowed to choose a user interface theme and chose IntelliJ which has a white background theme. I clicked next and Android Studio next provided the opportunity to verify settings. I clicked finish and Android Studio began the process of downloading SDK components. Finally, I clicked Finish to complete the wizard. The Welcome to Android Studio dialogue box appeared.

Figure 5.4.1.3 Welcome to Android Studio

I started a new project known as the KTDA loan Sacco App to create the system. This system consisted of two main actors who are the admin and member. For them to access the system I had to connect my android studio to firebase so that they can be registered and access the system.

5.2.2 System Manual

This system has two major users who include the admin and members. For them to access the system they need to both registered in the app and their information stored on firebase database. This can be illustrated in the diagram below;

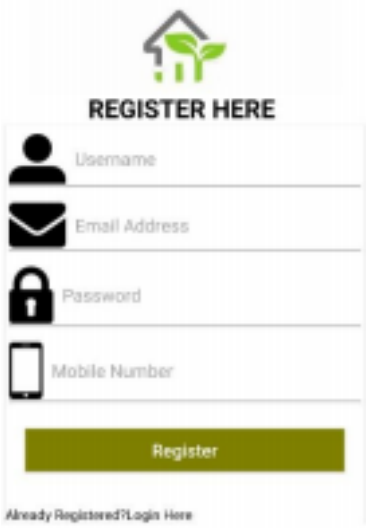

Figure 5.2.2.1 SignUp Page

Although when the users log in they are authorized into different access levels depending on the user. This is illustrated below;

Figure 6.2.2.2 Page when the admin logs in

Figure 7.2.2.3 Page when the member logs in

The admin of this system has access to the database and can create, delete and modify data which can be seen on the member's side. The member of the system will have to be able to apply for a loan, calculate their loan and view types of loan details. The different system design diagrams demonstrated ease in developing a suitable

system by creating each module at a time and also through prototyping. When creating each module I had to link them up with other modules so that there can be a flow and logic of the system. I began with registering two users which is the admin and the member. Since they have different access levels when they log in they are redirected to various pages. I then created a crud functionality in which the admin could add loan type details and the member can only read them from their side. Then I created a loan calculator where the member can be able to calculate their loan. The admin can also generate reports in members who applied for a loan and see from their contributions who are eligible to get a loan.

5.3 System testing

As stated in section 3.8 black box testing has been employed to ensure the system meets the system requirements. Through black box testing, I was able to come up with the following test cases and test results.

5.3.1 Test Cases

Below are tests conducted during development of the system.

TEST ID	**Related Requirements**	**Actual Result**	**Pre Condition**	**Test Data**	**Priority Level**
T1	Function Requirement 1.	Does the system validate login input?	The admin and members should be registered by the system	The data used to test the log in validation was email and password Email: latifa99ogeto@gmail.com P password:********	Medium

T2	Function Requirement 2	Does the system allow different access levels to be accessed by authorized users?	The registered admin and member when loggin in to be assigned to	Admin: latifa99ogeto@gmail.com should be redirected to admin dashboard after loggin in and Member:s@gmail.com should be redirected to the member dashboard after logging in	High

			different pages depending on their user access level		

T3	Function Requirement 3.	Does the system allow the admin to generate reports and modify data?	Members should have applied for a loan so that admin can generate reports and the admin should have added data on loan details so as to modify it	The data on members who have applied for a loan.Example of test data was the data on loan details that was added to the system. Loan type details School Fees Ksh.800,000- 200,000 1% per month 4 months. Add Loan Type Update Delete The data on example of reports on members who applied for a loan. Full Name:Sally Latifa Abok. Address:84 Number Of Contributions Made in Months:6 Bank branch:KCB Bank account number:102320 Type of loan:Okoa Jahazi	High

				Type of loan amount:100000 Type of loan interest in percentage:10 Repayment period in months:1 Guaeantors full name:Halima Juma Wesonga Gurantors phone number:0721330777 Full Name:Mary Kambua Kinyanjui. Address:2456-00200 Number Of Contributions Made in Months:2 Bank branch:Equity Bank account number:099929 Type of loan:Product Loan Type of loan amount:350000 Type of loan interest in percentage:1 Repayment period in months:24 Guaeantors full name:John Ishmael Nyaga Gurantors phone number:0723933937	

				The admin can also generate graph reports on loan type details and also members who have applied for a loan.	
T4	Function Requirement 4.	Does the system allow viewing of loan details to a logged in member?	After logging in a member should see a button on loan details	When the member clicks on thebutton loan details they can view the loan details added by the admin. Loan type details School Fees Ksh.800,000-200,000 1% per month 4 months.	Medium

T5	Function Requirement 5.	Does the system allow logged in members to apply for a loan?	After logging in a member should see a button to apply for a loan and got to the page and see a form for applying for a loan	Below is at test data for a member applying for a loan. Full Name:Sally Latifa Abok. Address:84 Number of contributions made in months:6 Bank branch:KCB industrial area Bank account number:102320 Type of loan:Okoa Jahazi Type of loan amount:100000 Type of loan interest in percentage:10	High

				Repayment period in months:1 Guarantors full name:Halima Juma Wesonga Gurantors phone number:0721330777	

T6	Function Requirement 6.	Does the system allow logged in members to calculate their loan?	After logging in the member should see the button for loan calculator	When the member clicks on the button LoanCalculator they can view and calculate with the test data below Loan amount:100000 Intereste rate:10 Months:1 CALCULATE PAYMENTS Monthly payments:100833.33 Total Paymemts: 100833.33	High

Table 5.3.1 Test Cases

5.3.2 Test Results

Below are the results on the tests performed

Test ID	**Expected Results**	**Actual Result**	**Status**	**Remarks**

T1	The system should check if all fields have been field to allow registered users to log in	The system gives a warning if one of the required fields is not field	Pass	The system warns the user concerning the missing fields and does not allow them to access the system
T2	The system should check the user level to allow them to login to their respectful pages	The system retrieves the user level from firebase and allows the registered users to their respectful pages	Pass	The system allows respective users according to their user levels
T3	The system should allow the admin to modify data and generate reports	The system allows the admin to modify data and generate reports	Pass	The system gives acces to admin to modify data and generate reports

T4	The system should allow registered members to view loan details	The system allows registered members to view loan details	Pass	The system gives acces to registerd members to only view loan details
T5	The system allows registered members to	The system allows registered members to	Pass	The system gives acces to registerd members to

	apply for a loan	apply for a loan		apply for a loan
T6	The system allows registered members to calculate their loans	The system allows registered members to calculate their loans	Pass	The system gives acces to registerd members to calculate their loans

Table 5.3.2Test Result

Chapter 6: Conclusions,Recommendations and Future Works

6.1 Introduction

The aim of this chapter is to provide conclusions, recommendations and future works based on the objectives stated earlier in chapter 1.Furthermore, this chapter is going to cover on the system and what the system has been able to achieve at the end of its completion.

6.2 Conclusion

The project developed was aimed in solving the problem of the existing loan application process in KTDA Sacco is inefficient and time-consuming, requires a lot of paperwork to be processed manually. The project developed also was developed was able to get rid of the paperwork being processed manually.The project developed was also able to get rid away of data being manipulated. The project developed also sataisfied the different requirements mention in 3.4. The project developed allows members to register and log in to the system. The system has been developed in a way that it can identify and differentiate between a normal user and admin. When the user logs in they can apply for loan,calculate their loan and see available loans. While the admin can see the members who applied for a loan,generate reports on them and through the number of contributions made know whose eligible to be granted for a loan. The admin can also add loan details so that the members can view them.

6.3 Recommendations

The project developed was only able to solve some of the problems faced in loan application sacco systems. Other unsresloved areas related to the project which could be created in the future is having a repayment module that updates the member the repayments they have done and also allow them to make small payments via Mpesa.

6.4 Future Works

The KTDA loan sacco application , not all areas have been address due to the scope of the project. Different functionalities and aspects can be added to the system. The system can be improved by enabling new members to make contributions and see what they have comtributed so far. Through interaction of the system, future developers can add a repayment module that updates the repayment done for each member , the amount they have repayed and also allow them to make small

payments via Mpesa. They can also add a way for way to ensure that all requirements are considered before applying for a loan.

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Appendix A: Timeline of Activities

Appendix B: Cool Code

Below are some diagrams below showing on how members apply and also download the loan they applied for.

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