AN INSOURCE SYSTEM FOR ACCESS TO DONATION PROGRAMS FOR THE NEEDY IN KENYA

JOHN ODHIAMBO

101964

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Faculty of Information Technology

Strathmore University

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Declaration and Approval

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

Student's signature:

……..…….. [*Signature*]

……..…….. [*Date*]

Approval

The work of ***101964*** was reviewed and approved by:

Supervisor's signature:

……..…….. [*Signature*]

……..…….. [*Date*]

Abstract

With the current information age, most people and organizations seek help and also reach out to help needy individuals via various social media channels such as Facebook, Twitter and Instagram. People also tend to volunteer and help as individuals in whatever way they can be it donating a kilogram of rice or some small amount of cash. Some people have excess food they want to throw away or would like to offer assistance. Some organization tend to set up mode of payment in donation such as Mpesa paybill option especially where a huge amount of fund is needed to be raised. It is a challenge on how to effectively spread the information since most organizations use media sources while individuals rely on the word of mouth (tell a friend to tell a friend) and also making it difficult for one to tell if the program is genuine. Therefore, the information is limited to mostly individuals who share the same social media platforms. Also, platforms such as social media have issues such as invalid information dissemination.

A Web-based system can be developed to address this issue. The online platform should allow various interested organizations or individuals to register and let others know of their operation. The system should also allow organizations to post the various products or service they are offering. This would be easier to reach out to the targeted public under one platform. The methodology to be implemented will be RAD since it requires less time to understand and implement and also gives a high quality output. The programming language to be used is C# since it has vast frameworks that support web based development. MySQL is the preferred database language which is to be implemented using Microsoft SQL Server Management Studio Server as the database environment which is mostly used in the industry.

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List of Abbreviations

CASE Tools : Computer-Aided Software Engineering tools

CDF : County District Fund

IDE : Integrated Development Environment

MySQL : My Structured Query Language

FR : Functional Requirement

NFR **:** Non-Functional Requirement

NGO : Non-Government Organization

NPO : Non-Profit Organization

RAD : Rapid Application Development

UNWFP : United Nations World Food Programme

UNICEF : United Nations Children's Fund

Chapter 1: Introduction

1.1 Background

Donation of essential services and products will continue to be a recurring issue yet to be effectively addressed. Most developed projects worldwide attempt to solve food related donations and offer a medium that connects donors and mostly NGOs. However, other types of donations are not put into account such as clothing and financial which are very essential for human need. Also, it becomes difficult for random donors to take part not unless one reaches out to an NGO or an organization known for helping the needy. Therefore, this creates a gap between the needy people and an unknown individual who would like to help where need be.

For instance in Kenya, most organizations are also known to setting up mode of payment for donation such as paybill or reaching out through social media channels such as Facebook, Twitter and even Instagram nowadays. A challenge arises on how to effectively reach a large number of people willing to donate and also by limiting to those who have access to the social media accounts where such information is being shared. With reference to the current covid-19 pandemic, this challenge is very evident .Also, reaching out to the needy via government based channels is usually hectic since there is a lot bureaucracy involved and also prone to corruption in embezzlement of resources.

The developed system should provide a single platform where interested donors can post their various donations regardless of it being an NGO, organization or an individual. It should allow users to view of the products or services available for donation. This will also help gauge if a donation is genuine or not since the data input into the system can be used to assess the legitimacy. The addressed challenge is worth being considered as the need to donate to the needy will never cease to rise and finding an effective way of doing so would improve the living standards of people in general.

1.2 Problem Statement

The addressed challenge has been a problem since human existence down historical times. It is still recurring especially in times of natural calamities such as famine, drought and heavy floods. There have been many online systems trying to address this problem and even mobile applications especially with the current information age.

The solution seeks to develop a web-based application that will mostly focus on the needy, the sick in need of huge financial aid to cater for medical cost.

1.3 Aim

The developed system aims to develop a web-based system that will reach out to the needy by providing a platform for donation of food, clothing, furniture and financial support to address the problem stated above.

1.4 Specific Objectives

i. To review existing methods and requirements used for donation
ii. To design a web-based system to focus on solving the identified challenge.
iii. To develop a web-based system to focus on solving the identified challenge.
iv. To test the developed system using the information gathered.

1.5 Justification

The developed system will mainly benefit those in need of financial aid and those in need of food, clothing or home appliances. The local government in charge of locations and districts also stand to be benefit from this project since they also play a huge role providing funds through programs such as the Country District Fund (CDF). NGOs will also gain from this since they are mostly known to engage in donation programmes.

1.6 Scope and Limitations

The project is expected to mainly cover food, financial and basic donations such as home appliances like iron box, tables etc. since expanding the areas to cover might make it difficult to achieve. The system will also be limited to Kenya as a nation since gathering data from other countries will be quite challenging especially in term of the organization within a country and states. A challenge is expected in terms of gathering of data especially on allocating of resources to needy people and gauging how genuine a donor is prior to accepting the need.

Chapter 2: Literature Review

2.1 Introduction

As of October 2019, a report by UNICEF showed that an estimated total of 3 million people would require food assistance and access to safety due to severe drought. This depicts the demand needed in donation regardless of even looking at other sectors such as health fund raising. The major focus of this chapter will be how the current donation programs are undertaken and the challenges encountered in the current systems. The research also aims to find a better approach to address the issue.

2.2 Existing Methods in donation

Many charitable and non-profit organizations contribute to the society by providing help and support to those in need. Most present methods and systems are directed towards enabling the transfer of donation between individuals and charitable organizations. The process occurs through the transfer of donation from a donor to a facilitating charitable organization and then through the charity organization to the targeted people in need. However, this mostly varies based on the field of donation specialized by an organization. The following are some of the sectors covered in donation with the respective techniques incorporated.

2.2.1 Food Donation programmes

In Kenya, there are very few to almost none food donation systems that exist. Many food donations are conducted by known non-profit organizations especially those that partner with UNWFP. Most such organizations donate food through the process of food banking. This involves distribution of basic provision and non-perishable food items to the people in need free of charge. For instance, in Kenya an organization in the country that is well known for this Food Bank Kenya. It was initially formed to alleviate hunger to mainly families who need emergency help to put food across the table. But as time went by, the organization felt the need to expand since the needs were constantly increasing while its impact was small and hence register as a non-governmental organization.

Also some other systems use a different approach in addressing the identified challenge. Food Cowboy is also a known mobile system known for its operation to donate food. It is based in United States and uses a mobile application to safely route surplus food from restaurants and wholesalers. It facilitates donation between donors

and charity organizations registered within the Food Cowboy network. It deals with the two part and not individual donors.

An research by Talati(2017) reveals how there are many food donation projects enforced worldwide but limited by absence of information especially scientific literature especially in terms of food donation activities.

Arguments in relation to creating donation systems, especially food based are faced with various obstacles and resistance like the need to: lobby the government for change tax and other legislation, convince possible donors that the donations will not create negative outcomes towards them such as black markets and contractions in demand (Lovrencic, 2017).

2.2.2 Blood Donation

Kenya Red Cross Society is known to be the leading brand in blood donation in Kenya and worldwide at large. It is the strongest humanitarian agency in the East African region and Africa therefore limiting other organizations to venture into this sector. It is also known in other areas of donation such as funds and even food that was covered in the previous subheading. However, organizations such as Kenya National Blood Transfusion Service (KNBTS) have been in operation since 2000 to help collect, test, process and distribute of blood to respective needy patients mostly to all transfusing hospitals in Kenya.

Most blood donation systems operate more so as management systems. They allow users to register and provide their donation. Then the system maintains detail record of registered donors with their blood group details, contact addresses and status of the blood donation.

2.2.3 Other Donation programmes

There are other sectors of donation not popular with majority of the people but are known to donate to the needy people. For instance, TechSoup is a technology donation and discount implemented by the Kenya Community Development Foundation. It is open to all non-profit organizations in Kenya with a formal non-profit status. Its programme looks forward to include technology donations and offerings from other leading local and international companies.

The most common donations involve financial contribution. This are usually one time donations made via various payments platforms such as PayPal, Mpesa or donating via a smart phone using a bar code scanner depending on the method specified by the conducting organization.

2.3 Gaps in Existing Approaches

A review done by Scalisi(2013) showed that individual NPOs are often small entities that do not have the resources to engage in large-scale fundraising or advertising efforts, to accept contributions via multiple methods, or to obtain other benefits available to large organizations such as the Red Cross and the Salvation Army. Traditional methods of soliciting donations are costly to the non-profit, especially when the donation amount is small, and result in only a small portion of the donations actually going to charitable purposes. Moreover, many potential donors have credibility issues and are wary of giving to non-profits with which they are not familiar. In addition, these methods are often inconvenient for potential donors and may not result in donations when the potential donor might otherwise give a donation if asked at a different time. For example, if a non-profit calls asking for a donation when an individual is busy, a potential donor may not be inclined to donate within the given time frame. Further, most of the conventional ways of fundraising lack automated methods for thanking the donor subsequent to the donation or providing feedback as to how the donation was utilized.

Many people and institutes wish to offer their donations to needy organizations. Also, several organizations would like to inquire for numerous things required by them such as food, clothes, utensils and others. However, there lacks an available source through which they can satisfy their needs. Individual donors are also not taken to account as most organizations tend to deal with NGOs or NPOs.

2.4 Conceptual Framework of developed system

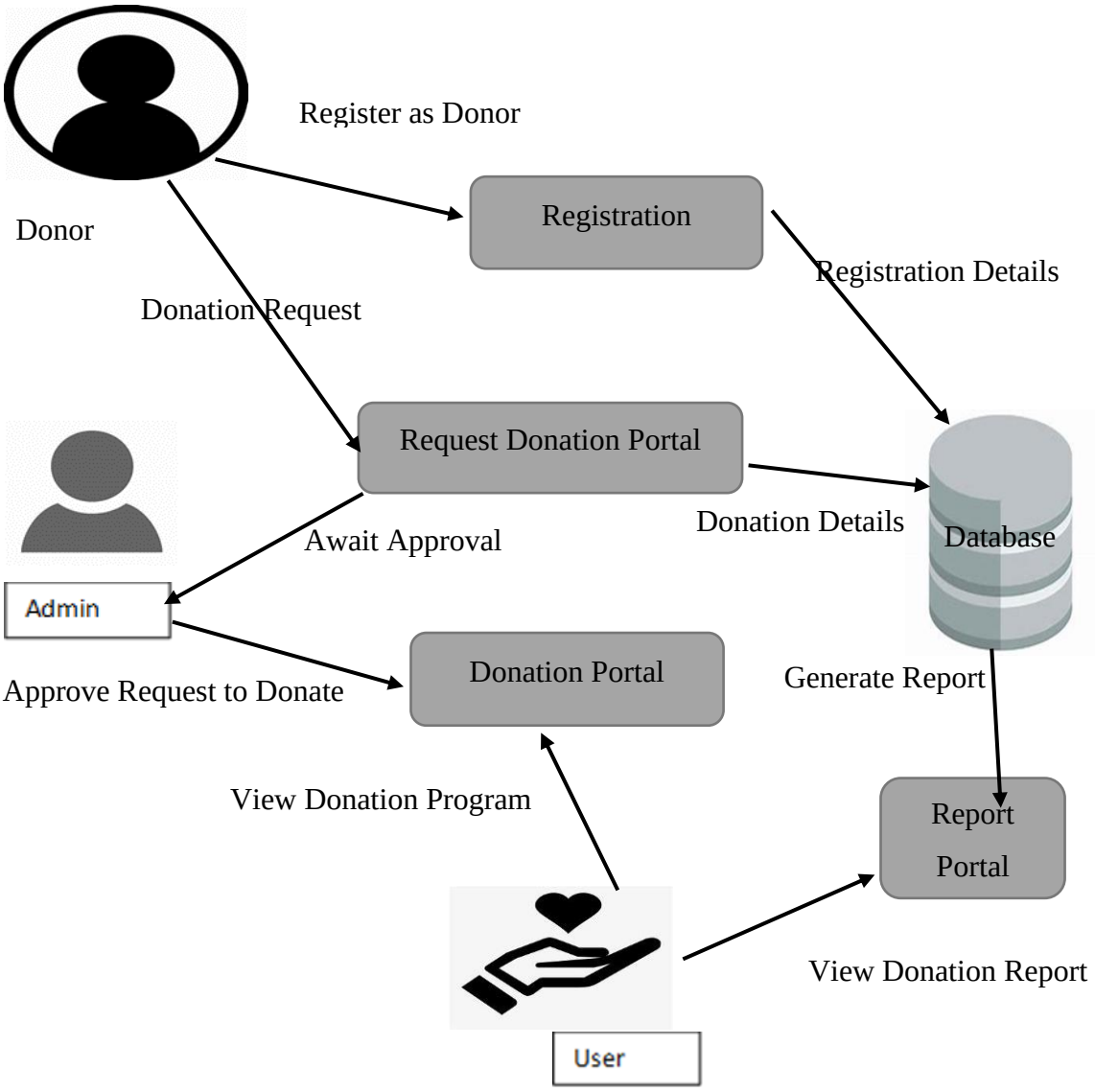

Figure 1.1 Conceptual Framework Diagram

The conceptual diagram demonstrates how the developed system functions. A potential donor registers into the system in the Registration Module. The potential donor can either be an individual or an organization. Afterwards, the user can now proceed to the Request Donation Portal and provide specific details of the donation service he or she is facilitating or intends to offer for example clothes, food, furniture or finance. If finance, the donor has to specify the mode in which he/she expects to receive the payments for instance account name, account number and so forth. The information then awaits the Admin's approval for it to be posted on the Donation portal for all users to see and contribute towards the various donation programs where possible. The Users can also be able to view donation report.

Chapter 3: Research Methodology

3.1 Introduction

System development methodology is the approach or steps that are used to form, plan and control the process of developing an information system. It is essential so as to be prepared to encounter the difficulties which tend to rise by nature. The developed system opts to use Rapid Application Development as the system methodology. RAD is the preferred methodology since it uses a task-oriented structure which makes progress measurable and therefore increasing the efficiency of the design and build process. Also the fact that it brings out high quality system with low investment costs.

3.2 System Analysis

The system analysis is the process of defining the expectations of the users for an application which involves the tasks that are conducted to identify the needs of the different stakeholders. The analysis approach to be used will be Object-Oriented Analysis and Design (OOAD). It's a structured method for analysing and designing a system by applying object-oriented concepts such as abstraction, polymorphism and inheritance in developing a set of graphical system models during the development life cycle of the software. OOAD makes is easier to understand since it relates the system requirements as objects which are to be implemented, identifies a relationship among them and generates a design which can be converted into an application. This makes is easier to maintain and promotes re-usability. OOAD is mostly data oriented as compared to Structured Analysis approach which is process oriented thus less risk involved

3.3 Rapid Application Development

RAD refers to a condensed development life cycle designed to offer much faster development and high quality systems than the traditional life cycles. It maximizes on CASE tools and techniques like database management tools, prototyping and iterative delivery to improve the quality of the system while reducing the time taken in development. The figure below shows a model of the RAP methodology.

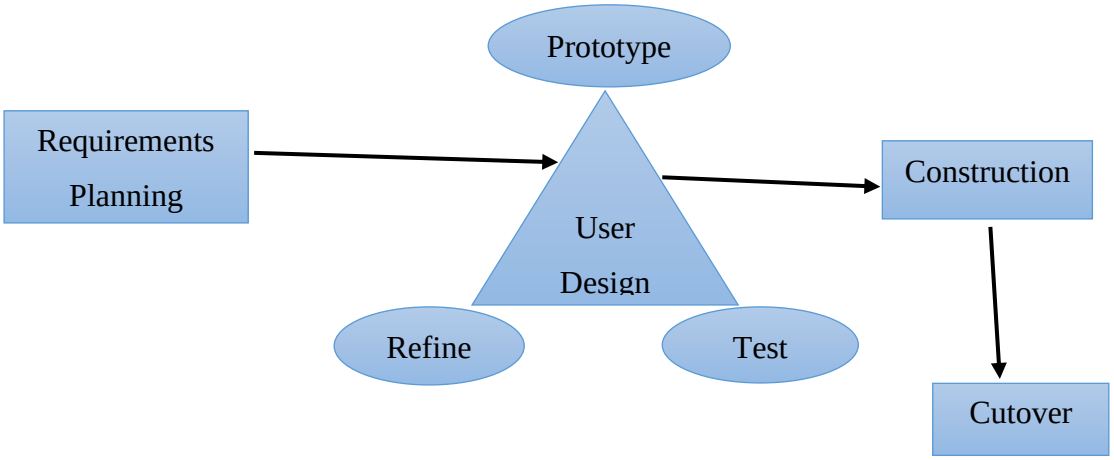

Figure 2.1 RAD Model

3.3.1 Requirements Planning

It is also known as the Concept Definition stage. This stage defines the business functions and data subject areas that the system will. It focuses on coming to an agreement on the project scope and application requirements. This also facilitates future changes especially with prototyping.

3.3.2 User Design

This phase is also known as the Functional Design stage. Its main objective is to build the user design through various prototype iterations. It allows developers to tweak the model until they reach a fulfilling design is reached. The developer designs a prototype which is then tested and refined on what worked and what did not work out. The three steps are repeated until all requirements are met.

3.3.3 Construction Phase

It is the Development stage. It is commonly known as the construction as it completes the construction of the physical application system. It is where the application coding, testing and integration occurs. The construction phase is often repeated as new components are required or some adjustments are made to cater for the needs of the project.

3.3.4 Cutover Phase

This is the final stage also known as the Transition or Deployment phase. It includes final user testing and training, data conversion and the implementation of the application.

3.4 Design

The system will use an OOAD approach in system design and therefore the following diagrams will be used in development.

Use Case Diagram

It is a representation of different user's interaction with the system that depicts the relationship between the user and the different use cases in which the user is involved.

Class Diagram

This is a static structure diagram that describes the structure of a system by showing The system's classes, their attributes, operations and relationship among the objects.

Sequence Diagram

It describes the interaction among classes in terms of the flow of message over time. This provides a good way of visualizing and validating various runtime scenarios.

3.5 System Development Tools and Techniques

These are the tools to be used to ensure the project is developed in the most efficient way. The preferred programming language to be used is C# since it is very robust and mostly recommended in most workplaces. It also incorporates Javascript which is very helpful in terms of object oriented resources. The IDE that is suited is Visual Studio as it is very professional and allows use of up-to-date frameworks such as ASP.net core which is most suitable for coding web-based application in C#. The MySQL is the chosen database language since it's easier to use and also very popular in most organizations. The MySQL will be implemented using Microsoft MySQL Management Studio since is it available as an open source software.

3.6 Method to be used to test the developed system

Integrated testing will be used is testing the developed system. It is a level of software testing where individual units are combined and tested all together.

3.7 Domain of Execution

The technique used to execute the developed system is web-based. A web-based approach broadens the coverage of the system to a wide range of users since there is less requirements needed for accessibility. Users with basic access to internet connection can access the system.

3.8 Developed Modules and System Architecture

The developed modules are Registration module, Request module once registered and the Donation module for the donors to offer their donation and users to also take part in the donation programs. All these modules will be handled by the Application Server. The Report module will rely on the communication between the Application Server and the System Database. The web architecture to be used is dynamic webpages and is shown in the diagram below.

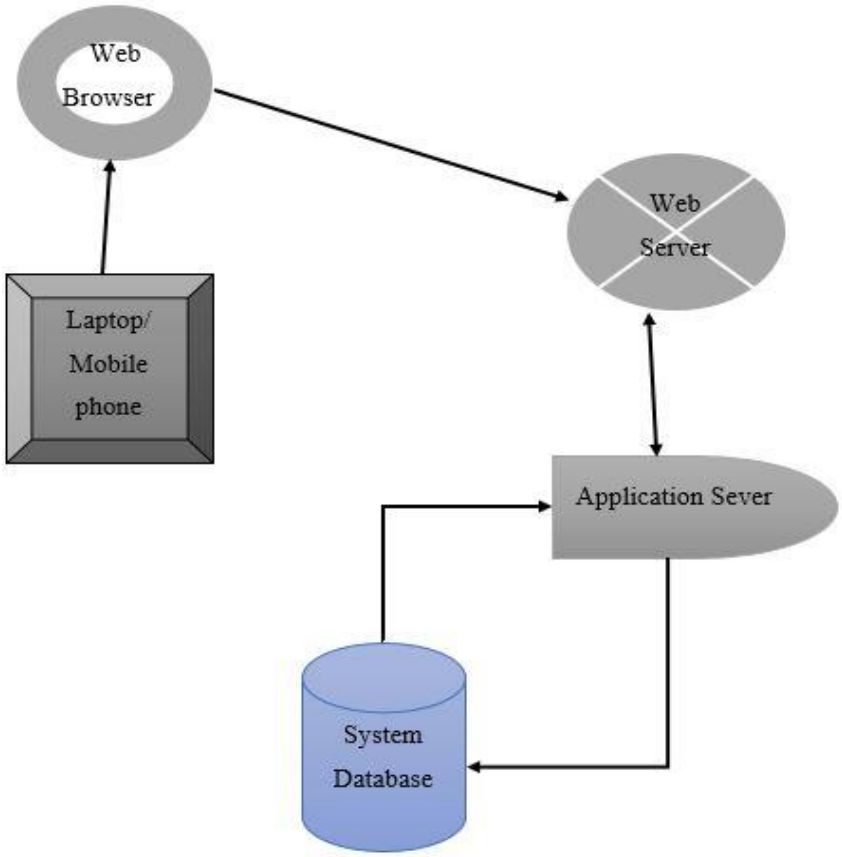

Figure 3.1 System Architecture

Chapter 4: System Analysis and Design

4.1 System Analysis

System analysis looks at the system itself, what it ought to achieve through the various actors of the system. It gives the generation expectation of the system's functionality.

4.1.1 Functional Requirements

Functional requirements includes the needs that specify what the system should do. They describe a particular behaviour of function of the system when certain conditions are met. Authentication, Reporting requirements, Authorization levels, Business rules

Administrative

The system administrators will provide support for users by ensuring all user operations in the system are maintained and available for use in regard to the level of privilege guaranteed.

Data Accessibility

The data provided by the system should be publicly available to all users regardless of those who are not registered into the system.

Entity profile

Potential donors should register into the system before they can submit their respective donation programs.

System Security

The public should only have read-only access via website. The system should potentially hide personal user details from public view.

Reports

The system should be able to generate reports depending on the output that is relevant.

4.1.2 Non-functional Requirements

They describe how the system should behave and what limits there are on its functionality. NFR specify generally specify the system's quality attributes or characteristics. It is essential to take them into account as they affect the users experience when interacting with the system.

Usability

The system should be user friendly and easy for users to navigate. It should not be complicated to enable most users to comprehend.

Performance

The system should be responsive and be less resource intensive which improves the general performance of the system making efficient in response time and throughput.

Design Factors

The landing pages should be well aligned which encourages scalability in terms of the system components.

4.2 System Design

4.2.1 Use Case Diagram

The diagram below demonstrates the relationship between the various actors of the system i.e. the donor, admin and normal user and how they interact with their respective use cases. It also shows the inheritance that occurs among the various cases as some are dependent on the others.

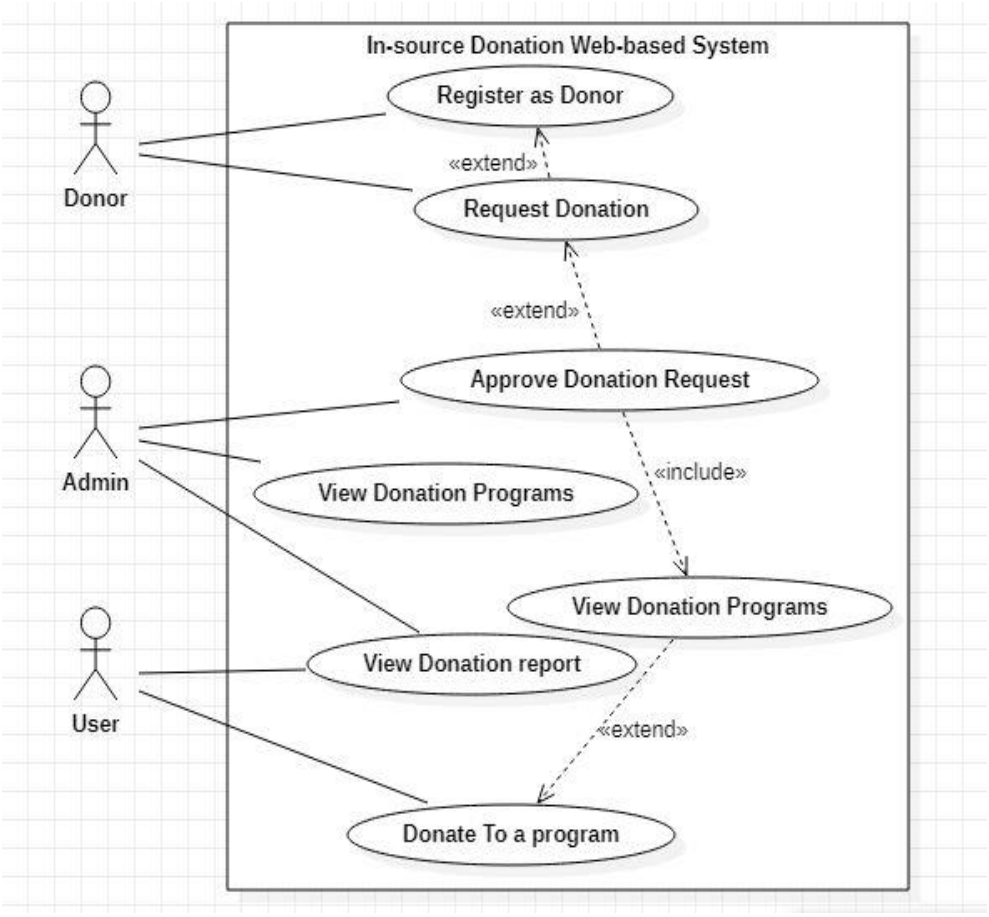

Figure 4.1 Use Case Diagram

4.2.2 Class Diagram

Class diagram shows the various classes, the attributes contained in each one of them and the operations they undertake. It also shows the various communications they have with each other.

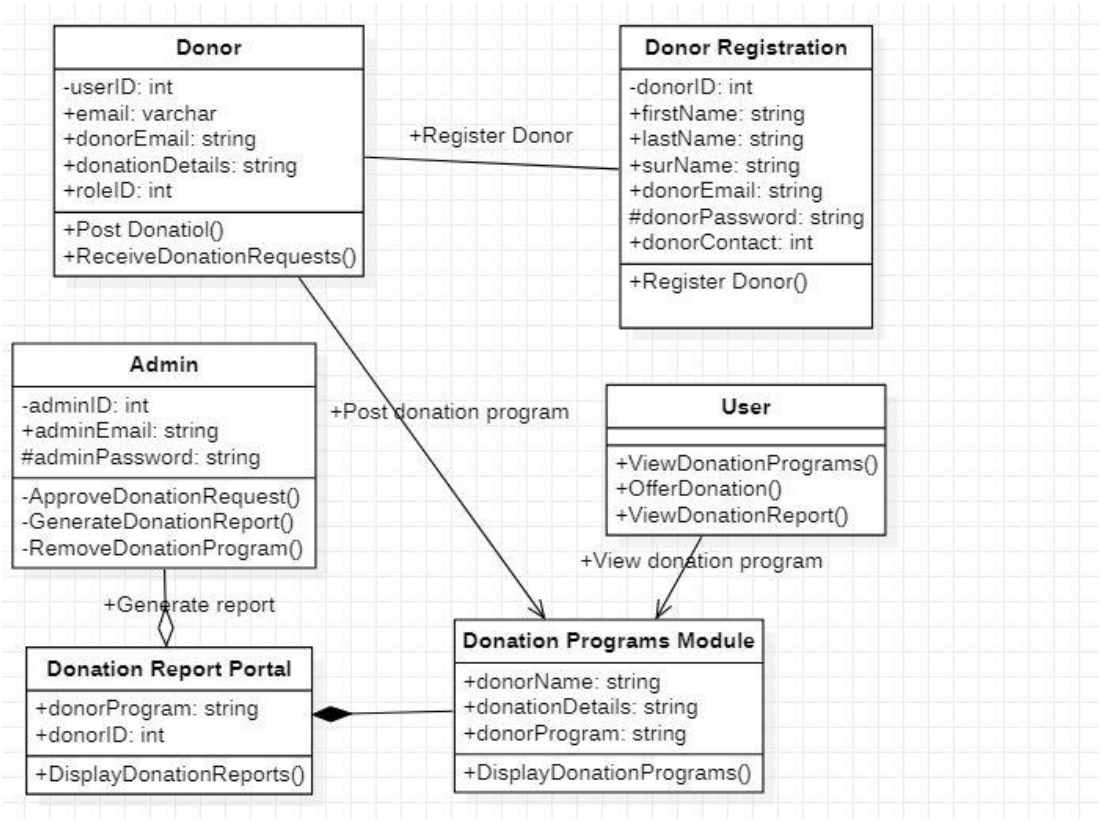

Figure 5.1 Class Diagram

4.2.3 Sequence Diagram

Sequence diagram explains the flow of activities within the system and their relevant interactions. It depicts the sequence of messages exchanged between the objects. This is clearly understood when implementing the GET and POST methods when developing the system.

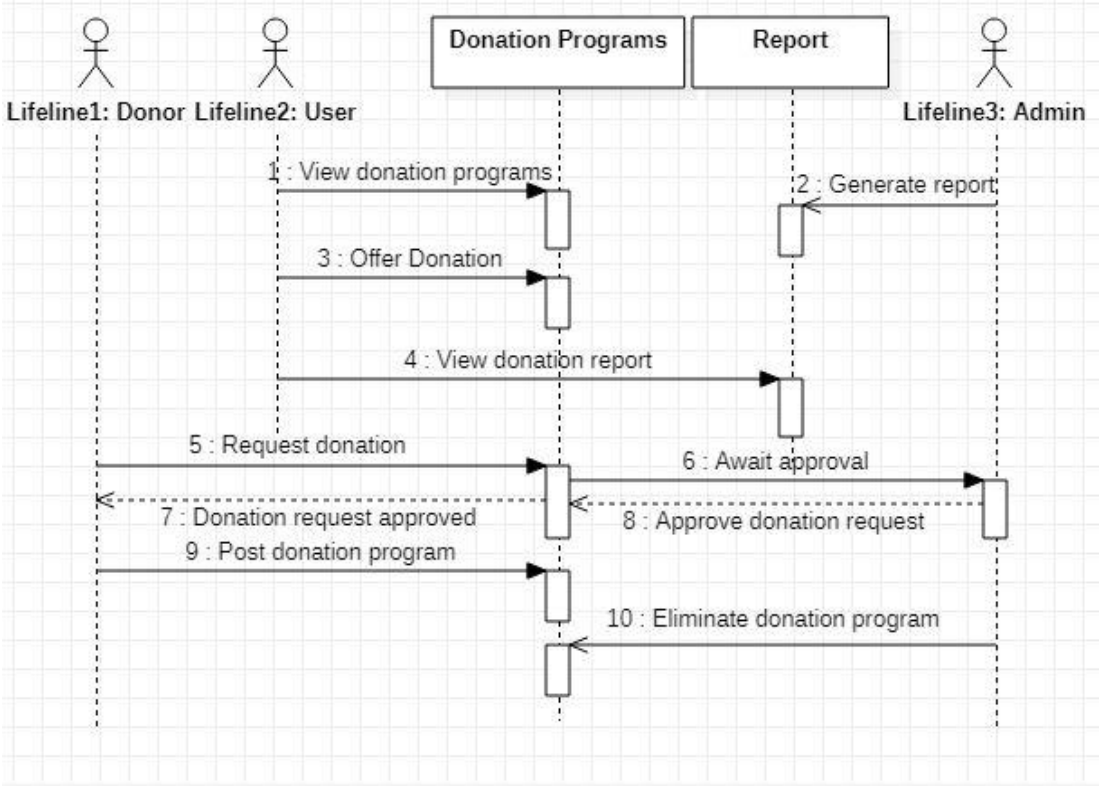

Figure 6.1 Sequence Diagram

4.2.4 Database Schema

The database schema shows the design as seen from a database perspective. The role can be the admin, donor or a normal user each linked with the respective action that is expected. For instance, the admin role is associated with generating the donation reports and donation programs. The donor role is associated with posting the donation program of which a normal user will be able to view.

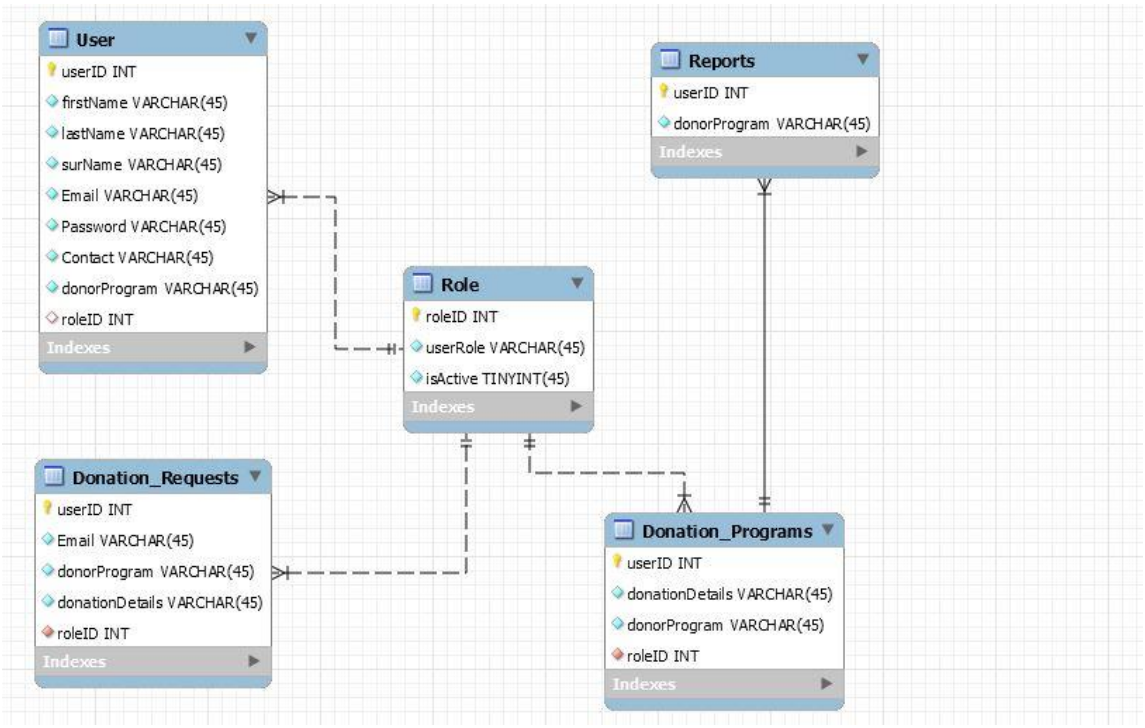

Figure 7.1 Database Schema

Chapter 5: System Implementation and Testing

5.1 Introduction

This chapter intends to focus on how the system was developed, implemented and tested to ensure both the functional and non-functional requirements have been met.

5.2 System implementation

The system was built as specified in chapter 3 of the document applying the Rapid Application Development. The framework that was built upon is Dotnet Entity Framework that uses the MVC model which has the model, view and controller, for C# programming language. The backend was developed in MySQL using the MSSQL Management Studio Server 2012 tool to separate the application development front-end from its backend server which is the database. The latest version of the server required a licence product and there the 2012 version was found as open source to use.

5.3 System Testing

This was aimed at whether the system met the expectations as per the system requirements. Initially, unit testing was done on the different modules to ascertain that they work as expected. After each module satisfied the expected output, integrated testing was done to ensure there is flow among the various system components and that the system's functionality has been met. Different test cases were drafted and the results recorded as shown on sections 5.4 and 5.5.

5.4 Test Cases

TEST ID	RELATED REQUIREMENT	INSPECTION CHECK	PRE-CONDITION	TEST DATA	PRIORITY LEVEL
T1	FR	Does the system allow a donor to register?	The donor should input registration credentials	Email: henry@gmail.com Pass: H@2022020	High
T2	FR	Does the system validate the inputs before registering?	Ensure the user inputs all fields. Email is in the required format. If both passwords match	Email: henry@gmail.com Pass: H@2022020 Retype: H@202	High

				020	
T3	FR	Does the system allow only registered donors to login?	Registration prior to logging in.	Email: henry@gmail.com Pass: H@202202	High
T4	FR	Does the system allow unregistered donors to login?	Try logging in with an unregistered account.	Email: Jermain@gmail.com Pass: J#123456	High
T4	FR	Does the system allow registered donors to post their programs?	The donor should have registered before creating a donation?	None	High
T5	FR	Does the system allow unregistered donors to post their programs?	Only registered donors should post their donations.	None	High
T6	FR	Is the data readily accessible to all users including the unregistered?	None	None	Medium
T7	FR	Does the system allow public users to edit the data?	Data should only be read-only	None	High
T8	FR	Is the system able to generate a report?	Already existing data	Donor Programs	Low
T9	NFR	Are the landing pages properly aligned?	None	None	Medium
T10	NFR	Is the system user friendly in terms of its interfaces and operations?	None	None	Medium

5.5 Test Results

TEST ID	EXPECTED RESULT	ACTUAL RESULT	STATUS	REMARKS
T1	The system should allow donors to register.	The system allows donors to register.	Pass	Successful registration
T2	The system should validate the credentials before registering	The system validates inputs and displays relevant errors	Pass	Successful validation and error message display
T3	The system should allow registered donors to login	Registered donors were able to login	Pass	Successful donor logging in
T4	The system should restrict unregistered donors from logging in	The system showed an errors of invalid login credentials	Pass	Successful logging in validation
T5	The system should not allow unregistered users to post their donations	The system takes on to the registration module prior to uploading	Pass	Successful validation
T6	The data should be readily accessible to all users	All users can see the data inclusive of unregistered users	Pass	Successful display of data
T7	The system should restrict public users from editing the data	Data is only read-only	Pass	Successful read-only implementation
T8	The system should generate some report	Report on the donations available in pdf or excel format	Pass	Successful report
T9	The system have the landing pages	Landing pages are properly integrated	Pass	Successful implementation

	properly aligned			
T10	The system should be user friendly	The system is easy to interact with basic functionalities	Pass	Successful implementation

Chapter 6: Conclusions and Recommendations for Future Work

6.1 Conclusions

The developed project aims at providing an efficient platform for facilitating donation programs that exist and emerge as time goes by. This has been very evident especially during the Covid-19 pandemic. There has been a high need to find for most donation organizations and projects to move to online to avoid physical contact as per the covid-19 measures as well as reach a large number of people. Therefore, most operations digitized their operations and structure.

6.2 Recommendations for Future Work

i. For further progress, an android based application would be a better platform for easier deployment by many users and make the application more popular since mobile sites offer a great competitive edge.

ii. For efficiency of the operations, the donor's creation module should enable the donors to have some control level by incorporating operations like the basic operations of adding, updating and deleting whatever has been uploaded.

iii. More security protocols should be implemented to ensure donations being uploaded meet a certain expectations and are legally allowed to conduct donation especially for programs that involve monetary collection.

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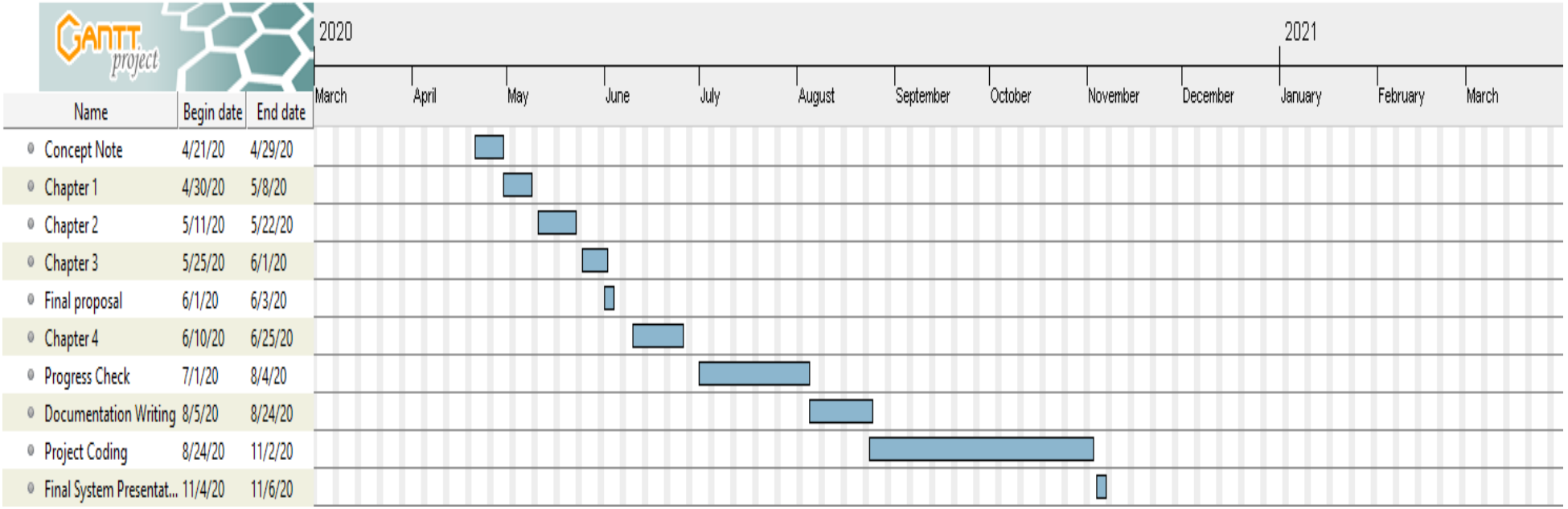
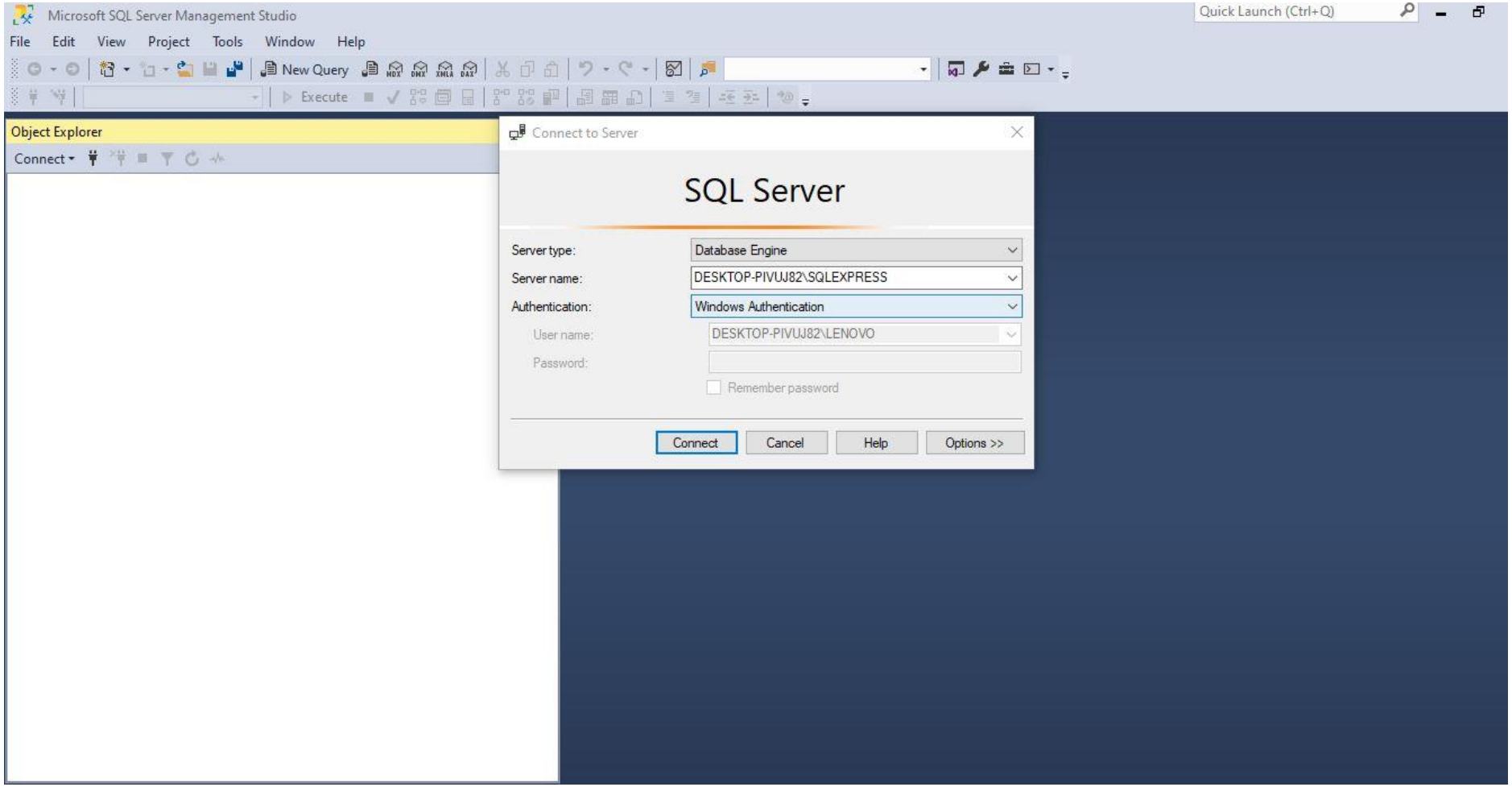
Appendix A: Timeline of Activities



Appendix B: Part 1 Database Server Connection



Appendix C: Part 2 Database Server Connection Code Snippet