A Web – Based Platform Linking COVID 19 Relief Aid Agencies with the Affected Population in Kenya

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Declaration

I declare that this work has not yet been previously submitted and approved for the award of a Bachelor's degree by this or any university. To the best of my knowledge and belief, the report contains no materials previously published or written by any other person except where due reference is made in the document itself.

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Abstract

As the virus that causes COVID-19 continues to spread from person to persons in communities and rampaging the world, the need for an effective real-time linking system that links the relief aid organization with the affected population becomes paramount. Although COVID-19 pandemic systems such as charity applications have improved the administration and management of virus, there are still challenges such as privacy, cost and ethical issues, the adoption of new technologies, standardized cases, and validly diagnosed case and validity. This system is a model for an interactive computer system using the internet for real-time collection and transmission of events related to COVID-19. Human resource allocation appears to be one of the important factors toward effective humanitarian relief operations. Particularly in developing countries, the role of volunteers which is mostly managed by humanitarian organizations has become prominent. Due to the limited human resources, the humanitarian organizations are challenged to allocate their resources to both provide assistance for COVID 19 pandemic victims and build organization capacity effectively. The developed system aims at identifying effective human resources allocation approaches in humanitarian organizations and building a system that can solve the issue and link the humanitarian aid organization with the affected population. Object Oriented Analysis and Design (OOAD) approach was used towards the development of the solution. Tools used in the project development include PHP as the programming language aided with elements of HTML (Hyper Text Markup Language), CSS (Cascading Style Sheet) and JavaScript Visual Studio Code IDE, the system uses a XAMPP database that stores up data and information about all the stakeholders and donations made.

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COVID-19 - Coronavirus disease of 2019

CSS3 - Cascading Style Sheet Latest Version.

DIK - Data, Information and Knowledge

FR - Functional Requirements

GoK- Government of Kenya

HTML5- Hypertext markup language 5.

IDE - Integrated development Environment

LRRD- Linking Relief, Rehabilitation and Development

NFR- Non-functional Requirement.

OECD - Organization for Economic Co-operation and Development

OOAD – Object Oriented Analysis and Design.

PHP - Hypertext Processor.

SDGs - Sustainable Development Goals.

UN – United Nations

WHO – World Health Organization

Chapter 1: Introduction

1.1 Background

Humanitarian action is the active provision of humanitarian aid: aid designed to save lives, alleviate suffering, and restore and promote human dignity in the wake of disasters and during large-scale emergencies (WHO, 2008). Beyond this definition, there is variation in how humanitarian action is framed and understood. It can be perceived as political or nonpolitical, as secular or non-secular, as a movement or an institution, and as short-term emergency response or longer-term development and guided by or apart from humanitarian principles. The COVID-19 outbreak, declared a pandemic by the World Health Organization (Adhanom, 2020) on 11 March 2020, has spread rapidly across the globe, with severe impact on lives and economies. The COVID-19 pandemic in Kenya has translated into critical socioeconomic impacts on Kenya's population, which must be understood to inform timely policy responses. School closures, restrictions on movement, bans on social gatherings, and limitations on economic activities have hit Kenya's socioeconomic life, creating negative consequences, such as income losses and increased food insecurity, which has been exacerbated by a locust invasion (Bank, 2021). It is crucial to understand the socioeconomic effects of the COVID-19 pandemic and identify the most critically affected populations. Such an understanding can enable evidence-based policies and programmatic responses. However, lack of updated socioeconomic data hinders efforts to efficiently allocate resources, for example, to roll out social assistance programs.

The identification and treatment of COVID-19 in Kenya, as in many parts of Africa, is particularly challenging because of the social conditions in the country. Many of the recommended practices to control the spread of COVID-19 include isolation or quarantine, social distancing, and hand washing, present particular challenges for persons living in poverty (Battle, 2020) Kenya's government knows that an effective pandemic response would have to strengthen key health system components, including financing, governance, human resources, clinical management, and information systems (Breen, 2020). The aim focuses on the response towards the pandemic, Kenya and other partner states continue improve the region's response capacity on disease prevention, safety and surveillance at border points. The Ministry of Health currently communicates daily via all media outlets the number of confirmed cases, fatalities, recoveries, overall COVID-19 related

bed occupancy in various hospitals, and the prevalence in all 47 counties. They also remind all citizens to continue taking precautions not to contract COVID-19; and provide contact details on how and where to seek assistance if one has present symptoms. In addition, the government has established the COVID-19 risk communication and community engagement sub-committee, in conjunction with media agencies, healthcare stakeholders and organizations such as The United Nations, World Bank and more, to enhance strategic communication and community engagement, promote trust and influence risk perception (Gichuki, 2021).

As technological advancements are being implemented daily in the field of technology those results in solutions being refined over time, this in turn creates a demand for systems produced by humanitarian aid organizations to be implemented in a real environment to solve issues, the case being the social impact of the COVID 19 Pandemic. One of the main initiatives of the administrative section is to identify and deliver human needs. Due to the non-availability of a well-established platform for handling these activities all the actions are handled manually which entail the current system and method involve mainly sharing messages via WhatsApp messages and other social media platforms, physical brochures, newspaper, radio stations and word of mouth. Over the last few years, outbound marketing methods like those who have relied on have declined in popularity among consumers. Now that potential customers can use new channels like the Internet, websites, and social media to research and discuss companies, they can choose to draw their own conclusions on where to take their business—and ignore advertising that suggests otherwise.

That is one reason why new media has pulled ahead in the debate between traditional media against new media. Consumers have also become less receptive to traditional media now that they are able to tune it out. Commercials can be skipped, radio stations can be changed, mail can be thrown away, and banner ads can be blocked. This means that marketing methods are often ignored or even seen as ineffective (Boyera, 2010).

This fails to get the required number of audiences and the entire transparency is not there. This created an immediate need to develop a new online platform to allow meet all these needs to avoid the delay in scheduling events, create more awareness and opportunities and raise more funds and build the humanitarian community all under one roof.

1.2: Problem Statement

The COVID-19 pandemic has fundamentally changed the world. With over 103 million cases reported as of February 2021 and over 2.2 million deaths worldwide, it is the deadliest pandemic since the 1918 Spanish Flu (Brindley, 2020).

The world is moving in a way in which warring parties kill civilians without consequences, and in which the human and economic costs of disasters is growing. Unless action is taken soon, serious natural hazards will become more frequent. Millions more people will be pushed further into a life of poverty and suffering – and international aid efforts will struggle to cope (Lowcock M. , 2018). Fixing the global humanitarian emergency response system and anchoring it more firmly in long-term development goals is an important part of Secretary-General Kofi Annan's plan for UN reform (Fleshman, Fixing the humanitarian aid system, 2016). The current system and method involve mainly sharing messages via WhatsApp messages and other social media platforms, physical brochures and word of mouth. This fails to get the required number of audiences and the entire transparency is not there. Everything is not accessible under one roof.

With majority of people in Kenya having access to the internet and smart devices, the developed idea manages to bring up an online platform where the Covid 19 relief workers and organizations can connect and volunteers come together and help out people in various areas and fields in accordance with United Nations Sustainable Development Goals, it offers relief in the form of financial, emotional and physical support, in order to meet the needs of people ravaged by disaster and other misfortune in Kenya.

The faster the humanitarian community is able to collect, analyze, disseminate and act on key information, the more effective the response will be, the better needs will be met, and the greater the benefit to the affected populations. The purpose of the presented system, therefore, is to provide a direct link and immediate response to the COVID 19 emergency crisis in support of ongoing efforts by the Government of Kenya (GoK) and the international community (Kwobah, 2014)

1.3: Aim of the system

The aim is to develop A web – based platform linking COVID 19 relief aid agencies with the affected population to solve the problem identified in 1.2: Problem Statement.

1.4: Research Objectives

The objective is to;

i. To evaluate challenges faced in the process of delivering humanitarian aid.

ii. To review and analyze the existing method of delivering needed provisions.

iii. To design and develop a web – based platform linking COVID 19 relief aid agencies with the affected population system

iv. To test and validate the proposed system.

1.5: Research Questions

i. What are the challenges faced by offering humanitarian aid?

ii. What challenges are faced by the current existing systems?

iii. What effect do different legal restrictions have on the proposed system?

iv. How flexible is the proposed system for the users?

v. What is the best method to test the newly developed system?

1.6: Justification

Within the international humanitarian framework, the term "humanitarian assistance" refers to the operating principles for guiding the actions of states and individuals in the event of a humanitarian emergency, that is, any suddenly occurring condition of danger requiring an immediate response to the needs of large numbers of people for basic survival necessities – safe water, shelter, basic medical support, and the like (Murphy, 2014). Despite continuing funding gaps, humanitarian action has never been better funded. U.N. appeals alone raised a record $14 billion last year, up from $4 billion in 2005. But the humanitarian sector is far from complacent and one recognizes that one can, and must, be better. Given the scale and complexity of the current humanitarian system, getting the best from everyone has never been more important — or more challenging. U.N. Office for the Coordination of Humanitarian Affairs works to coordinate preparedness and response in as inclusive, facilitative, and supportive a way as possible (Lowcock M. , 2018).

Growing interest in the links between humanitarian aid and social protection as well as recent trends in the delivery of aid (increasingly via cash transfers) have led to increased focus on the technologies and specifically data and information systems involved in the delivery of assistance to households. The rationale behind this push – according to recent research – has been a focus on increased 'effectiveness' and 'efficiency', both for institutions and individuals (Schoemaker, 2020)

The purpose of this system idea is to explore what design principles need to be considered in Enterprise Resource Planning (ERP) systems for humanitarian organizations (HOs) to enable agile, adaptive and aligned (Triple-A) humanitarian supply chain capabilities and digitize humanitarian operations. Enterprise resource planning (ERP) software standardizes, streamlines and integrates business processes across finance, human resources, procurement, distribution and other departments (Perkins, 2020).

The use of information systems in humanitarian operations is becoming fundamental to managing the information flows and networks important in crisis response (Sigala, 2020). The project system aims to exist to bring humanitarian agencies together in order to coordinate cohesive and coherent humanitarian responses. Rather than focusing on an integrated enterprise resource system for enterprise-wide implementation and decision-support, the idea centers on the design requirements and premises required to meet the communication and information needs of emergency and crisis personnel. Here, one can find great resources, including press releases, crisis updates and more about what is happening on the ground. The platform is justified because of the risk of further deterioration of the humanitarian situation particularly in the urban parts of the country.

Today, Artificial Intelligence systems have numerous capabilities that include natural language processing, computer vision, speech and audio processing, predictive analytics and advanced robotics (Dale, 2020). These and other techniques are proposed to be deployed to augment development and humanitarian action in innovative ways.

In 2017, humanitarian organizations reached more people in need than ever before and countless lives have been saved. However, humanitarian emergencies have become more frequent, complex, and longer-lasting and are affecting more people than ever before, stretching the humanitarian community to new lengths (Verboom, 2018).

The identified greatest opportunities lie within the people receiving aid and service. Building on the knowledge and skills of the people getting served can help improve the services and make sure that they are tailored to the needs of the community being serving.

Other promising opportunities include the growth of new technologies, new and stronger partnerships, and the increased involvement of the private sector. While careful adaptation of existing tools was used to increase coverage and inclusion, the technological innovation is embraced as a way forward to better address the needs of those affected by humanitarian disaster, and to address the challenges faced in humanitarian assistance. One such innovation that is changing the face of humanitarian aid is cash programming (supplying cash instead of goods to people in need). It is seen as a fantastic way to preserve the dignity of the people served by allowing them to make decisions about what would help them most in their situation of need.

The activities implemented under it is carried out expeditiously and effectively within the required timeframe, with food supplies and distribution, fund raising platform and a platform for individuals and organizations to connect aiming at restoring a degree of normalcy in both the social and economic life of the populations.

1.7: Scope

The scope entails individuals and population groups who were already suffering from violence, stigma, discrimination and unequal access to basic services and living conditions are bearing the brunt of this new crisis.

This study of this project system focuses on determining the wider understanding of the advantages, benefits, and positive effect that the proposed web – based platform linking COVID 19 relief aid agencies with the affected population system can provide to the affected population in Kenya. The project also explores the strategic delivery plan to have accurate information and need to have the technology as a tool for solving problems and at the same time increasing the productivity and the quality of delivering aid supplies.

1.8: Limitations

Although the model has been useful to demonstrate the allocation trade-off, some limitations still need to be highlighted. First, although the model is generic, the parameter values are only relevant

for the typical disaster in the study (Covid -19 pandemic), different disaster and location of disaster may have different parameter values. Second, the conceptual model is elicited based on a few Humanitarian Organizations, more Humanitarian Organizations are still needed to get representative model specification. It is suggested that future analysis could thus focus on refining the conceptual model as well as testing the model to gain more confidence on the model. Last but not least, experiments could be conducted to explore the effect of productivity, knowledge gained from field, etcetera., which may be useful to increase efficiency in relief operations

The results of this study are based on a single case study limiting generalizability. Moreover, disinformation and stigmatization can cost lives. Humanitarian organizations therefore now need to ensure that people in crisis situations, such as displaced persons, also have access to up-to-date and correct information.

Chapter 2: Literature Review

2.1 Introduction

This chapter reviews on the existing literature on the current humanitarian aid management situation in Kenya, existing management systems, the trends in web development technology, the adoption of web technology in other countries as well. It begins by exploring the challenges that exists in the current humanitarian aid delivery system being used and it finally depicts various technologies used in development.

A review of literature has been carried out in order to provide justification for the development of the research objectives. This research also looks at various platforms in which humanitarian aid agencies and volunteers are able to plan their aims accordingly. The stated research objectives clearly define what this research is going to cover; a lot of secondary research has been used as it proved to be much more efficient and approved.

2.2. Problems and Challenges faced

The crisis in Kenya has increasingly been used as a model to illustrate the ambiguities inherent in, and obstacles to humanitarian action faced by today's aid agencies (Brunel, 2014).

The challenges that relief aid worker and organizations face during the act of providing relief are among them, communication flow, corruption, flow of relief supplies and logistics of the relief supplies.

2.2.1 Communication flow

Communication was identified as one of the most important things a disaster affected population needs. Communication with the population affected by a disaster has increasingly received prominence in the world among the relief workers and organizations. Communications plays a key role during any humanitarian crisis situation. When populations are struggling for basic needs and rights, effective communications can provide relevant and reliable information, with which people have better chances to survive through a crisis situation (Lamicchane, 2016).

Effective communication is critical to drive material along the relief aid network within and among the field/aid workers Research shows that two-way communications with both internal and external parties is critical for a successful output (Raymond, 2015).

As Kenya steps up its fight against the COVID 19 pandemic, misinformation is also spreading fast. This time around, the work of humanitarian aid organizations also involves convincing people that the virus is real (Smith, 2020). There is dissatisfaction with the weak performance of the media and lack of control on several social networks. The multiplicity of media and lack of a unique and influential management for organizing supervision and monitoring on the news, and the existence of ample inauthentic news sources were considered as the most significant challenges.

There is also inadequate data or information to evaluate the effectiveness of national directives like curfews and lockdowns in reducing the spread of COVID-19. While some data is released daily, a more detailed set of data is needed to answer those questions and making evidence-based decisions. Information is either missing or is inadequate on how well the healthcare system is doing at all levels, such as average length of stay in intensive care units, number of beds and ICUs available, the effectiveness of contact tracing teams, or deaths in high-risk or vulnerable communities (Lewis M. , 2020).

2.2.2 Corruption

Kenya's fight against the coronavirus pandemic is hampered by persistent shortages of equipment and supplies, including basic materials such as personal protective equipment. Health workers suffer directly from these shortages: as Kenya witnesses a surge in coronavirus cases, medical practitioners have died by the dozens (Gul, 2020). In a report to a joint Senate Committee on Health and Covid-19, the EACC said: "Investigations had established criminal culpability on the part of public officials in the purchase and supply of Covid-19 emergency commodities at Kenya Medical Supplies Authority (KEMSA) that led to irregular expenditure of public funds." (EACC, 2020).

The potential causes as investigated by (J., 2015), recognizes most causes in a general view in many countries; all of them are developing countries or countries in transition, with rare exceptions, low-income countries, most countries have a closed economy, the influence of religion or community influence is visible, low media freedom and a relatively low level of education.

Corruption is often associated with abuse of entrusted power and embezzlement of resources where a bribe is a major factor in exchange for preferential treatment and where there is corruption there is always bad governance. In Kenya, the phenomenon of corruption is strongly influenced by the

political and economic environment. The more the economic activity in the country is regulated and limited, the higher the authority and the power of officials in decision making and the greater the possibility of corruption, since individuals are willing to pay or offer payment in order to avoid restrictions. A great potential for corruption is especially there where the officials are under the regulation given the opportunity to decide on the basis of discretion (Šumah, 2018).

The directly damaging impact of corruption the diversion of basic resources from poor people. Corruption in humanitarian aid is most egregious form of this, as it deprives the most vulnerable poor people, the victims of natural disasters and civil conflicts, of essential life-saving resources (Ahlendorf, 2014). Humanitarian assistance aims to save lives and alleviate the suffering of people in times of crisis. Yet these noble ambitions do not immunize emergency responses from corrupt abuse.

In order to provide the assistance to the affected the agencies have to engage in diverse activities ranging from procuring the items for distribution, transporting the items first to the country and then within the country, targeting specific areas, setting up camps, registration of the affected to assess the needs and actual distribution to construction work. Alongside these activities the relief organizations have to also employ staff and independent contractors to carry out the various operations from transport through to distributions. In each and every stage of the operation there is scope for corruption. These can range from an international organization having to bribe the customs officials to cross the border, an individual beneficiary having to bribe the distribution official in order to receive food and shelter, diversion of funds paid to the local agency for relief operations, provision of sub-standard goods, over estimation of numbers of people requiring assistance to favoritism in the engagement of local staff for relief operations

Forms of corruption in humanitarian settings in Kenya extend beyond cash bribes and other forms of financial corruption to include the fraudulent diversion or theft of resources, the denial or granting of access to resources to serve political ends, extortion of affected populations, nepotism in recruitment practices in aid agencies as well as sexual exploitation of those (predominantly women) seeking access to aid. The exact nature of corruption encountered will further depend on the form of aid being provided, whether this is shelter, food, healthcare, sanitation, longer-term

infrastructure development or all-encompassing support, such as in refugee camps (Harvey, 2015).

It was critical to recognize that some groups of people are more vulnerable than others to various forms of corruption in these settings. Studies of gender and corruption have shown how women and girls experience corruption differently and, as primary service users, may be more adversely affected by the problem (Shipley, 2019)

Corruption persists in Kenya primarily because there are people in power who benefit from it and the existing governance institutions lack both the will and capacity to stop them from doing so and this proves to be costly in the pandemic phase.

2.2.3 Challenge of relief supplies

In humanitarian relief, supplies including food, water and medication are received in batches/waves from the suppliers and the donors. Then, these supplies are distributed to local dispensing sites located in the affected areas (Çankaya, 2018). Following the initial Covid 19 pandemic phase, needed supplies would be sanitary engineering equipment, food, water, mental health support.

For the over half a million people living in Mathare, one of Kenya's largest slums, the arrival of the COVID-19 outbreak in the country may have presented an even bigger risk than being infected with the virus. The disruption of the local health care infrastructure caused by the outbreak has badly affected their ability to find essential medical care, leaving many at risk of being deprived of life-saving services (Odongo, 2020). This added to the precarious conditions in which most people in the area are forced to live, often sharing crammed spaces with limited access to clean water, which makes COVID-19 preventive measures impossible to adopt. The result is a situation with potential for dramatic consequences, as the need for medical assistance increases while its availability is significantly reduced.

As to procuring necessary supplies, it was difficult to obtain access to local markets and suppliers in areas with limited or no security, confronting with the late delivery of supplies and time pressure arising from the urgent need for those supplies (Balcik, 2008). Despite being experienced and aware of the key points in humanitarian supply chains, people in charge of supply chain

management in most humanitarian organizations are not often specialized in this area, thus they are not experts in the tools for solving the problems that might occur during the operations. There would also be domestic barriers such as the need of excessive paper work, and specific policies of the region that would cause additional delays, as well as external complications due to foreign relations.

Scarcity of resources like data and information, supplies, people, technology and transportation, along with inadequate infrastructure, warehouses and funding are but some of the many examples of operational constraints that add to the logistical challenges of the procurement, warehousing and last mile distribution of aid

2.2.4 Logistics of relief supplies

The basic task of humanitarian logistics comprises acquiring and delivering requested supplies and services, at the places and times they are needed, whilst ensuring best value for money (Tomasini, 2009).

According to (Yan, 2020), there are four principal components in managing humanitarian supplies:

i.   **Acquisition of supplies**. This requires determining what items are necessary, how to acquire them, and how to use them to meet identified needs. •

ii. **Transport**. This entails an accurate assessment of readily available and alternative means of transportation to promptly and safely deliver supplies.

iii. **Storage**. An organized storage system safeguards supplies until they can be delivered to their final destination. The system also assists in anticipating amounts of supplies in reserve for later needs.

iv. **Distribution**. The ultimate objective of the logistic supply chain is to deliver assistance to the persons affected by the disaster or to the organizations in charge of their use. Balanced and controlled distribution must be ensured to avoid abuses, waste, or damage to the supplies.

These components are linked and complementary, and required very careful coordination to ensure that there are no interruptions in the logistics chain. However, constraining factors such as funding may prohibit the completion of such efforts before a disaster occurs. The other factor is the lack of

coordination between government water and power organizations, municipalities and the private sector delayed the installation of sanitation facilities for affected populations. In other cases, the direct involvement of civilians and voluntary groups in the distribution of relief items tend to disrupt the supply chain for unsolicited bilateral donations (UBDs), as these actors are not able to unpack and sort the items to meet the affected populations' needs (Maghsoudi, 2021).

Transportation is another significant challenge that is faced during the Covid relief operations. With county movement lockdown and curfew restrictions placed in Kenya, delivering these supplies is a significant challenge in getting to the destination on time

2.3 Review of Existing Systems

The growth of the internet has changed both institutional and community practice dramatically. The use of computers has also expanded rapidly in many industries over the past 10 years (Akhmatova, 2020). Technological advances that have recently emerged or become more widely available offer promising opportunities to support and improve humanitarian access.

Humanitarian NGOs aid people who are suffering, particularly victims of armed conflict, famines, and natural disasters. Sometimes these organizations are also called relief societies (FOLGER, 2021).

2.3.1 The Manual Method of delivering relief aid

Humanitarian aid has long been dominated by a classical paradigm based on ethics around humanitarian principles, centered on international humanitarian UN agencies and NGOs (King, 2018). However, too often development partners continue to use the traditional model, which relies disproportionately on foreign expertise and often gives preferential treatment to companies and consultants in the donor's home country. The OECD's Development Assistance Committee calls such flows country programmable aid (Bryant, 2019). This statistic does not include debt forgiveness, because often debt relief had not provided additional funds for projects and programs on the ground. In many cases, debt relief was made to countries that cannot pay off their debt and is a transfer between the treasury of a donor country and another agency of the donor government that made a nonperforming loan in the past. Country programmable aid also did not include donors' administrative costs or technical cooperation funding, because no cash actually flows to the recipient government or to poor people in developing countries. Finally, country programmable

aid does not include emergency aid, which is not intended to address long-term development goals (Branszick, 2004). The diagram below is intended to depict the flow of operations.
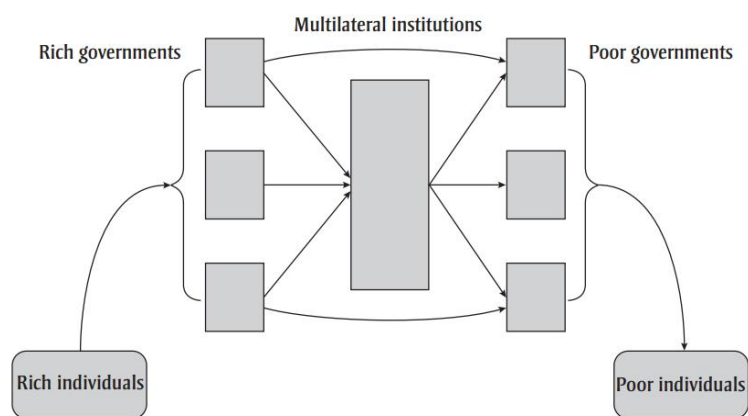
Figure 2.1: Traditional method of relief aid delivery, (Kharas, 2010)

The implication was that a large fraction of aid money never reaches a developing country, perhaps one reason that aid skeptics find that aid has little impact. Beyond the problems in categorizing aid, however, the more fundamental issue was that aid is coming from more places and being allocated through more channels. Figure 2.1 shows the old reality of aid flows.

In Kenya, the experience has been that China and other emerging bilateral prefer to engage directly with the recipient government, building on the principle of mutual respect. Recipient governments often prefer this arrangement as well. It allowed them funding that is not subject to the conditions demanded by traditional donors. Existing aid monitoring mechanisms had the tendency to handle new donors poorly. Many databases to track aid incorporate data only on the funding or offer spotty coverage of NGO and vertical fund projects, which means that they left out on average 40 percent of aid flows. The result is that emerging donor-funded projects are tracked in disconnected systems, are likely to fall into disarray when funding is interrupted, or are simply opaque (Alexander, 2021).

2.3.1.1 Lisha Mkenya, Kenya

Lisha Mkenya is a charity organization that aims in stretching a helping hand to needy Kenyans, who do nott have a means of providing to their basic needs. The organization has a charity form, from which donors fill their details and submit, the organization mostly uses social media handles

to reach and interact with their donors. Door-to-door collections is one of the strategies used by the organization to reach donors, this allows them to engage with their donors when they are at home and promote the awareness of the organization (Daniel, 2017).

This system of collection is not efficient, most of the times it is not easy for donors to identify the legitimate collectors and sometimes donors may not be aware of the organization and what it does. In most cases, this charity collection process was not transparent, and due to this, the charitable organizations struggle to gain donors trust and interest.

The main challenge experienced in manual collection of items for instance Lisha Mkenya Organization, is lack of trust by donors, since donors do not have any details about the organization and what they do. Sometimes door to door collection is unreliable to the organization since donors are not notified on when donations are made so that they can make arrangements on the items and amount of money to donate (Wales, 2021).

2.3.1.2 Strathmore community Outreach System of collecting relief supplies

Strathmore community outreach program is a program that reaches out to the communities every weekend to donate items, mostly orphanages and the needy households. Most of the contributions come from students and the school at large. Students take their donations, whether its money, books, clothes or even food at the Community Outreach Program office in school. There are specific days which students are asked to come along with their donations from home, mostly on Fridays since the donations are usually dispatched on weekends. Communications to when donations can be taken at the office is usually through student's emails and students WhatsApp groups (Maina, 2021).

This system of collecting donations is not reliable to most of the donors especially students. Some of the students do not stay around school, and when they carry their donation items to school, they sometimes find the office is closed.

The main challenge experienced is retaining donors and engaging them. This is because of regular communication with them in order for them to stay on track. This leads to donors donating once, hence reduction in retention rate. The system does not also provide information to their donors,

about the items that are important to the needy and places like orphanages, in this case, donors may end up donating items that are not relevant.

2.3.2 Existing Technical Systems and gaps

2.3.2.1 RedRose ONESystem

The RedRose ONESystem is a web-based system, tailored solely to meet the needs of the Humanitarian Sector. The ONEsystem enables NGOs to register beneficiaries, rapidly mobilize Cash and DIK Programs and provides real time monitoring and evaluation reporting. The system also enables NGOs to deliver all modalities of cash aid including: multi-purpose cash, paper vouchers, e-vouchers, cash for works, and SMS mobile money to beneficiaries at the touch of a button, using its secure web-based platform. Red Rose ONEsystem products can be used both 'online' and 'offline', which enables both 'real time' program information and remote management (Sheikh-Ali, 2017).

However, the drawback and weakness in this system is that the security integrity is weak, there has been multiple security breaches in the system such as the following evidence.

Emerson Tan, chief executive officer for Mautinoa Technologies — a self-acknowledged emerging competitor in the digital payments space — informed Devex last week that his organization had found a lack of security in an active RedRose deployment managed by Catholic Relief Services in West Africa. Through the security breach, they could access personal, economic, geographic, and photographic information about beneficiaries, which could be downloaded for offline analysis (Cornish, 2017).

2.3.2.2 HELIOS

Named for the all-knowing, all-seeing god of Greek mythology, Helios is a software solution developed by Fritz Institute to enable humanitarian relief organizations to optimize their supply chains. Developed with extensive input from humanitarian logistics professionals, Helios provides complete visibility across the humanitarian supply chain, from mobilization to the warehouse. It automates logistics processes at both the headquarters and field levels and provides tactical visibility from each of these perspectives (Wong, 2021).

However, while its capacity as a logistical supply chain monitoring and management tool is unmatched, Helios is not intended to function as a Material Resource Planning (MRP) system, a

financial system, an Enterprise Resource Planning (ERP) system or a Fleet Management system. Helios performs basic asset tracking functions but is not a total asset management system.

2.3.2.3 sQuid Kenya

sQuid Kenya is an information system that delivers digital payment, transaction & learning solutions from its base in Nairobi

sQuid Kenya is regulated by the Central Bank of Kenya and delivers a range of eMoney services for corporates, cashless payment solutions for education, and digital transaction solutions for humanitarian aid & development programs (Park, 2018). However, this system is only restricted to online transactions towards a humanitarian relief cause and there is lack of transparency on where the money given is used in

2.4 Gaps, analysis of architectures and solutions

In a nutshell, it is evident that the current method of delivery of relief aid by organizations in Kenya has short comings and weaknesses such as,

i. Geographical distance: Development projects are international. Organizations from different countries cooperate. The distance between the stakeholders made coordination and information sharing more difficult (Brooks, 2016).

ii. Decisions are influenced by politics: A great percentage of the funds that humanitarian organizations had to carry out projects come from governmental funding agencies. They are usually pursued by political objectives and influence the decision-making process in development organizations (Attinà, 2012).

iii. Competition between organizations: Several organizations work in similar fields and compete for the same resources (donations, credits.). They do not want to share information although they may have the same objectives (Branczik, 2014).

iv. Not all information is suited for sharing, for example published information about projects in totalitarian countries may endanger the participants. Lack of motivation for information sharing: Information sharing needs a big effort of the stakeholders.

The current architecture of the provision of humanitarian aid can be depicted from the diagram below studied by (Humphries, 2013),
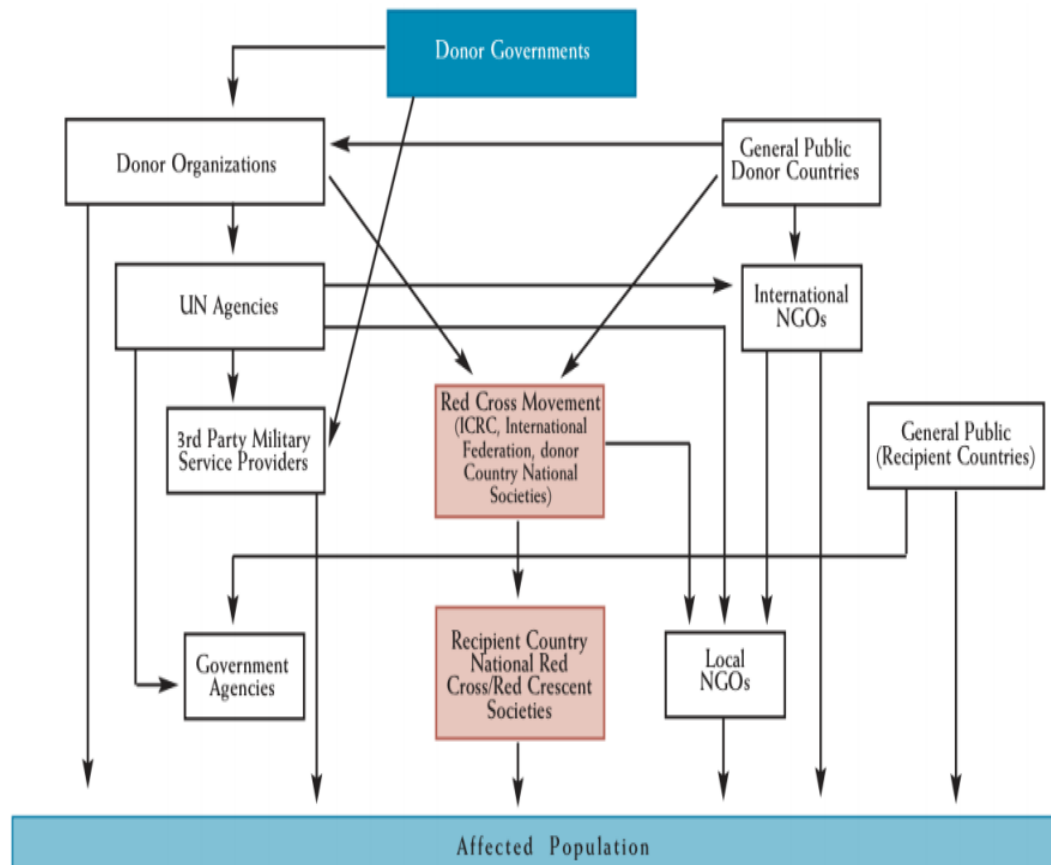
Figure 2.2: Current Architecture of the Delivery of relief aid

Following the analysis of the current system, it is clear that, development aid can exist without humanitarian aid (in developing countries that do not have humanitarian crises), but it also often exists in addition to humanitarian aid during and after crises. For example, if an earthquake strikes a country, short-term humanitarian aid is needed. This includes the delivery of food and water, the provision of temporary shelter, as well as health services.

The developed system aims at achieving the concept of Linking Relief, Rehabilitation and Development (LRRD). This project looks at aid effectiveness and the need to engage in relief efforts that reinforce development objectives, as well as development efforts that prepare communities to better withstand disasters and emergencies. LRRD looks to bridge the crucial gaps between humanitarian and development aid. At the same time, it recognizes the need to maintain

a degree of separation between the two, as each offers its own expertise and comparative advantage.

One of the main elements of the LRRD concept is that transitioning between humanitarian and development programming is a non-linear process. It is a continuous cycle where populations are constantly moving from relief to development or from development to relief in chaotic and unexpected progressions.

2.5 Conceptual Framework

Figure 2.3: Conceptual Framework is a conceptual diagram that shows how the presented system functions. The intended users of the application are NGOs and people who want to donate (donors). The administrator logs into the system and can insert or view relief organization and donation details. The NGO can get insights on potential affected population from the system. The management can also log in and retrieve reports on the route, NGO, item, or even donations. The application will also report on the trends and provide people profiles of quality leads for the organizations to pursue. The web application is also used to alter the data sent or to generate the reports.
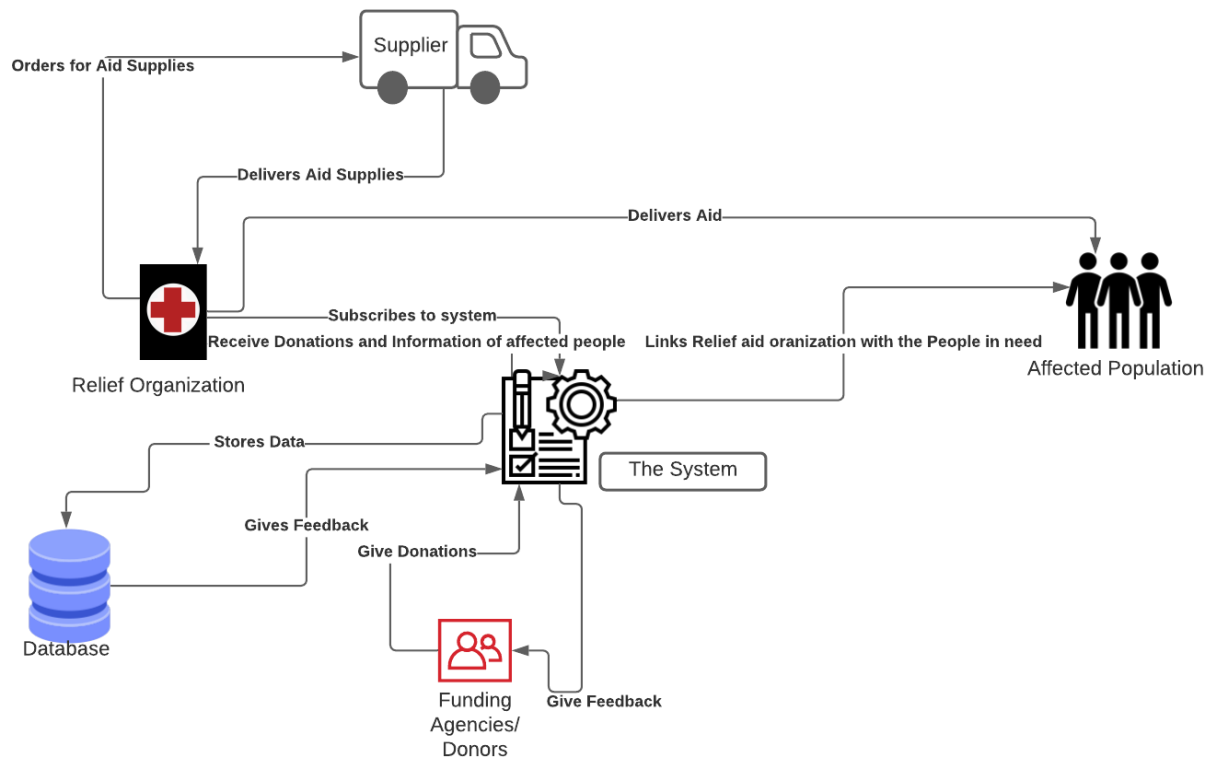
Figure 2.3: Conceptual Framework

Chapter 3: Methodology Review

3.1: Introduction

This chapter states a basic summary of the methodology that was used for the development of the system. The aim of the methodology is to ensure that the system is be able to improve the humanitarian aid delivery. The chapter will cover the following areas: development methodology, justification of the methodology, functional, non-functional requirements and tools and techniques to be used.

3.2 Research Approach, Techniques and Design

The approach that used was Prototyping. Prototyping is defined by (Lewis S. , 2017), prototyping model is a systems development method in which a prototype is built, tested and then reworked as necessary until an acceptable outcome is achieved from which the complete system or product can be developed.

The steps for prototyping as illustrated in figure 3.1 include:

3.2.1 Initial Requirements

In this step, the requirements of the system were defined in detail. During the process, the approach was from secondary sources of data, this entailed information from published reports, blogs, documents, websites and more.

3.2.2 Design

After planning, the needs, database models, and technical requirements were finalized based on the plan. A functional architecture, schematic, or algorithm that satisfied the requirements was created

3.2.3 Prototyping

This referred to bringing the concept to life. A small working model of the system.

3.2.4 Customer Evaluation

This stage referred to presenting the stakeholders with the concept that had been created to ensure that the concept matched their needs.

3.2.5 Review

This was the stage in which the process in which any amendments made by the user were implemented.
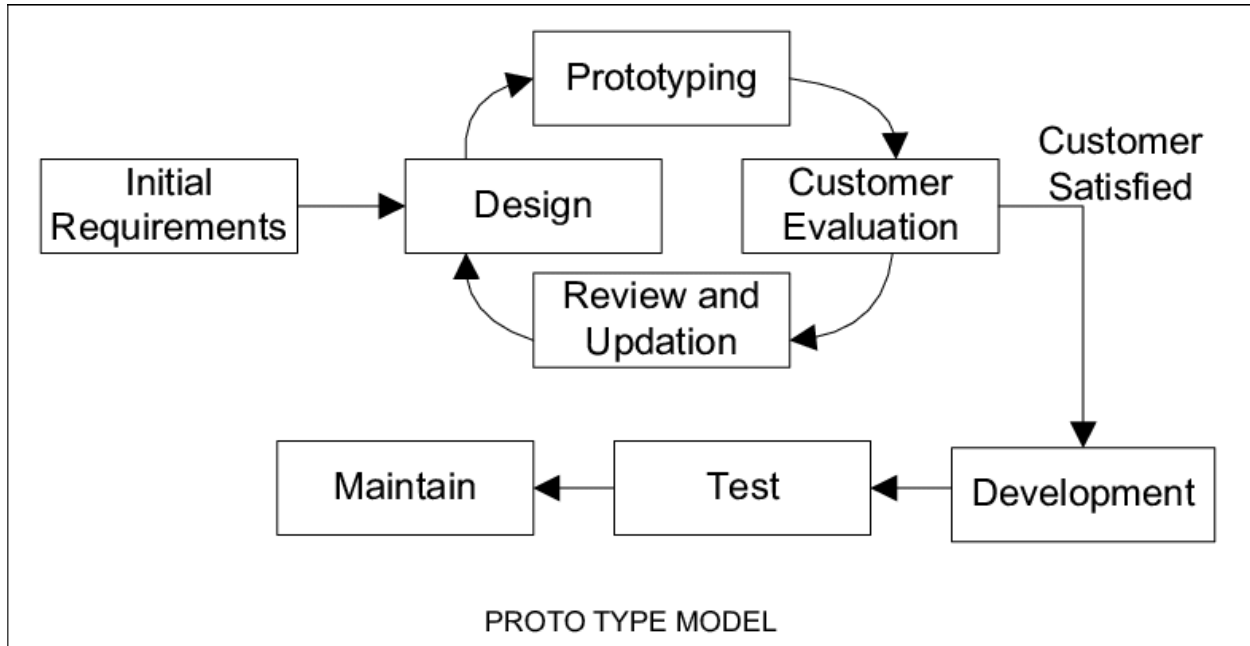
Figure 3.1: Prototype Model

3.3 Justification of Methodology

Prototyping methodology is the best, because most importantly, it helps eliminate misunderstanding and miscommunication during the development process (Cooper, 2020). Prototyping is important as designs were going to change overtime and new ideas had arised so it was best not to jump straight into development.

It allowed the users to experiment with the system, and so, refine the requirements. They managed to get new ideas for requirements and find areas of strength and weakness in the software.

Furthermore, as the prototype was developed, it revealed errors and in the requirements. The specification was then modified to reflect the changes. In the system design, a prototype can help to carry out deign experiments to check the feasibility of a proposed design. It was better compared to other methodologies as it got the user to be satisfied with the prototype developers started bringing into the standard needed for the final product (Ries, 2017).

3.4 Software Requirement Analysis

Requirement Analysis, also known as Requirement Engineering, is the process of defining user expectations for a new software being built or modified. In software engineering, it is sometimes referred to loosely by names such as requirements gathering or requirements capturing (Udoagwu, 2021).

3.4.1 Functional Requirements

Functional requirements are product features or functions that developers must implement to enable users to accomplish their tasks. So, it is important to make them clear both for the development team and the stakeholders. Generally, functional requirements describe system behavior under specific conditions (Brown, 2018).

i) Donation option**-**The system should present the user: donor with donate money option and donate items option and the items the chosen charity needs. The system should also allow the donor to fill their details for payment method options.

ii) Search **-** The system should allow donors to be able to search for the available organizations and the needy communities they need to connect to. In a case of an NGO, the system should provide the organization with available recognized slums (as a unique identifier) in the given area.

iii) Relief Aid history**-** The application should allow the donors to see their donation history.

iv) Administrative functions -The system should allow the administrator to accept and approve donations from donor, give them feedback about their donations and give them up to date information. The administrator can also approve recognized NGOs to sign up to the system

3.4.2 Non-Functional Requirements

Non-functional requirements are a specification that describes the system's operation capabilities and constraints that enhance its functionality. These may be speed, security, reliability and more (Jafari, 2020). These requirements are also used to specify criteria's that are used to judge the operation of the system.

i) Performance-The application should run smoothly, and to be able to perform the tasks at a certain speed to ensure tasks are completed efficiently.

ii) Usability-The UI of the application should be easy to use and interact with, well-designed and a clean interface. The system should not be complicated such that it requires constant challenges with its use.

iii) Operational - The system should be able to work in any web browser.

iv) Security - Security measures is aimed to ensure the software's safety against espionage or sabotage. These features are necessary even for stand-alone systems;

3.5 System Design

Systems design is the process of defining elements of a system like modules, architecture, components and their interfaces and data for a system based on the specified requirements. It is the process of defining, developing and designing systems which satisfies the specific needs and requirements of a business or organization (Odhiambo, 2018).

The development paradigm used was Object-oriented analysis and design (OOAD). OOAD is a software engineering technique that depicts a system as a collection of connected objects. Each object was defined by its class, state (data components), and behaviour, representing a part in the system being modelled.

The main benefits include: Improvement of quality, detailed documentation of the development stages, and reusability of similar projects that follow.

The design modelling diagrams that was used in this project:

i) DFD – Data flow diagram shows ways in which information flows through a process or system, it includes, data inputs and outputs, data stores, and various sub-processes the data moves through.

Process: The relief organizations can get the donations and deliver Relief Aid

Data Flow: This represents the movement of data, from the input to the outcome.

Data Stores: This represents the data of the user, for example an NGO; their name, their phone number, their location address.

ii) Use case Diagram – The use case diagram shows how the users will perform tasks on the applications: this includes the simple steps, from the beginning to the end when the relief aid organizations have linked with the affect people.

iii) Sequence Diagram - Sequence diagrams depict how items interact with one another and in what order they do so. It's worth noting that they only reveal interactions for a specific scenario.

iv) Class Diagram - The essential component of every object-oriented solution is the class diagram. It depicts the classes in a system, their attributes and activities, and the relationships between them

3.6 System Development tools and Techniques

These are tools that were used to ensure that the system would run in an efficient manner.

3.6.1 Visual Studio Code

Visual Studio Code is a streamlined code editor with support for development operations like debugging, task running, and version control. It aims to provide just the tools a developer needs for a quick code-build-debug cycle and leaves more complex workflows to fuller featured IDEs, such as Visual Studio IDE.

3.6.2 PHP

Stands for "PHP: Hypertext Preprocessor," a recursive acronym. PHP is a scripting language web developers use to create dynamic websites. In this project, it is installed by default on Apache web servers, alongside MySQL as part of a "XAMPP" configuration.

3.6.4 HTML and CSS

The majority of the front end was coded using HTML5 and CSS3 – CSS was used for all the styling and positioning.

3.6.5 JavaScript

This was used for added functionality of the application and for interactivity, in particular the framework JQuery.

3.6.6 Database Tools

MySQL relational Database Management System that helped maintain the relational databases used in the project. The MySQL language was used to query the database to attain useful information for the user.

3.6.7 Web Scrapping

Web scraping is an automatic method to obtain large amounts of data from websites. Most of this data is unstructured data in an HTML format which is then converted into structured data in a spreadsheet or a database so that it can be used in various applications. In this project, Web Scraping was used to get live feed on the number of Coivd-19 cases both worldwide and in Kenya from the site https://www.worldometers.info/coronavirus/.

3.7 Method used to test the System

The system was tested using the black box method. In this method, the internal design, structure and implementation of the item being tested is known. The project as a black box allowed users to insert data and expect a given outcome. The advantages of using this method are that the tester does not require technical knowledge, programming or IT skills, the user does not also have to learn implementation details of the system.
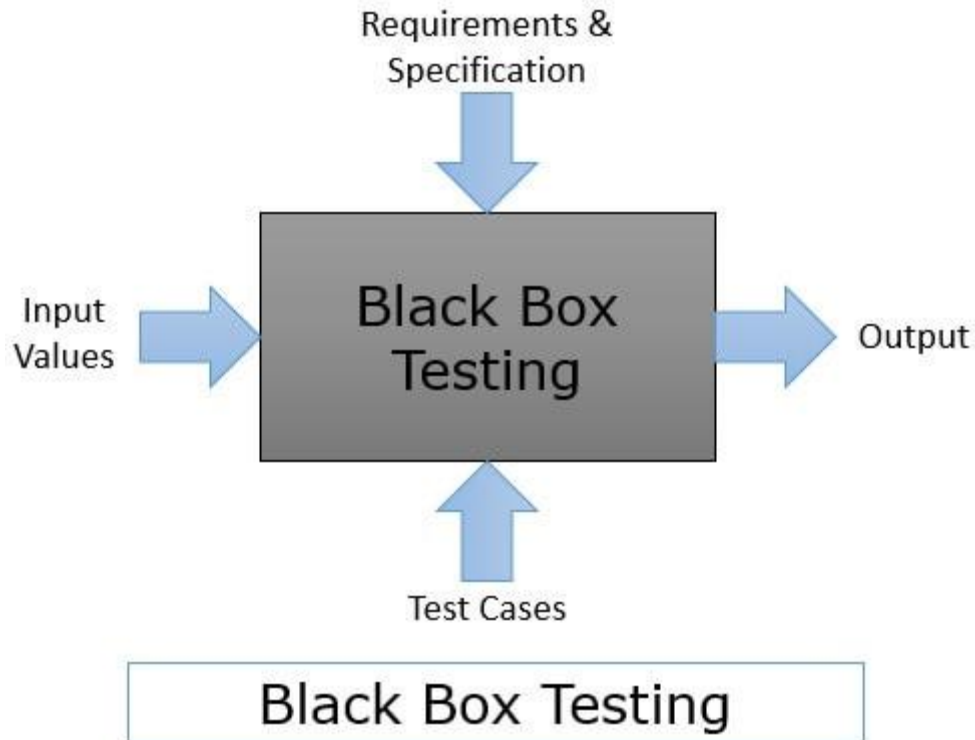
Figure 3.2: Black Box Testing Model

3.8 Domain and Execution

The execution of the project was the web application showing the donation management system. The application will not only be useful to the people, but also to the Humanitarian aid organizations, to track the records and manage the resources. This helps the organizations processes to be cost effective and save on time. Users will be able to access the application at anyplace with the access to the internet.

3.9 System Modules and System Architecture

The following are the modules that have been included in the system:

3.9.1 Administrator Module

The administrator will be able to manage/accept profiles for relief aid organizations and donors.

3.9.2 The Humanitarian Organization Module

The organizations are able to sign up and post news in the system and be updated about the current situation accordingly

3.9.3 The Donor Module

Under this module, donors are able to sign up, donate various items such as food, items and fiscal donations

3.9.4 The Dispatch Unit Module

The Dispatch Unit are units available to receive and deliver the items donated and provide confirmation.

Chapter 4: System Analysis and Design

4.1 Introduction

System diagrams are diagrams that illustrate the visual model of a system's components and their interactions (Salustri, 2007). Below are the system diagrams that are to illustrate the visual model of the web-based platform system's components and their interactions. They include: a use-case diagram, a sequence diagram, a class diagram, an entity relationship diagram and a database schema, as previously mentioned.

4.2 Use Case Diagram

A use case diagram is a graphical depiction of a user's possible interactions with a system. A use case diagram shows various use cases and different types of users the system has. The use case diagram below shows the activities and capabilities of all 4 actors involved are capable to do.
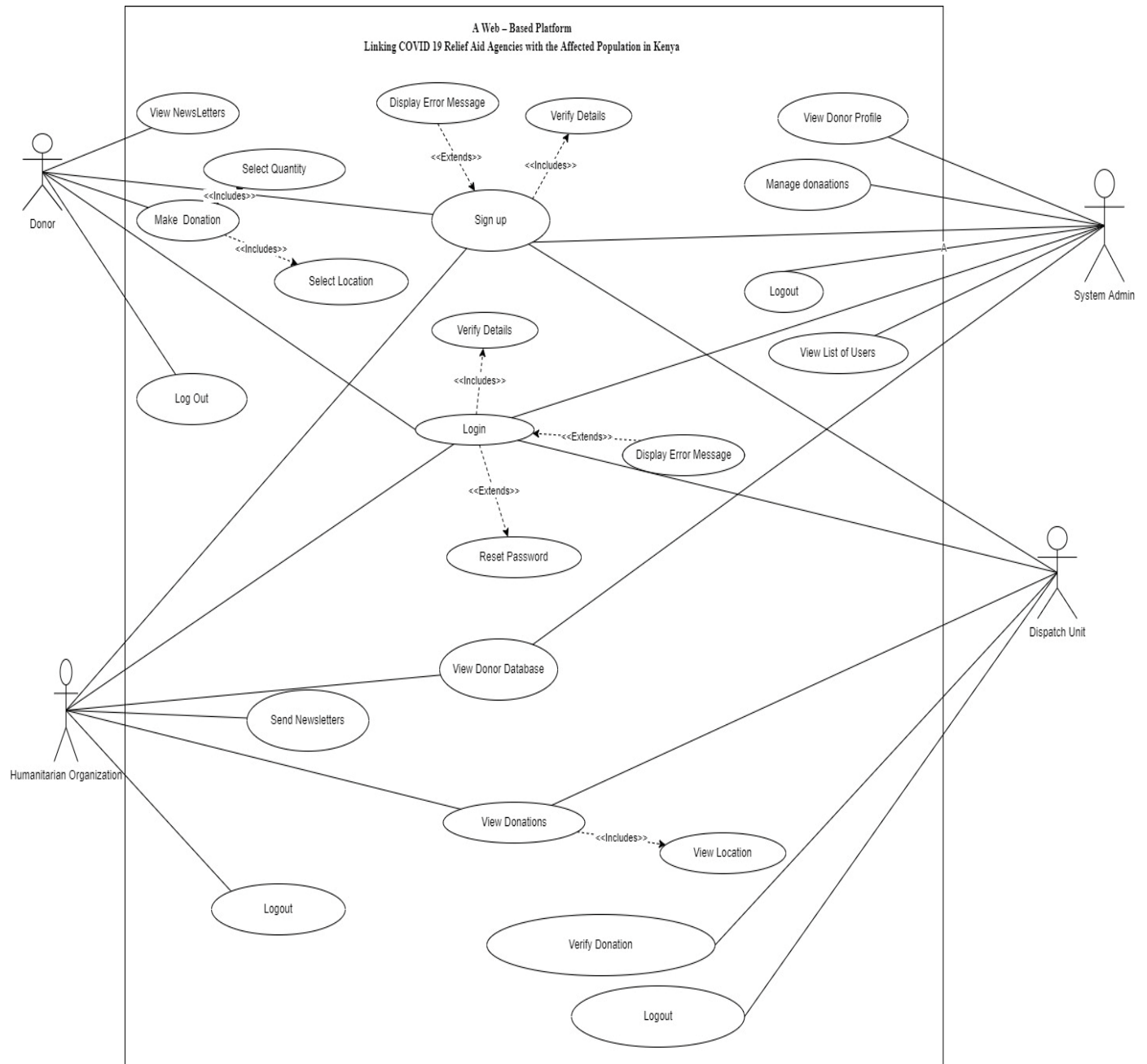
Figure 4.1 Use Case Diagram

Name	A Web – Based Platform Linking COVID 19 Relief Aid Agencies with the Affected Population in Kenya
Description	An online system that allows the general public and relief organizations involved in closing the gap caused by the Covid 19 pandemic and aid the affected population and connecting people.
Primary Actors	i. Donor ii. Relief Aid Organization iii. Dispatch Unit iv. Admin
Pre-Condition	1. The domain of execution is web-based therefore the system must be connected to the internet. 2. The general public must have access to the system 3. The Dispatch Unit must have access to the system
Post-Condition	i. The users should be able to log out. ii. The system must retain all the information that has been inserted from previous sessions. iii. The session must end when the users' logout of the system.
Main Flow	**General Public** i. The general public should be able to register themselves into the system. ii. The members of the general public should be able to login into the system as donors. iii. The members of the general public can make donations of their choice (food, cash or relief items)

	iv. The general public should be able to view newsletters
	v. The general public should be able to logout of the system
	Relief Aid Organizations
	vi. Humanitarian Organization (HO) should be able to be registered into the system
	vii. The HO should be able to login to the system
	viii. The HO should be able to CRUD newsletters
	ix. The HO should be able to logout of the system
	Dispatch Units
	x. The Dispatch Units should be able to be registered into the system
	xi. The Dispatch Units should be able to login to the system
	xii. The Dispatch Units should be able to Update Donations Made
	xiii. The Dispatch Units should be able to view the Donations Database
	xiv. The Dispatch Units should be able to logout of the system
Alternate Courses	i. Incorrect login credentials for any of the users, the system should validate the login and provide an error message

	showing that the username or password is correct
	ii. Any of the users forget their password, The users will be able to click a "forget password" link and will be prompted to input their email and they will receive a link to reset their password.
	iii. The Passwords can be reset accordingly

4.3 Sequence Diagram

The below sequence diagrams illustrate the objects involved during the development of the system and the sequence of messages exchanged between them so as to fulfill the specified requirements. They illustrate such in the three main processes; the complete overview, donor's view, humanitarian organization view and the dispatch unit view.
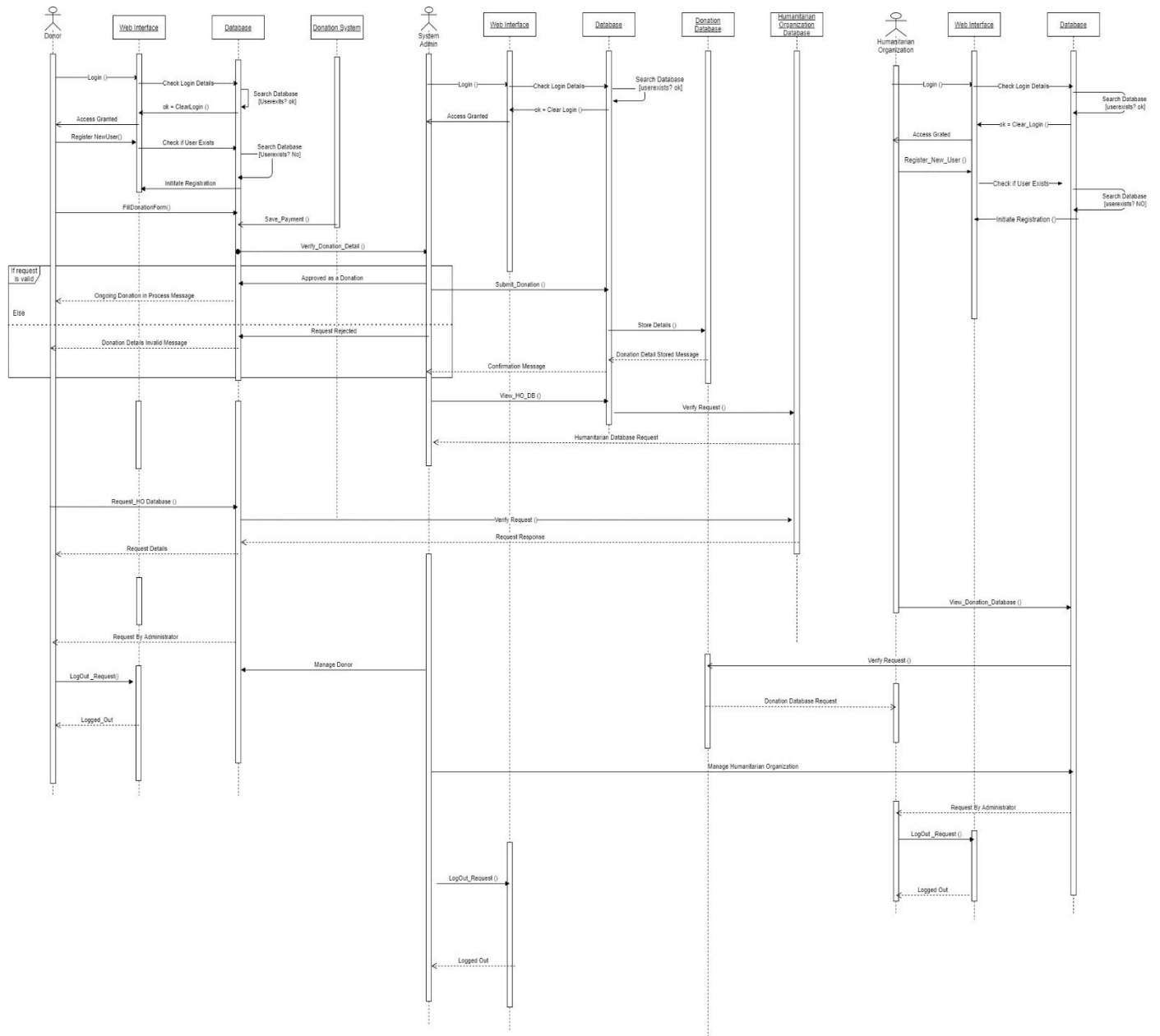
Figure 4.2: Complete Sequence Diagram

43
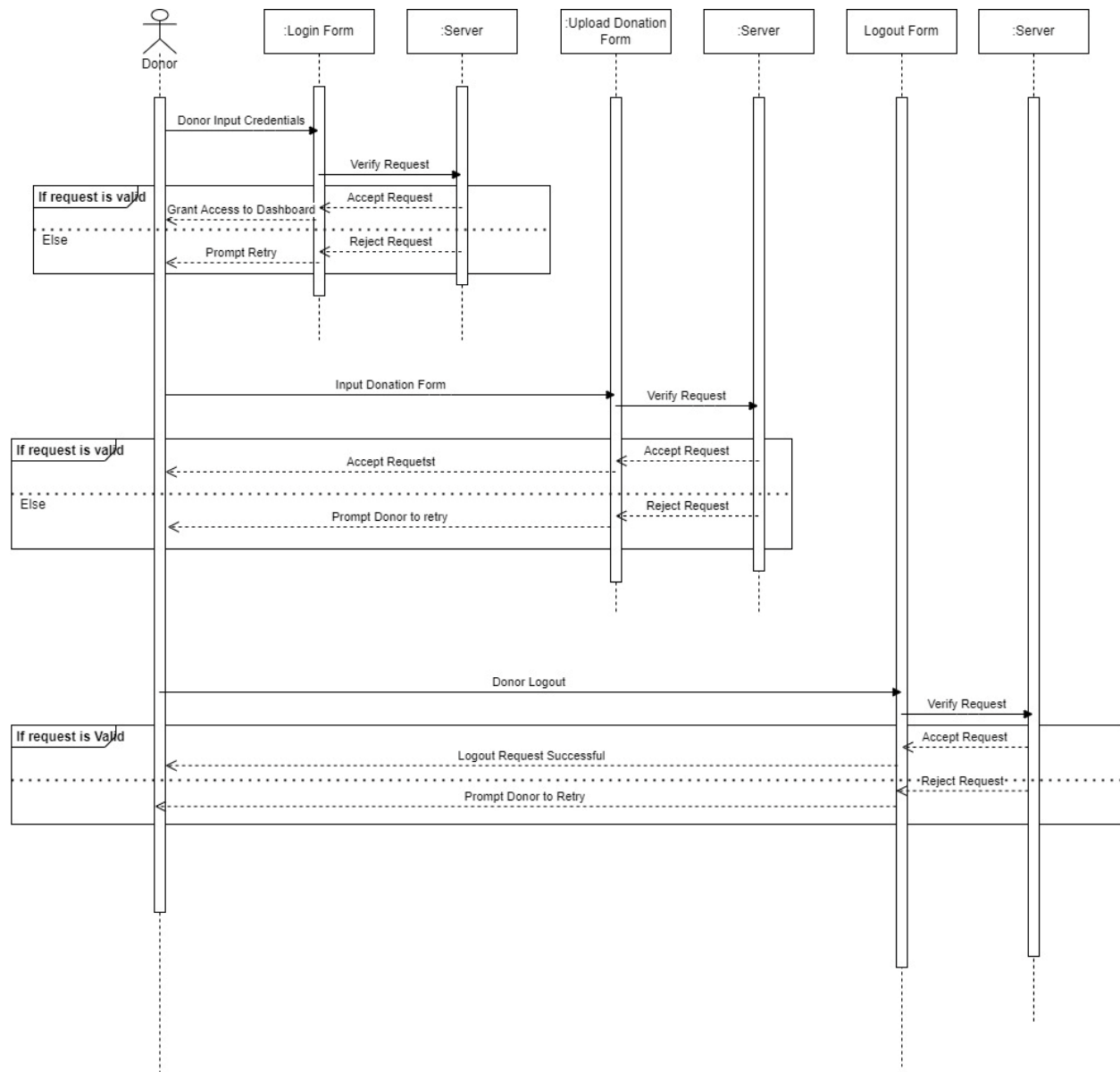
Figure 4.3: Donor Sequence Diagram
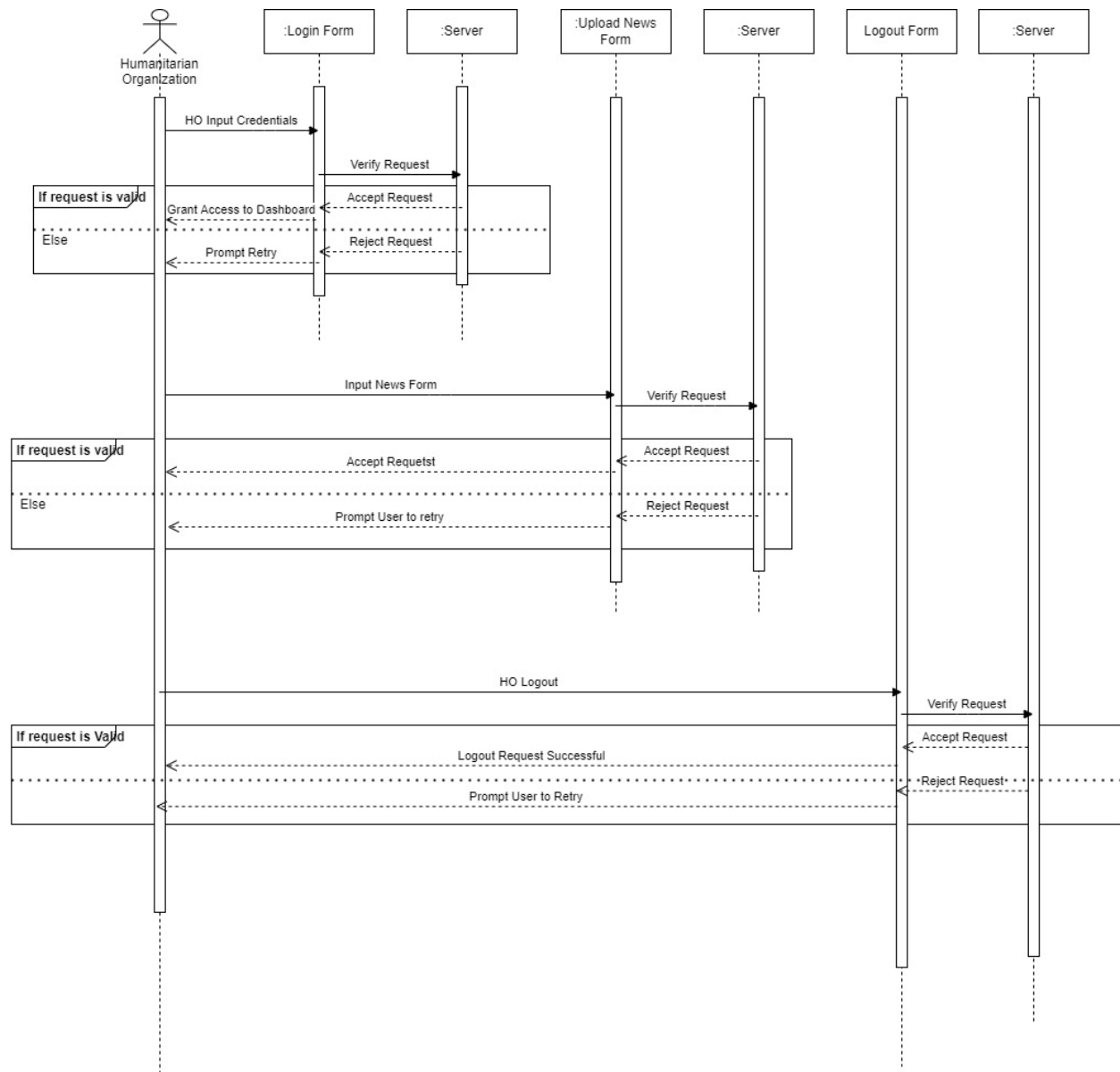
Figure 4.4: Humanitarian Organization Sequence Diagram
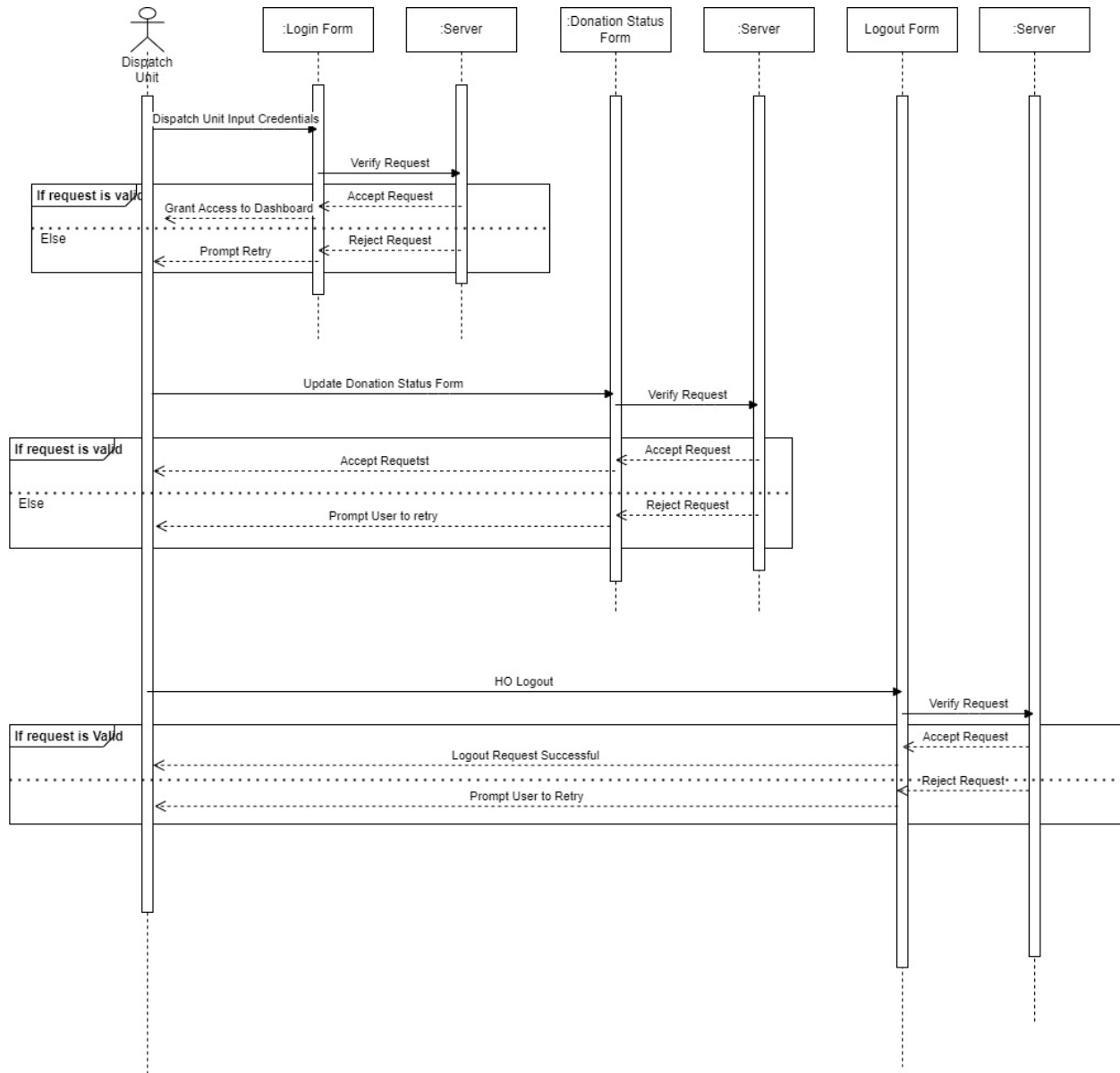
Figure 4.5: Dispatch Unit Sequence Diagram

4.3 Class Diagram

In software engineering, a class diagram in the Unified Modeling Language is a type of static structure diagram that describes the structure of a system by showing the system's classes, their attributes, operations, and the relationships among objects.

The class diagram below depicts the classes of controllers and models of the web-based application system accessed by the admin and representatives of various organizations and dispatch units including their interactions.
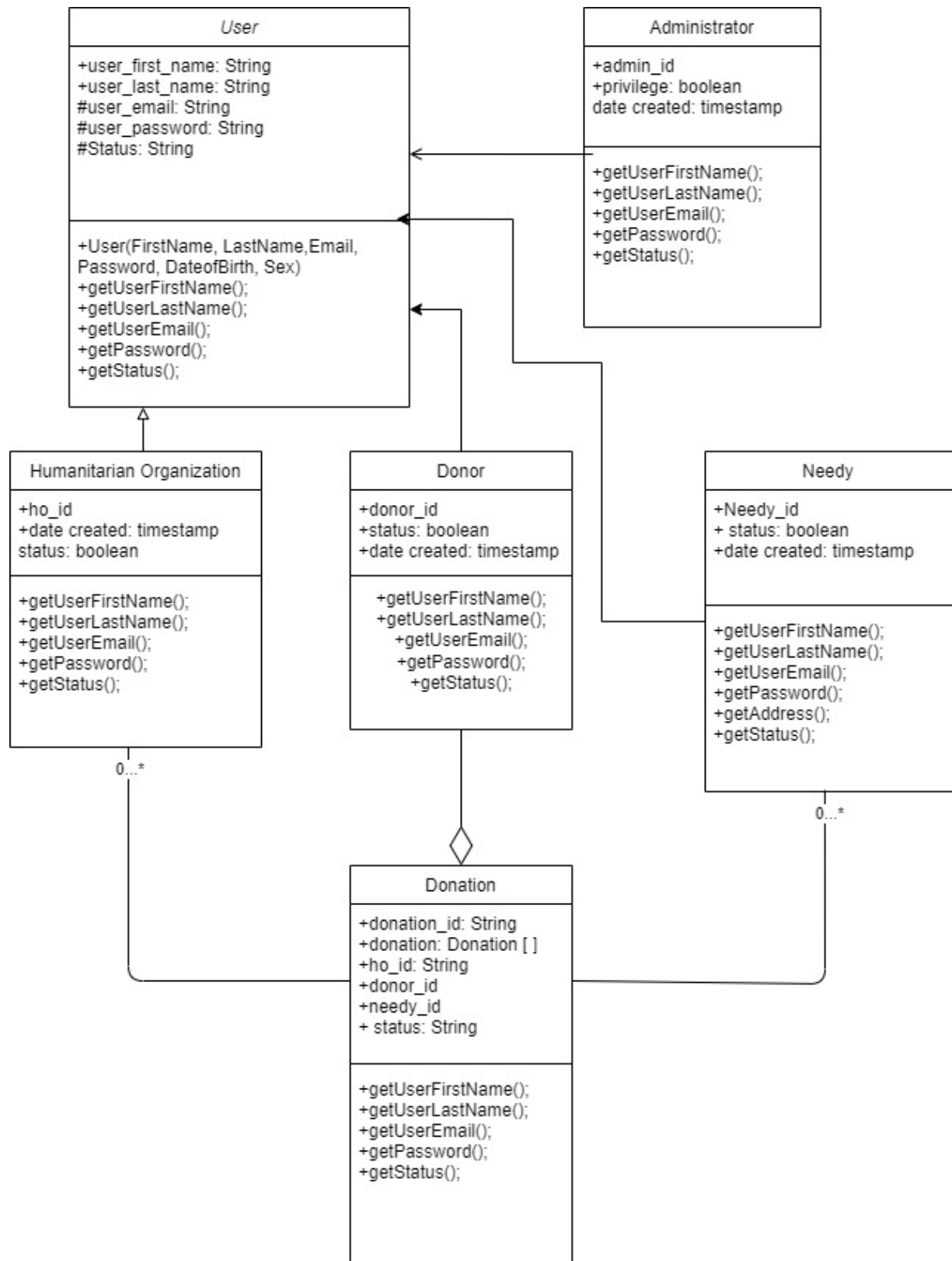
Figure 4.6: Class Diagram

4.4 ERD Diagram

An entity relationship diagram (ERD), also known as an entity relationship model, is a graphical representation that depicts relationships among people, objects, places, concepts or events within an information technology (IT) system
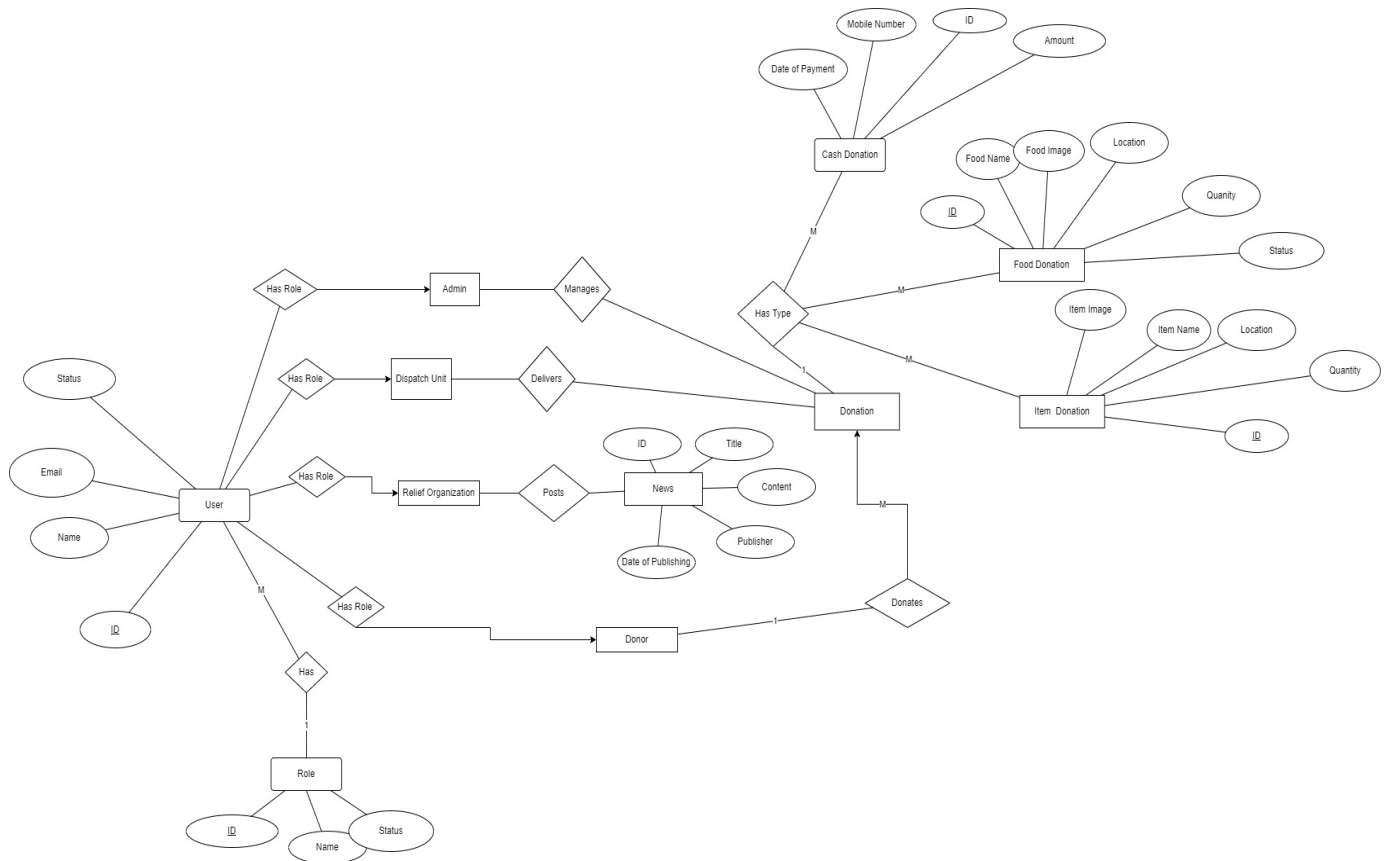
Figure 4.7: ERD

4.5 Database Schema Diagram

A database schema is the skeleton structure that represents the logical view of the entire database. It defines how the data is organized and how the relations among them are associated. It formulates all the constraints that are to be applied on the data.
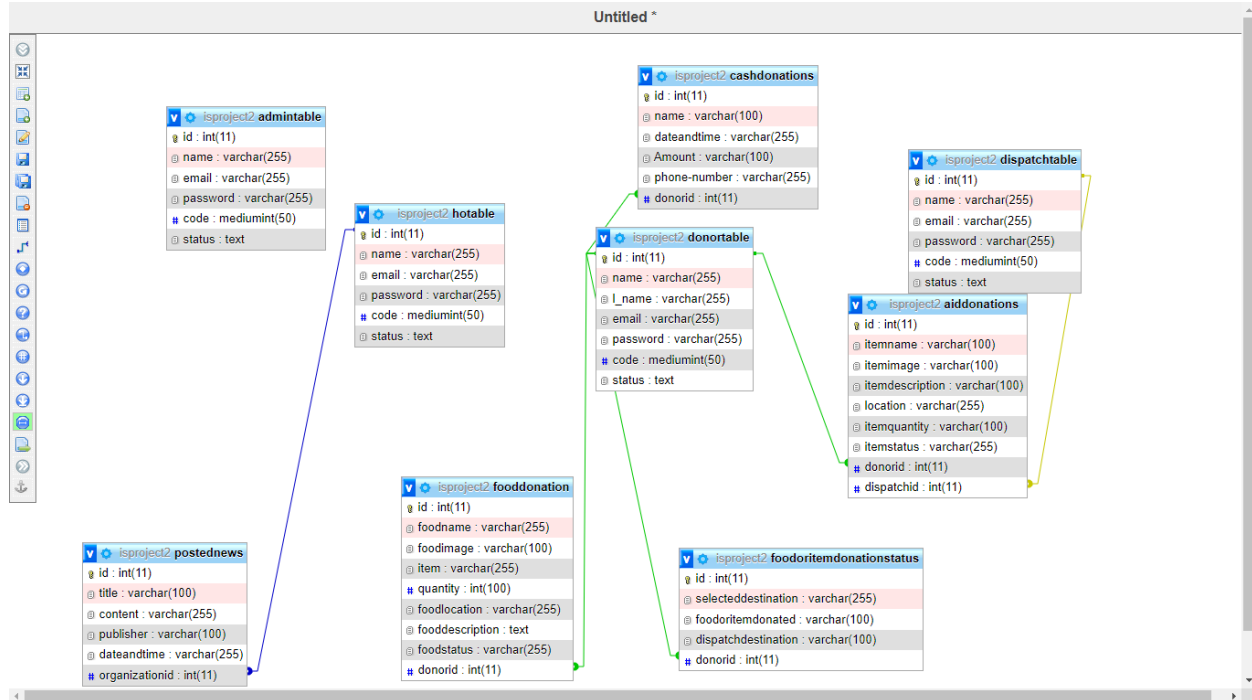
Figure 4.8: Schema

Chapter 5: System implementation and testing

5.1 Introduction

This chapter provides insight on the development of the system. The chapter will cover the implementation and testing of the system on a local environment. Subsequently, it will provide an in-depth view of the modules developed and the fulfilment of the functional and non-functional requirements.

5.2 System Implementation

The system is built using the methodologies described in the previous chapters. PHP, HTML, CSS and JavaScript has been utilized to develop both the frontend and the backend of the system. It is a web-based platform and thus will be easy to come up with the system using the above-mentioned languages. The different types of design diagrams make it easy to identify how the system will work and also makes it easy identify the process flow of information throughout the system thus proving very helpful to the developer. Using the proposed system development methodology, it proved easy and more applicable to develop the system by prototyping and developing each module at a time. On completion of the different module development, they were later linked to come up with the system as a whole. In the process of linking the different modules was important to maintain the logic of the system in that it was of essence to make sure that modules link together in a manner that is understandable and consistent. This means that on the click of a button the button should redirect to the next stated page and not a page that previously came before it.

5.2.1 Navigation Implementation

To begin with, there was the development of the CRUD functionality in that there was the division of the different aspects of CRUD that was to be done by the different actors of the system. This segment also reviews the flow of the system.
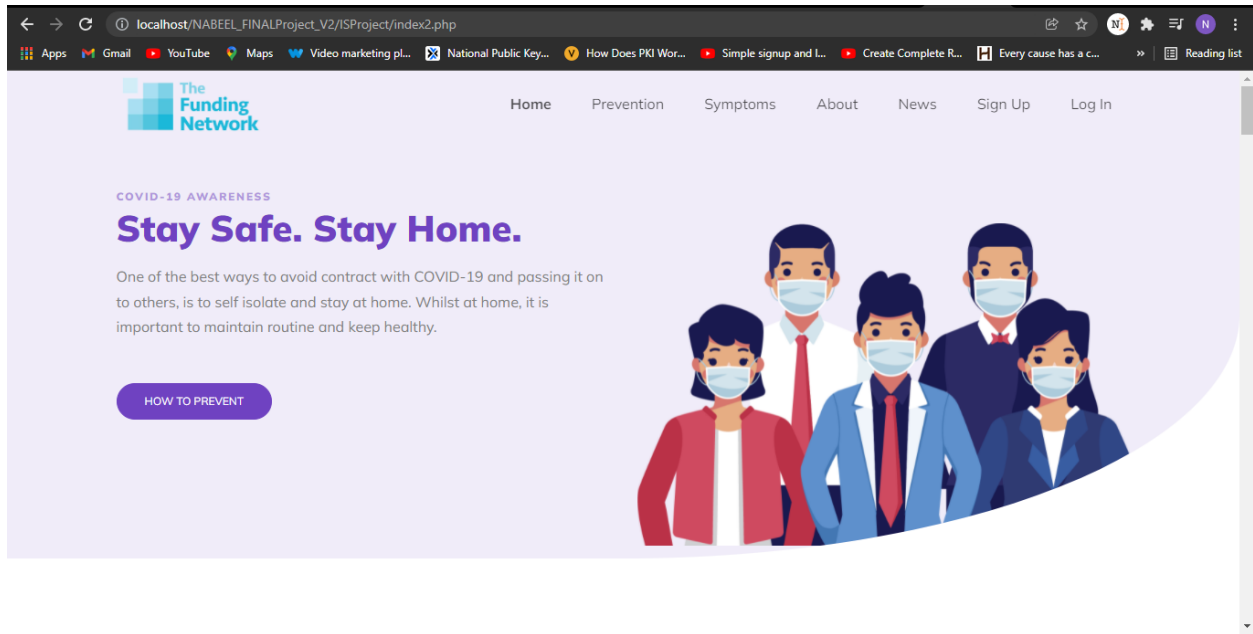
Figure 5.1: Landing Home Page

General public users can navigate this platform and gain access to live news feed and information on how to protect themselves from the Covid-19 Pandemic.

5.2.1.1 Administrator Navigation

The administrator is the super user of the system. The administrator manages all the other users of the system and is able to view reports. However usually administrators can not sign up, for first administrator it is available to sign up, however after it should be then removed.
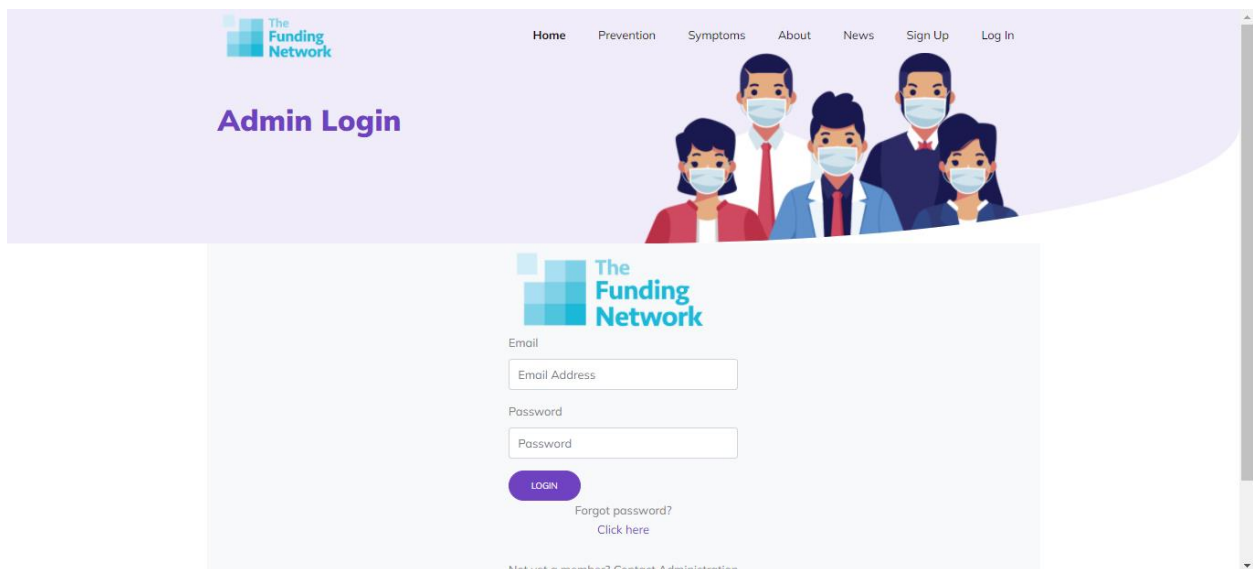
Figure 5.26: Admin Login Page

Once the administrator is logged in, they have access to their dashboard from which they can navigate through the system
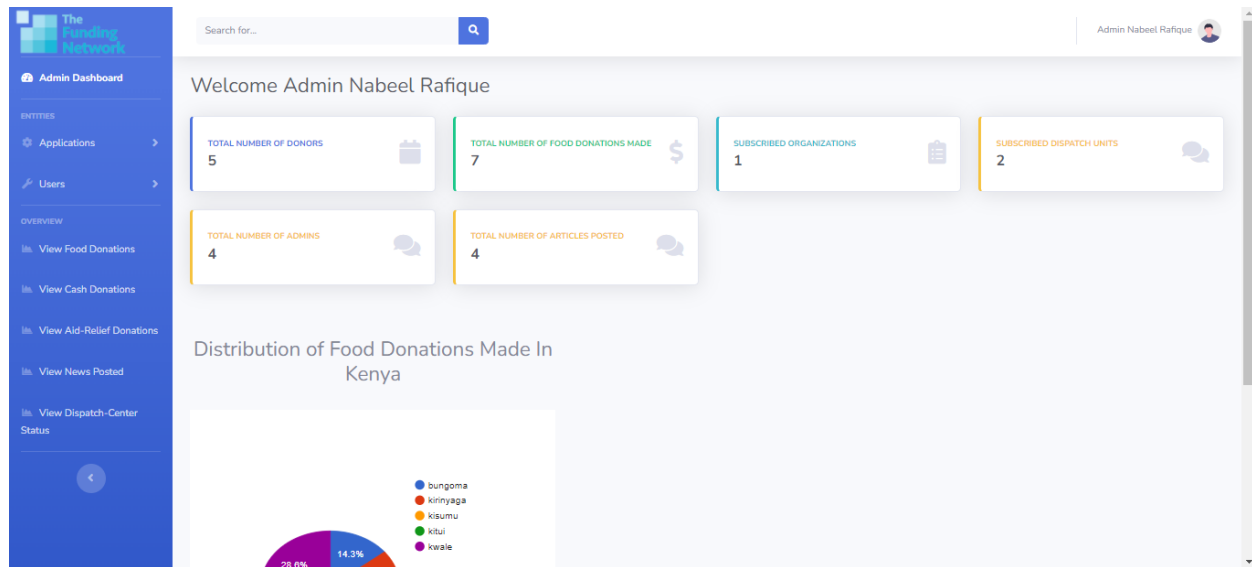
Figure 5.3: Admin Panel

The admin has the following capabilities,

    i.   Add new admin

   ii.   View all types of donations and acquire statistics as above (Google Charts)

  iii.   Print reports on donations

  iv.   View all articles posted by subscribed organizations.

Below are a few sample screenshots of the system interaction with the admin
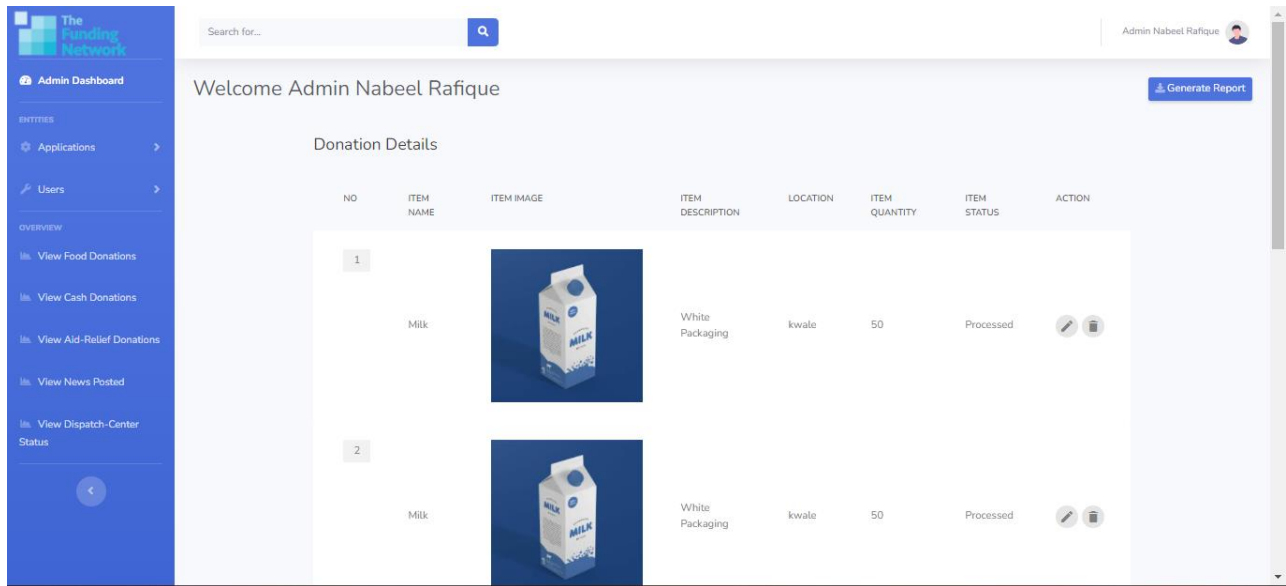
Figure 5.4: Admin Viewing Food donations

Figure 5.5: Sample Report Generated by the system

Figure 5.6: Administering New Administrators

5.2.1.2 General public and Donor Navigation

At the home page, they have the entire freedom to navigate around accessing information about Covid-19 as well as articles posted by Humanitarian Organizations.
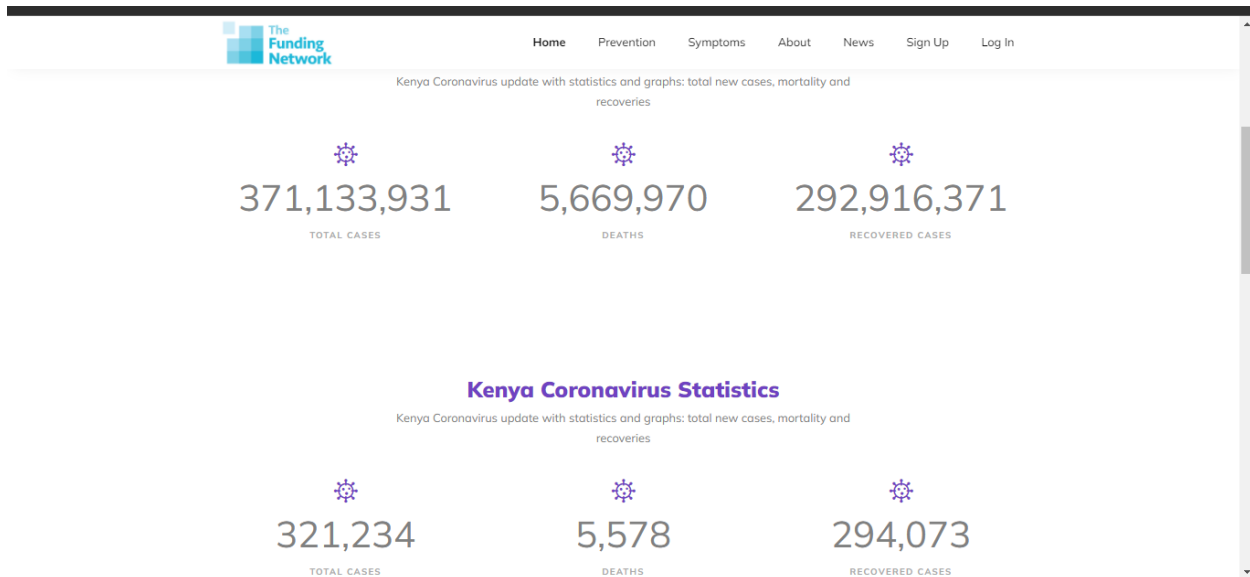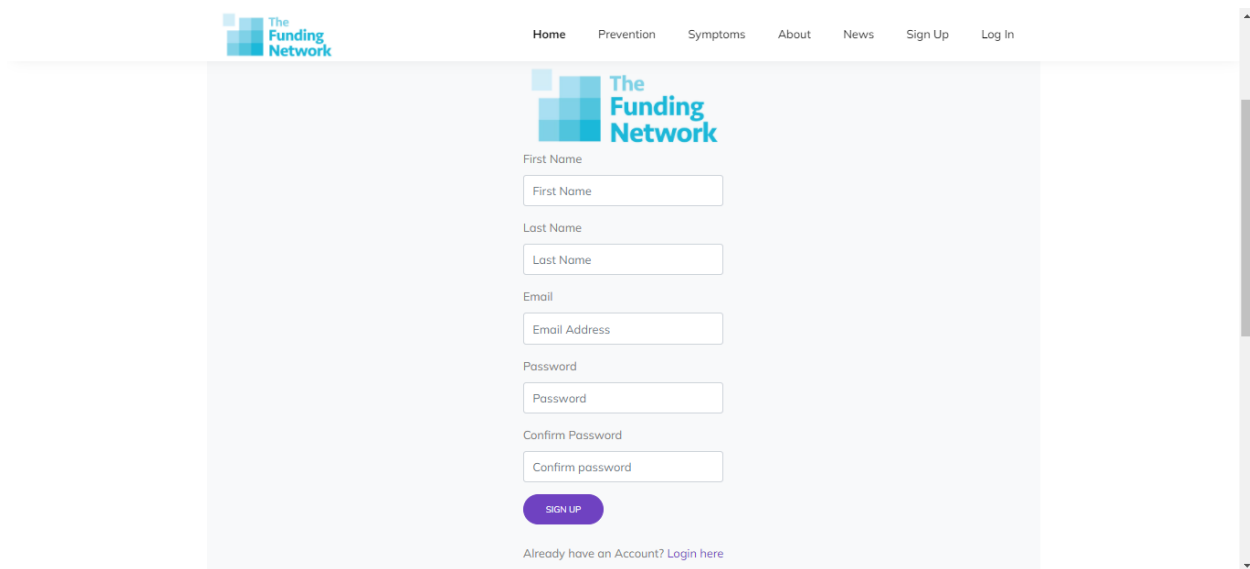

Figure 5.7: Web Scraped data from https://www.worldometers.info/coronavirus/

In this page, users can get live feed on the number of Covid-19 cases as well as access News articles posted by subscribed organizations.
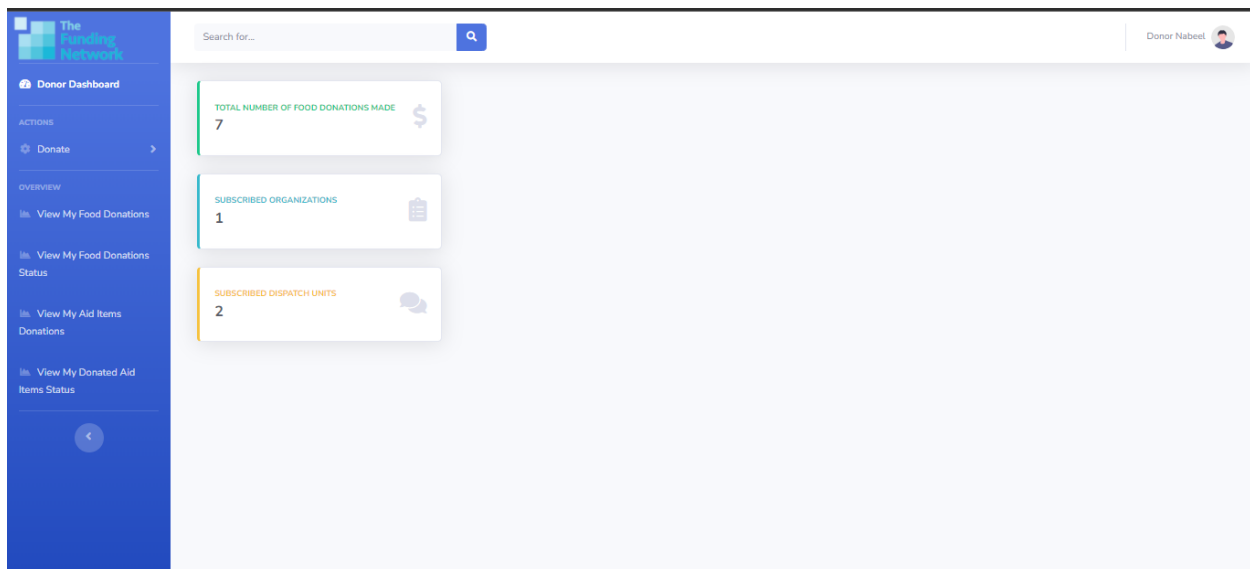
Figure 5.8: Sign up Portal for Donors

The general public is open to becomes donors and so can sign up to the system freely and donate.

Upon filling in their details, the system will send a verification code to their respective emails for confirmation and then users will be able to login.

Figure 5.9: Donor's Panel
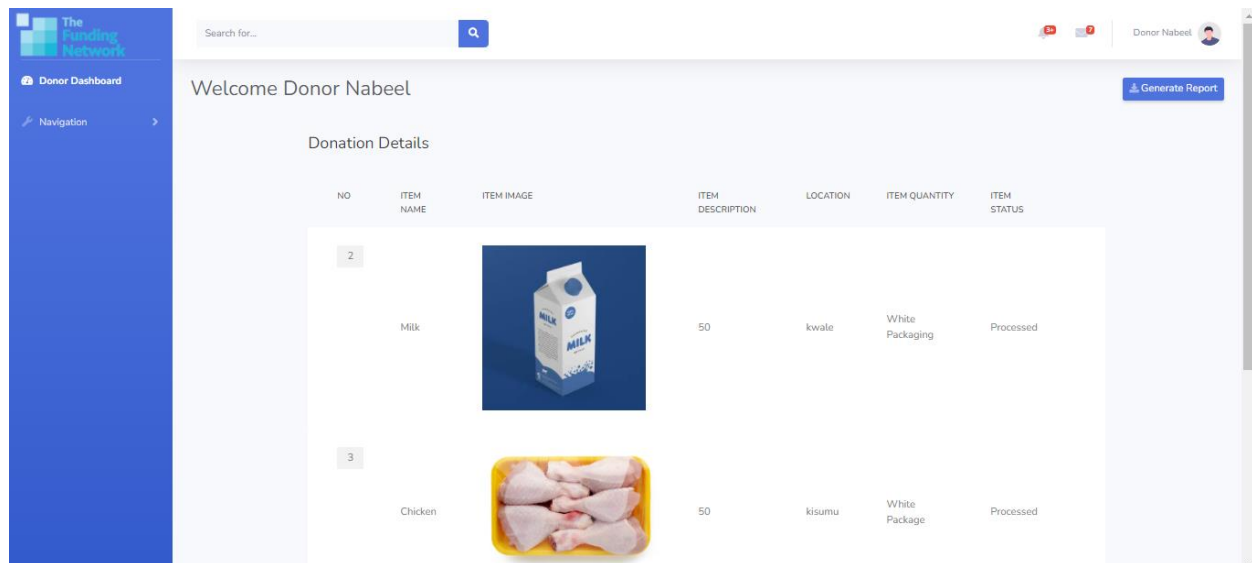
Figure 5.10: Donors Panel to View their Donations and Status
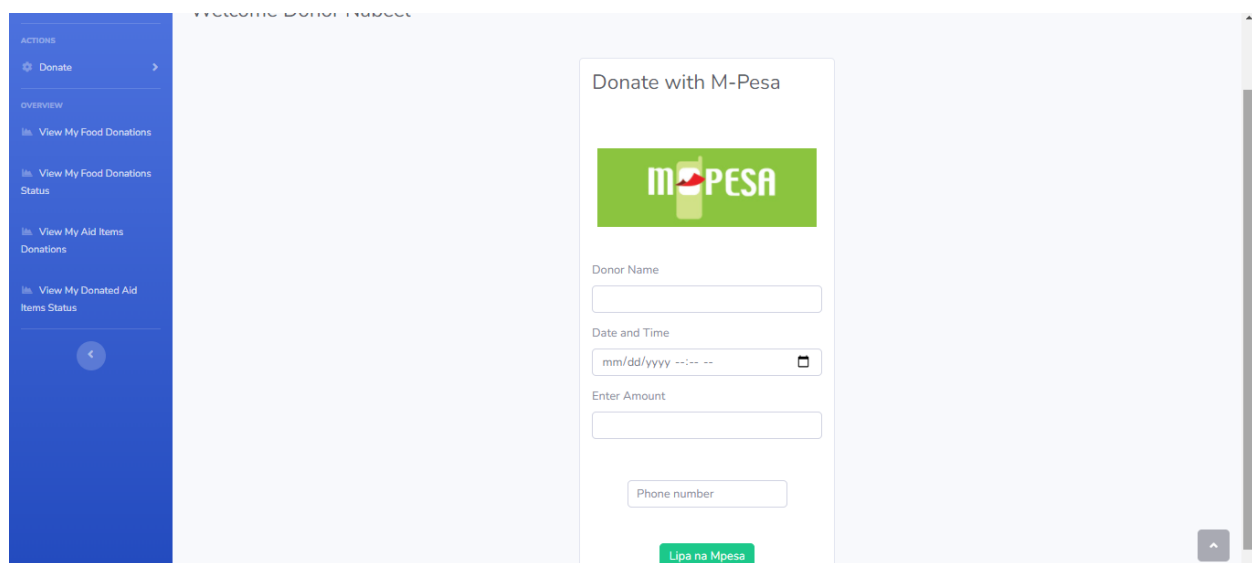
Figure 5.11: Donors Cash Donation Portal via MPESA

The system can accept cash donations via Mpesa, User can simply enter their phone numbers details and a prompt will pop up on their mobile devices to complete the payment making the process effective. The system was integrated with the API of TinyPesa which aided the process of accepting M-Pesa.

5.2.1.3 Dispatch Units Navigation
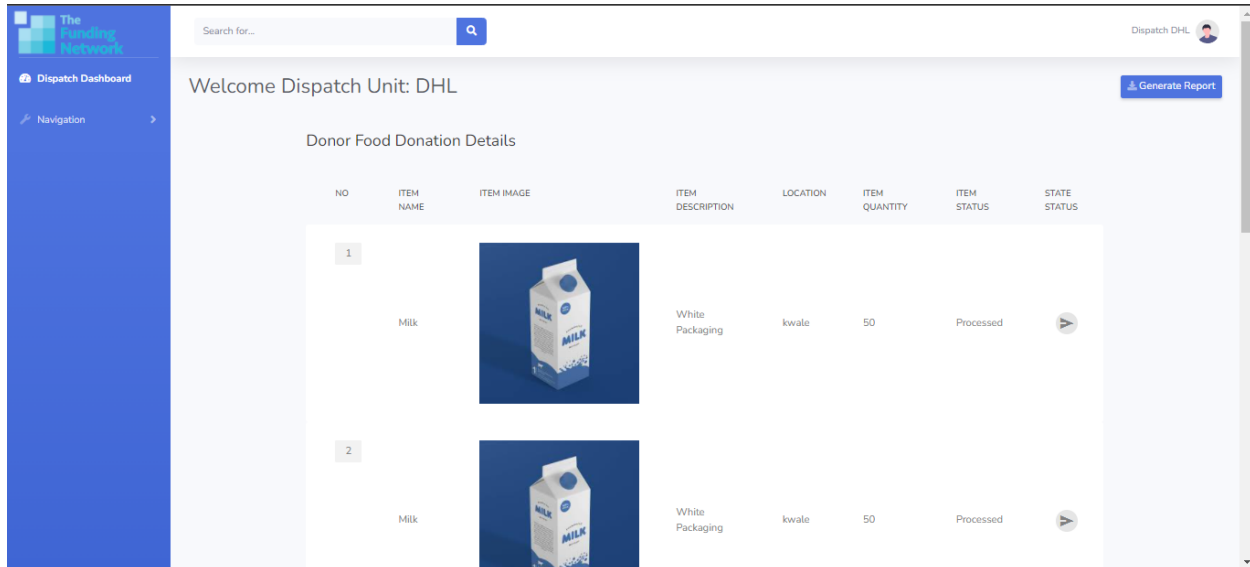
Dispatch Units can freely subscribe to the system and access the status of donations and be assigned to pick and deliver food and Item donations.

Figure 5.12: Dispatch Unit Panel to view and Update details of Donations

Figure 5.13: Dispatch Panel on Delivering donations and Updating

5.2.1.4 Humanitarian Organizations Navigation

Relief Aid organizations are able to sign up to the system freely and post relevant and authorized articles and news on the system as shown below.

Figure 5.14: Posting News Form

Organizations are also able to view their news posted and print them accordingly.

Figure 5.15: Viewing News Articles

5.3 System Testing

This section aims to investigate and report on the system's ability to fulfil the functional and non-functional requirements set in development phase of the system.

5.3.1 Test Cases

Test ID	Related requirement	Inspection check	Pre-condition	Test data	Priority
T1	FRQ1	Does the system allow the administrator to login to the system	The system must have already been installed and served and seeded.	Email: efunding@gmail.com Password: 123456	High
T2	FRQ1	Does the system reject the administrator if they provide the wrong details?	The system must have already been installed and served and seeded.	Email: efunding @gmail.com Password: test	High
T3	FRQ4	Does the system allow the administrator to admit a new administrator?	The administrator must be logged in.	First name: jo last name: test email: efunding @gmail.com	High
T4	FRQ 4	Does the system allow the administrator to create the Donation Report?	The administrator must be logged in.	First name: io last name: test email efunding @gmail.com	High
T5	FRQ4	Does the system allow the administrator to create News Analysis?	The administrator must be logged in.	First name: HO last name: test email: efunding @gmail.com	High
T6	FRQ4	Does the system allow the administrator to create Cash Donation Report?	The administrator must be logged in.	First name: jo last name: test email: efunding gmail.com	High
T7	FRQ4	Does the system allow the administrator to deactivate each user in the system?	The users must be in the system. The administrator must be logged in. The users must be active.	Delete button press.	Medium

T8	FRQ4	Does the system allow the administrator to activate each user in the system?	The users must be in the system. The administrator must be logged in. The users must be deactivated.	Activate button press.	Medium
T9	FRQ4	Does the system allow the administrator to view the charts?	The users must be in the system. The administrator must be logged in. There must be an donor in the system. There must be a Donation that has been made.	The administrator must navigate to the charts and view them.	Medium
T10	FRQ1	Does the system allow the donor to login to the system?	The donor must sign up. the donor must be active.	Email: efunding @gmail.com password 9832	High
T11	FRQ1	Does the system allow the Relief Aid Organization to login to the system?	The Organization must sign up.	Email: efunding @gmail.com password 3628	High
T12	FRQ1	Does the system allow the Dispatch Unit to login to the system?	The Dispatch Unit must Sign up The Dispatch Unit must be active.	Email: efunding @gmail.com password 9463	High

T13	FRQ4	Does the system allow the donor to Donate?	The user must have logged into the system.	Food name: Bread Location: Mombasa Report: this is a test donation Image name: picture of a Bread File: test.jpg	High

Test ID	NFRQ		Expected behavior		
T14	NFRQ 3	Does the system show all the locations of the donations have been made?	The administrator must be logged in. The donation must be delivered.	Food name: Bread Location: Mombasa Report: this is a test donation Image name: picture of a Bread File: test.jpg	Low
T15	NFRQ 4	Does the system allow the Dispatch Unit to login with an incorrect password?	The Dispatch Unit must have registered themselves into the system already.	Email: nabe.jusab@strathmore.edu Password: Wrongpassword	HIGH

Table 5.2 Test Cases

5.3.2 Test Results

Test ID	Expected Result	Actual Result	Status	Remark
T1	Administrator is directed to the administrator dashboard.	The administrator is redirected to their dashboard	PASS	The administrator was able to login with the correct credentials
T2	The page reloads the page	The page reloaded and a prompt was loaded showing that the credentials are wrong	PASS	The authentication provides a through authentication scaffolding with inbuilt messages.
T3	A Donation Station is added into the database.	An Donation station is added into the system database.	PASS	The system allows for the create functionality to function seamlessly.
T4	The Donor is added into the database.	A Donor details is added into the system database	PASS	The system allows for the create functionality to function seamlessly.
T5	A Dispatch Unit is added into the database.	A Dispatch Unit is added into the system database	PASS	The system allows for the create functionality to function seamlessly.

T6	A Relief Organization is added into the database.	A Relief Organization is added into the system database	PASS	The system allows for the create functionality to function seamlessly.
T7	The user is unable to login to the system.	The user was unable to login to the system.	PASS	The status changed function can be improved by changing the status from a Boolean to a string.
T8	A previously deactivated user is able to login to the system.	The user is able to login to the system. The status is changed from	PASS	The deactivation function works but should notify the user that they are able to login to the system again.
T9	The location chart is displayed.	The location chart was displayed	PASS	The charts were displayed as expected.
T10	The administrator is able to view their dashboard.	The donor was able to access their dashboard	PASS	The login functionality works as expected.
T11	The Dispatch Unit is able to view their dashboard.	The Dispatch Unit was able to access their dashboard.	PASS	The login functionality works as expected.
T12	The Humanitarian Organization is able to view their dashboard.	The The Organization is able to view their dashboard.	PASS	The login functionality works as expected.
T13	the Donor is able to view their dashboard.	The Donor is able to view their dashboard	PASS	The login functionality works as expected.
T14	The user is unable to login.	The user was unable to login to the system.	PASS	The system was able to verify that the credentials were wrong hence blocking the user from logging into the system.
T15	The user was unable to login.	The user was able to retrieve the password to the system.	PASS	The system is equipped with a forgot password functionality which is a key feature in the system users.

Table 5.1 Test Results

Chapter 6: Conclusions, Recommendations and Future works

6.1 Conclusions

The system was designed with an aim to store data in relation to the Covid 19 Pandemic. The storage of data and its visual components provided by the charts is appealing to the eye and provides crucial insight especially in terms of the rate of effect per county. The system is also user friendly and is easy to implement. The system has not been tested in a live environment but is deemed to work without any issues as it is highly flexible. The reusability of code allows for greater flexibility with emerging technologies. As the development went on, the system has been deemed to be feasible in the general relief aid department.

6.2 Recommendations for Future Work

The system performs well but this can be improved by extending the storage to a dynamic non-SQL database.

The reports generated by the system are good but can be improved by providing data with specific dates between the donations status changing as it moves from one user to another. The system would be improved greatly with a report showing how the progression of each donation is made, also the ability of filtering the reports would be recommended.

A notification function can be added onto the system to allow its users to see notifications relevant to them when they access the system. The notifications can also be incorporated to USSD form for urgent reminders and to increase the efficiency of the system.

The system can also be improved by adding a dynamic manner of adding news articles instead of having a fixed number of slots allowable. This would be essential in reducing the amount of space the system would occupy in terms of the size of data being stored.

To make the system more secure there could be the use of sessions that times out a user after a long inactivity period and prompts them to login again and get back to their task that they had earlier started. This will greatly facilitate the authentication process for the system and avoid future attacks by hackers into the system

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Appendix A: Time Schedule

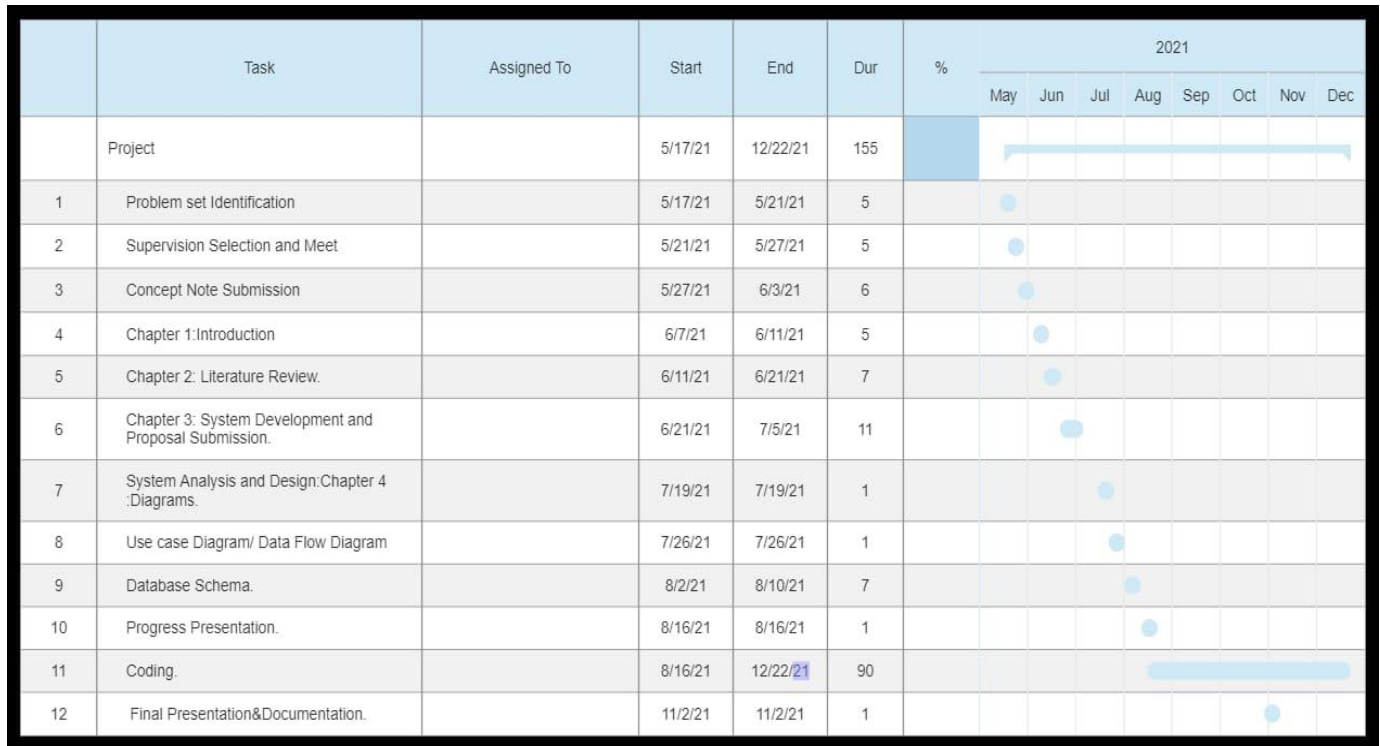|	Task	Assigned To	Start	End	Dur	%	2021							
							May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	Project		5/17/21	12/22/21	155									
1	Problem set Identification		5/17/21	5/21/21	5									
2	Supervision Selection and Meet		5/21/21	5/27/21	5									
3	Concept Note Submission		5/27/21	6/3/21	6									
4	Chapter 1:Introduction		6/7/21	6/11/21	5									
5	Chapter 2: Literature Review.		6/11/21	6/21/21	7									
6	Chapter 3: System Development and Proposal Submission.		6/21/21	7/5/21	11									
7	System Analysis and Design:Chapter 4 :Diagrams.		7/19/21	7/19/21	1									
8	Use case Diagram/ Data Flow Diagram		7/26/21	7/26/21	1									
9	Database Schema.		8/2/21	8/10/21	7									
10	Progress Presentation.		8/16/21	8/16/21	1									
11	Coding.		8/16/21	12/22/21	90									
12	Final Presentation&Documentation.		11/2/21	11/2/21	1									

Figure 7: IS Project Gantt Chart

Installation Procedure

This section contains a systematic installation manual to get the system running on any local windows 10 machine.

i. The system is available on the Bitbucket repository. To download the system, one must follow https://github.com/Nabeel-Rafique/ISProject2/tree/master then copy the system URL.
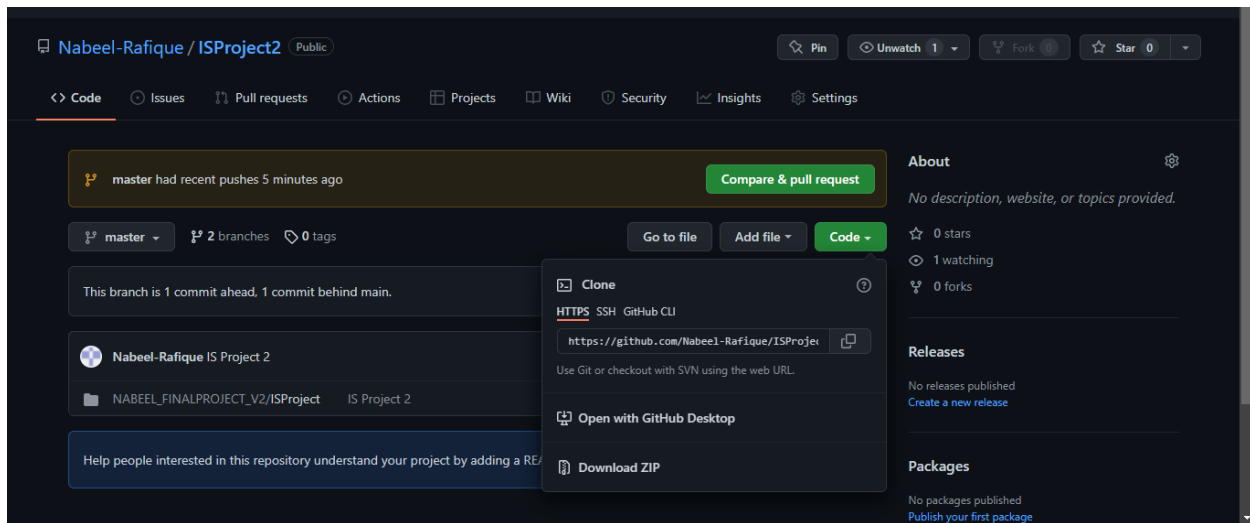
Figure 8: Github Repository clone Page

ii.   Open the directory you would like the system to be installed into. Open the terminal of your choice, and paste the clone statement as shown below. The system will be downloaded into this directory. Be sure to clone this git repository on your htdocs folder under XAMPP.


Figure 9: Git Clone Terminal

System Manual

This section will cover the final setup and launch of the system.

Pre-setup

i.   Go to https://www.apachefriends.org/index.html to download the server and select the installer for your specific Windows Operating system. Download the server to the local computer and save it to the folder of your choice.

ii.   Open the downloaded installer and this will open the XAMPP setup window, you may have to click OK on a warning if you have a User Account Control activated on your computer.

iii.   It is recommended to leave all the settings as default and click next
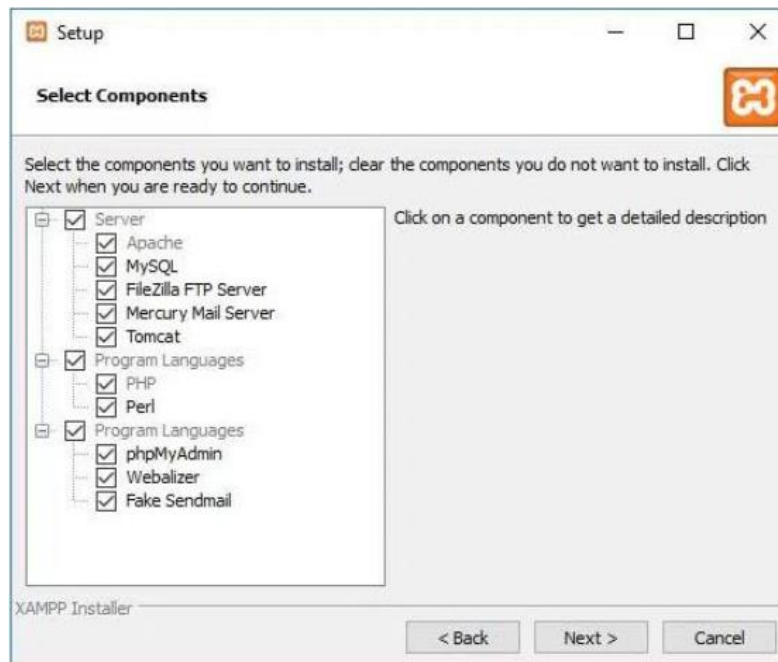
Figure 10: XAMPP Panel

    iv.   Use the default folder location to install the software and click next

    v.   Once the Xampp setup wizard is finished click the Finish button.

Launching the system

    i.   Once server is installed open the executable file.

    ii.   Select your preferred language

    iii.   On the XAMPP control panel, click the start button for Apache.

    iv.   On the XAMPP control panel, click the start button for MySQL

    v.   On any preferred browser, paste the following link http://localhost/NABEEL_FINALProject_V2/ISProject/index2.php.

    vi.   To Access the Database panel, paste the following link on your bowser provided your Xampp is running with both Apache and MySQL running. http://localhost/phpmyadmin/index.php.

    vii.   Import the isproject2.sql file in this panel to import the database tables in the phpMyAdmin Panel.