ACCOMODATION ALLOCATION SYSTEM FOR FLOOD VICTIMS USING WEB TECHNOLOGY

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CERTIFICATION

This is to verify that Ekpe-Nasamu Ossy Wilfred, an undergraduate student in the department of Computer Science, Faculty of Physical Science, University of Benin, Edo State, with matriculation number PSC1709109 did this project in partial fulfillment of the requirements for the award of Bachelor of Science (B.Sc.) in Computer Science, University of Benin, under my supervision.

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Mr. P. Imienfoh Date

(Project Supervisor)

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Prof. Mrs. A. Egwali Date

(Head of Department)

DEDICATION

I dedicate this project work to God Almighty. For His faithfulness and unfeigned love towards me. I also dedicate this work to my family for thier unending support all through my academic career in this institution.

ACKNOWLEDGEMENT

My sincere gratitude goes to God Almighty, for granting me the grace and mental prowess to complete this project. This project completes another milestone in my academic career. I sincerely appreciate the Head of Department, Computer Science, Prof. (Mrs.) A. Egwali. It is pertinent at this juncture to appreciate the efforts of my project supervisor, Mr P. Imienfoh, for his support and guidance throughout the course of this project.

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CHAPTER ONE

1.0 Introduction

Allocation systems are structured methods used to distribute resources effectively based on specific criteria. Examples include hotel and airline booking systems, the 2017 Secondary School Places Allocation (SSPA) used in Hong Kong to assign students to senior secondary schools, and the Seasonal Agricultural Water Allocation System (SAWAS), introduced by Science Direct Agricultural Systems in 2016, for agricultural planning. These systems help ensure optimal and efficient use of limited resources.

1.1 Background

Disasters are generally classified into two types: natural and man-made. Man-made disasters, such as terrorist attacks, are unpredictable and challenging to prevent. Natural disasters—including earthquakes, floods, hurricanes, wildfires, and volcanic eruptions—can sometimes be forecasted with limited accuracy, despite technological advances in meteorology. These events can result in serious consequences, such as the spread of disease, food shortages, injuries, homelessness, or even fatalities. For example, data from the NOAA World Data Center (2021) and Seach (2020) highlight the human toll of earthquakes and volcanic eruptions.

This study focuses specifically on flood evacuation. A historical example is the Johnstown Flood of May 31, 1889, in Pennsylvania, caused by the failure of the South Fork Dam, which led to over 2,200 deaths (Johnstown Pennsylvania Information Source Online, 2017). Similarly, the Midwest Flood of 1993 affected several U.S. states, resulting in $18 billion in damages and 52 deaths (Zimmerman, 2019; Changnon, 2018). Between 1959 and 1991, floods accounted for 3,984 deaths across the U.S. and Puerto Rico, averaging 119 deaths annually (Dittamann, 1994).

In Nigeria, flooding has also caused severe damage, displacing approximately 1.2 million people and resulting in about 800 deaths. These tragedies underscore the importance of disaster preparedness and response. Disaster management refers to a coordinated set of activities aimed at managing disaster risks and supporting affected populations before, during, and after such events (Disaster Management Center, 2017). Its goals include minimizing casualties, property loss, and recovery time.

This paper focuses on flood evacuation planning before a disaster occurs. Key terms include:

- Inundation area – Regions that become submerged during flooding (NOAA, 2004).
- Buffer zone – An area extending 500 feet beyond the inundation zone.
- Emergency Planning Zone (EPZ) – Comprises both the inundation and buffer zones; residents here must evacuate before roads become impassable.

A major task in evacuation planning is identifying suitable shelters for evacuees outside the EPZ. According to Sherali et al. (1991), the location of shelters significantly affects evacuation effectiveness.

This project proposes a location-allocation model for flood evacuation, which factors in shelter capacity constraints. Unlike traditional models, this one uses bi-level programming framed as a Stackelberg game between two players:

- Planning Authority – Selects shelter locations and capacities to minimize overall evacuation time.

- Evacuees – Choose their shelters and routes based on the given shelter locations and capacities.

1.3 Problem Statement

The current room allocation system for housing flood victims is inefficient—it relies heavily on manual processes, which are time-consuming, labor-intensive, and vulnerable to human errors and bias. This inefficiency hampers accurate matching between applicants and suitable accommodations. To resolve this, a web-based room allocation system is proposed to streamline the process and ensure fair and efficient matching of applicant profiles with room features, amenities, and payment options (either free or paid).

1.4 Aim and Objectives

Aim:

To develop a web-based system for efficiently allocating accommodation to flood victims.

Objectives:

- Minimize time and labor in the allocation process.
- Reduce errors and prevent manipulation during room assignments.
- Ensure accurate matching between applicants' profiles and available room features and amenities.

1.5 Scope of the study

The scope of this project was involved developing a standalone system that matches the applicants profile with allocation of accommodation and amenities in the storage facilities. The project allows consultations from different residents inside and outside storage facility. Internally, it helps to generate and allocate a room feature that matches with applicants profile at the storage facility.

1.6 Significance of Study

This system reduces time required for allocation of accommodation for flood victims by improving information processing speeds when computing points and money paid based on an applicant's profile or given free of charge. The system provides Knowledge to community in that it reduces human error during the allocation process since there is minimal mental involvement to come up with a profile for each applicant. Maximum transparency and consistency is achieved due to a standard criterion which cannot be easily altered. In that case the system is so beneficial to the community at large.

CHAPTER TWO

LITERATURE REVIEW

In this chapter, the researcher would give a detailed description of various concepts of flood management system in Nigeria, web technology, ways of improving the system, and related works done by various researchers.

Flood Management in Nigeria

Land and water are two of the most vital elements of the Earth's surface and must be effectively managed to prevent degradation. These resources are invaluable to human civilization, with water being essential for sustaining life and supporting agricultural, domestic, and industrial activities. Rainfall is the primary source of water, contributing to soil moisture, groundwater, seawater, and surface water. Depending on the intensity and frequency of rainfall, regions may experience either droughts or floods. Thus, implementing a well-structured and effective water management policy is especially crucial during times of extreme weather events, particularly floods, which occur annually during Nigeria's rainy season.

Too much water can be just as harmful as too little. Flooding and inadequate drainage are common issues in water and land resource management. A flood occurs when water levels rise to the point of submerging land that is usually dry. Although various definitions exist, most recognize that flooding involves significant damage and water coverage.

As the famous Nigerian musician Fela Kuti once sang, "Water has no enemy," but for flood victims, the experience might prompt a different sentiment—perhaps "Rain, rain, go away."

In Nigeria, flood disasters are largely human-induced. They often result from people settling in flood-prone areas, either due to ignorance, economic necessity, or poor urban planning. Additionally, the lack of enforcement of environmental regulations at all levels of government contributes significantly to the problem.

Causes and Characteristics of Flooding in Nigeria

Flooding in Nigeria is predominantly influenced by climatic factors. Intense and prolonged rainfall, whether from thunderstorms, monsoons, or tropical cyclones, is the main cause. Human activities, such as blocking waterways with waste and debris, also worsen the situation, leading to excess surface water that the natural drainage system cannot handle.

Flood behavior can vary greatly across regions, even when the same weather patterns occur. This is due to differences in catchment areas—such as basin structure and river channels—that influence how much rainfall becomes surface runoff and how quickly it moves. Human activities like urbanization, agriculture, and mining often alter these characteristics in ways that increase flood risks. However, with proper management, these same factors can be adjusted to reduce flooding.

Recent Flood Disasters in Nigeria

A recent and severe flood affected more than 25 states across Nigeria—from the northern to southern regions—due to excessive rainfall combined with water released from Cameroon's dam.

This disaster led to the destruction of property worth billions of naira, disrupted business and economic activities, caused disease outbreaks in some resettlement camps, and resulted in loss of lives.

Prior to the disaster, experts had predicted such an event using meteorological data but offered limited actionable solutions. Most recommendations were not implemented, though a few states took preventive steps such as clearing debris and desilting drainage systems. While these efforts weren't perfect, they were better than doing nothing.

It's important to recognize that all natural systems—including rivers, oceans, lakes, and drainages—have capacity limits. As rainfall affects both land and water bodies, once those limits are exceeded, overflow into nearby communities becomes inevitable. In such cases, it's wiser to adapt to nature than to ignore its warnings.

Management Alternatives

Flood management in Nigeria should adopt short-, medium-, and long-term strategies. Effective flood control should focus on:

- Understanding both natural and human-induced causes of flooding
- Predicting and forecasting flood events and their impact
- Gauging public perception of flood risks
- Educating communities about flood hazards
- Implementing appropriate response strategies, including mitigation and protective measures

Flood Prediction and Forecasting

Forecasting floods is a proactive approach to disaster management. It represents a key component of pre-flood planning. This process involves collecting data on water discharge and related variables—data that are often lacking in Nigeria. Therefore, it's essential to improve hydrological data collection, especially in tropical catchment areas.

Besides rainfall and river flow data, flood forecasting also requires information on:

- Water stage or depth
- Volume and rate of discharge
- Extent of land submerged
- Duration of flooding
- Seasonal patterns of flooding
- Historical frequency and severity of floods

Such information can be obtained through statistical analysis of historical flood data, enabling better planning and risk assessment.

ADJUSTMENT

Flood hazard adjustment refers to various strategies employed on flood-prone areas to reduce the risk of flooding. One key approach involves regulating land use, as outlined in the flood and erosion control provisions of NESREA laws. Essentially, adjustment measures are aimed at guiding human activities in a way that minimizes the negative impacts of flooding.

ABATEMENT

Flood abatement involves implementing land use changes or other preventive measures within the upstream areas of a river basin to reduce downstream flood risks. Such efforts include afforestation and other forms of watershed management that help regulate water flow and reduce surface runoff.

PROTECTION

Flood protection focuses on physical interventions to control water levels and prevent flooding. This includes constructing barriers and infrastructure along rivers or coastal areas to limit floodwater spread and reduce water depth in flood-prone zones. According to Ward (2019), four primary methods can be used to protect against river flooding, each with advantages and drawbacks. Careful evaluation is necessary to select the most appropriate method for a given area, as some may worsen flooding in upstream or downstream regions. These methods include:

- Building embankments and floodwalls to contain rising water.
- Enhancing river channels to improve their capacity (e.g., dredging and river training).
- Creating reservoirs and dams to temporarily store excess water.
- Constructing bypasses or diversion channels to redirect surplus water away from vulnerable areas.

WATER HARVESTING

Considering Nigeria's frequent flood disasters, it is ironic that many regions still struggle with water scarcity for domestic, industrial, and agricultural use. With proper planning, floodwaters could be harvested and repurposed. Rainwater harvesting stands out as an effective flood control and water conservation strategy.

Therefore, the federal government, alongside state and local governments, should urgently develop and implement a unified water policy. This policy should promote large-scale rainwater harvesting, potentially capturing over 30 billion liters of water annually for economic reuse while simultaneously mitigating flooding.

Additionally, property developers should be encouraged to incorporate rainwater collection systems in residential and commercial estates. Such micro-level initiatives could be adopted across states, contributing to water conservation, land preservation, flood prevention, and even supporting activities like fish farming.

Further, public-private partnerships could be formed to offer regular public awareness campaigns on flood control. Proper waste disposal also plays a vital role in flood mitigation. The government should ensure strict enforcement of waste management regulations by providing accessible disposal bins and, where possible, creating recycling centers for solid waste.

INTRODUCTION TO RESOURCE ALLOCATION

Green (2016) defines resource allocation as the process of distributing resources—especially financial resources—from central authorities to regional or local levels. It involves allocating limited resources among competing groups, institutions, ministries, or programs. When resources are scarce and demands exceed supply, allocation becomes a key concern.

According to Tauber (2015), resource allocation presents both economic and ethical challenges, tied to the concept of distributive justice. How resources are classified significantly influences economic behavior. When resources are seen as public goods, considerations like fairness and equity come into play, aligning with welfare economics. In contrast, when viewed as commodities, allocation becomes centered on competition and efficiency.

Gugushvili (2017) adds that resource allocation is a multifaceted issue. Addressing this complexity requires theoretical frameworks, including:

- **Cost-effectiveness analysis of interventions**
- **Use of Quality-Adjusted Life Years (QALYs)**
- **Needs-based allocation,** which prioritizes areas with the highest health needs

Resource allocation is an integral phase of planning. Green (2017) suggests that budgeting and allocation go hand in hand—allocation refers to the broad distribution of funds, while budgeting outlines how those funds will be used in detail.

Allocation decisions occur at various levels:

- **National level** – distributing resources among ministries
- **Ministerial level** – allocating funds across provinces, districts, or specific programs
- **Institutional level** – hospitals or clinics allocating resources among services or patients

As costs rise and demands grow, there's a greater need for resource allocation models that reflect real health needs and ensure effective use of funds. Solutions have included improving both technical and allocative efficiency and ensuring equitable distribution of limited resources.

Health Outcomes and Resource Allocation

To achieve the best health outcomes, it is essential to distribute resources in a way that fairly considers the health requirements of all population groups and regions. McIntyre and Anselmi (2020) identify several key indicators of health needs, which include:

- The total population size
- Age and gender demographics
- Prevalence and severity of illness
- Socio-economic conditions

Assessing the cost of delivering health benefits is crucial in resource allocation. The Essential Health Benefit framework outlines expected standards at various levels of care—such as infrastructure, staff, and types of services—which enables a gap analysis between existing conditions and desired standards, along with estimated costs to bridge those gaps.

A thorough evaluation of opportunity costs should accompany all decisions on resource distribution. As emphasized by Asante et al. (2016), the focus should not solely be on the amount of resources available, but rather on how effectively these resources are spent to enhance the overall health and well-being of citizens. For instance, in South Africa, historical racial disparities under apartheid are partly to blame for the poor health outcomes among black communities due to unequal resource allocation (McIntyre, 2017).

Policy experts argue against the continued use of outdated funding models based on previous allocations or demand capacity. Instead, they advocate for new strategies that recognize regional and demographic differences in need. Traditional models are often criticized for being arbitrary and for potentially worsening existing inequalities.

Internationally, efforts have been made to create more equitable distribution systems. The UK's National Health Service (NHS) has led the way in needs-based resource allocation since 1977, heavily influenced by the work of the Resource Allocation Working Party (RAWP) (Asthana et al., 2014). Initially used for geographic planning, this approach expanded to include the allocation of resources to health authorities and primary care trusts, using health need as a guiding principle. The RAWP method aims for fairness by ensuring equal access to healthcare for populations with similar health risks (Mooney & Houston, 2014).

Earnshaw and Dennert (2016) suggest that mathematical programming offers an effective solution for managing health resources under financial constraints. These models incorporate various constraints and include sensitivity analyses, making them useful in evaluating healthcare technologies (Earnshaw & Dennett, 2018).

Several European countries—including Germany, Switzerland, the UK, Sweden, and Spain—have adopted scientific models for resource allocation. Spain uses a basic non-weighted capitation model, whereas Sweden and the UK employ more advanced systems that consider socioeconomic factors, mortality, and morbidity data (Smith et al., 2001). These methods ensure resources are allocated based on real-time population health needs.

Related Literature on Evacuation Planning

Research on evacuation strategies has approached the subject from multiple angles. Sherali et al. (2021), for instance, analyzed hurricane and flood evacuation plans by focusing on how shelter locations influence total evacuation time. They proposed a location–allocation model formulated as a nonlinear mixed-integer programming problem to optimize shelter selection and planning.

ElDessouki (2018) addressed both pre- and post-disaster management. The pre-disaster model linked evacuation with a combined trip distribution and assignment (CDA) framework, focusing on minimizing total evacuation time while considering shelter capacity, although it did not account for traffic congestion. The post-disaster model was framed as a special case of multi-period network design.

Feng and Wen (2013) explored traffic control methods in areas affected by earthquakes. Their models were designed to maximize the number of vehicles entering controlled zones and minimize rescue times. Tuydes and Ziliaskopoulos (2014) expanded on this by proposing reversible traffic lanes during disasters. Their model extended the dynamic traffic assignment framework using the cell transmission model to reflect real-time traffic flow and optimize road capacity usage.

Murray and Mahmassani (2015) introduced household dynamics into evacuation models. They proposed two linear integer programming solutions to capture household behavior, including meeting point selection and pickup route planning.

While various studies have explored shelter locations, route planning, and traffic control, only Sherali et al. (2016) and ElDessouki (2018) explicitly examined how shelter locations and capacity limitations affect evacuation efficiency. However, both studies assume authorities have full control over evacuees' choices, which may not always reflect real-world scenarios.

Existing Systems for Housing Flood Victims

Providing suitable shelter during the early stages of a disaster is vital to human survival (The Sphere Project, 2011). However, a shelter must offer more than just a roof—it should include essentials such as clothing, bedding, cooking equipment, fuel, and access to clean water and sanitation services (Ashmore, 2004).

Disaster Relief (DR) shelters serve as temporary, safe, hygienic, and functional accommodations during emergencies until individuals can return to their homes. These shelters are often designed for quick assembly, disassembly, and reuse (Arslan, 2007). Examples of DR shelters include plastic tents, prefabricated units, and community buildings such as schools, religious centers, sports arenas, or private rentals (AGOTS, 2007).

It's important to distinguish between shelters and houses. While shelters offer short-term safety post-disaster, houses support daily living activities, including work and household responsibilities (Johnson, 2007b; Félix et al., 2013a).

According to UN/OCHA/ESB (2006) and Hadafi et al. (2010), a suitable shelter environment must offer protection, secure tenure, access to clean water and sanitation, and proximity to education, employment, and healthcare. In contrast, housing is a broader concept referring to any form of human habitation, including government-led efforts to provide shelter to low-income populations.

Categories of Shelter/Housing

After a disaster, individuals often move through several types of shelter arrangements before either returning to their former homes, upgrading their temporary shelters into permanent ones, or building new houses. These shelter types are commonly grouped into four main categories: emergency shelters, temporary shelters, temporary housing, and permanent housing (Quarantelli, 1991; Wu & Lindell, 2004; Johnson et al., 2006; Johnson, 2007a, 2007b; Félix et al., 2013a). The International Federation of the Red Cross and Red Crescent Societies (2013) further expanded this classification by including transitional shelters, progressive shelters, and core (or one-room) shelters.

a. Emergency Shelters
Emergency shelters are basic and short-term solutions intended to provide immediate life-saving support during the early stages of a disaster. These are typically used for very brief durations, ranging from a single night to a few days, often without facilities for cooking or long-term medical care (IFRC/RCS, 2013; Quarantelli, 1991).

b. Temporary Shelters
These are slightly more advanced than emergency shelters and serve short-term needs, often lasting a few weeks. Examples include tents or mass shelters provided after a disaster. Speed and cost-effectiveness are prioritized during construction (IFRC/RCS, 2013).

c. Temporary Housing
Temporary housing solutions are intended for longer durations—typically between six months and three years. These include rental units or prefabricated homes that allow individuals to resume their regular routines. Often, these shelters are placed on temporary sites (Quarantelli, 1991; Johnson, 2007a).

d. Transitional Shelters
Transitional shelters are usually self-constructed by displaced people post-disaster. These structures can later be moved, upgraded into permanent housing, sold, reused, or recycled. They are expected to last for several months or even years (IFRC/RCS, 2013; IOM, 2012; Yoshimitsu et al., 2013).

e. Progressive Shelters
These shelters are built to be semi-permanent and allow for future upgrades through modifiable components (IFRC/RCS, 2013).

f. Core Shelters/One-Room Shelters
Core shelters are intended as the foundation of a future permanent home. They include basic infrastructure like plumbing and utilities and typically consist of one or two rooms that can later be expanded (IOM, 2012; IFRC/RCS, 2013).

g. Permanent Housing
Permanent housing can result from upgrades to transitional, progressive, or core shelters, or from the construction of entirely new homes. These houses are designed to withstand future disasters.

Authorities need to carefully evaluate which shelter type best suits each group of survivors, acknowledging that shelter transitions rarely follow a simple, linear path. For example, when homes can be repaired quickly, emergency shelters may suffice. Otherwise, building transitional shelters on personal land may be more effective. Early reconstruction helps reduce both social and economic costs (Quarantelli, 1991; Nigg et al., 2006).

Challenges in Disaster Accommodation Systems

Determining the most suitable shelter type for various disaster scenarios remains a challenge. Poorly designed shelters can lead to numerous environmental, economic, technical, and sociocultural problems:

- **Environmental Concerns**: Ignoring climate conditions (e.g., providing tents during winter) or failing to consider local materials and access to clean water and air can worsen conditions (Johnson et al., 2006; Arslan, 2007).
- **Economic Constraints**: Temporary units can cost more than building permanent homes, sometimes up to three times as much. Infrastructure like electricity, sanitation, and roads also adds significant cost, especially in developing countries. Additionally, manufacturing and transporting shelters from other regions is expensive (Hadafi & Fallahi, 2010; Félix et al., 2013a).
- **Technical Issues**: These include limited space for storing shelter materials, unauthorized occupancy post-disaster, and the complexity of assembling certain shelter types, which may require skilled labor and special kits (Johnson, 2007b; IOM, 2012).
- **Sociocultural Barriers**: Mismatched cultural expectations between aid providers and recipients can result in poorly received solutions. Other concerns include lack of social cohesion, absence of communal spaces, inequality among survivors, inadequate support for vulnerable groups, and issues related to gender, religion, and education (Camp Coordination, 2010; IRP & ISDR, 2011).

The Proposed New System

The proposed solution is a web-based platform that allows users to browse and book free accommodation online from anywhere. The system interacts with a database and uses various input forms tailored to different needs. It enhances user experience while simplifying system management and tracking usage.

This new design specifically targets the needs of the humanitarian sector, addressing limitations of the existing system. It incorporates detailed data management, streamlines operations, and provides improved access and efficiency.

By using digital processes, the system aims to reduce the challenges faced by flood victims. Features include an accessible physical environment, online access to resources, secure online payments, and enhanced data protection. Ultimately, the goal is to deliver a more flexible, functional, and user-friendly shelter allocation experience.

CHAPTER THREE

SYSTEM ANALYSIS AND DESIGN

3.1 INTRODUCTION

Organizations across various industries, including education, rely on different types of information systems to support their operations and business processes. Each system serves a specific function and has a unique operational life span. This operational lifecycle is known as the **Systems Development Life Cycle (SDLC)**, which encompasses the stages of planning, developing, implementing, using, updating, and maintaining an information system.

This project applies a standard methodology for system analysis and design, combining principles from engineering with software development practices—a hybrid known as the Cistern Development Life Cycle (SDLC).
A system is generally defined as a set of interconnected components that work together to fulfill particular objectives based on defined functional and performance criteria. A system is considered well-structured when its objectives are clearly articulated.

This chapter explores the various phases involved in analyzing and designing the proposed system. The design phase is particularly focused on outlining how the system should function and creating methods or procedures to ensure it performs accordingly. In essence, system design is about turning a defined problem into an effective technological solution.

In this study, web-based technologies will be the foundation. System analysis, in this context, refers to a thorough examination of the system's components and their interactions, laying the groundwork for the development of a more efficient and robust system (Fielding & Reschke, 2014).

3.2 SYSTEM ANALYSIS AND INVESTIGATION

System analysis involves the collection and interpretation of relevant data, identifying core issues, and breaking down a system into smaller, manageable units. The goal is to understand the system's functions and pinpoint areas that require improvement. It is a problem-solving process aimed at ensuring that every part of the system contributes effectively to its overall performance.

This process involves examining both the system and its environment to gain insights that inform future improvements or modifications. Analysts use various tools such as observation, inquiry, and evaluation to investigate how the system operates under different conditions.

The primary purpose of this phase is to collect sufficient data to assess whether the problems or inefficiencies observed in the current system warrant moving forward with the next stages of the SDLC.

3.3 OVERVIEW OF THE EXISTING SYSTEM

Currently, the system for housing flood victims lacks a structured, reliable method for storing personal items or receiving safe, government-provided accommodations during disasters. Victims face stress and uncertainty due to the absence of a formalized support mechanism.

3.3.1 Limitations of the Current System

Because the present system operates manually, it faces several key challenges:

- **Time-Consuming Process:** The manual approach often requires individuals to be physically present, which is inefficient—especially for those balancing other responsibilities.
- **Inadequate Security:** Manually assigning accommodations poses significant security risks, especially in emergency situations like the COVID-19 pandemic, where social distancing is crucial.
- **Slow Operational Speed:** The current process is sluggish when handling documents and administrative tasks.
- **Delayed Data Management:** Gathering and retrieving data is inefficient.
- **Limited Information Access:** Users experience difficulty in quickly obtaining necessary information.
- **Poor Data Security:** Data is not adequately protected.
- **Inefficient Data Processing:** Slow processing reduces the system's overall effectiveness.
- **Data Loss Risks:** User data may be lost or mismanaged due to the lack of a proper tracking system.

3.3.2 Proposed Solution to Current Challenges

Implementing a web-based accommodation allocation system for flood victims will significantly address the limitations of the current model. Such a platform would enable timely, secure, and stress-free access to housing support, while also improving data management, user experience, and system efficiency.

3.4 THE PROPOSED SYSTEM

The proposed solution is a **web-based platform** that enables users to easily search for and reserve free accommodation for flood victims from the comfort of their homes. This system will utilize customized input forms to collect data and perform queries on a centralized database. Beyond delivering a user-friendly experience, the system will also support efficient maintenance and tracking of user activities.

This new system is developed to address the challenges observed in the existing manual process and to align with the needs of humanitarian agencies. It accounts for the limitations of the old method by integrating all essential operations, detailed data requirements, and system functionalities with the goal of greatly improving performance and service delivery.

The system uses digital processes to reduce the burdens faced by flood victims, including physical difficulties in accessing accommodation, limited access to resources, and lack of data security. Features such as online resource access, digital payments, and secure data handling will enhance system flexibility, functionality, and overall user satisfaction.

3.4.1 Objectives of the Proposed System

The effectiveness of a system depends on accurate problem definition and careful planning during the design phase. To ensure that the system meets its intended functional goals, the following objectives are established:

1. Provide an alternative digital approach to secure accommodation.
2. Minimize fraud and malpractice in the allocation of emergency housing for flood victims.
3. Promote the use and development of web and information technologies.
4. Introduce users to wireless network applications.
5. Ensure compatibility with existing operational systems.

3.5 SYSTEM DESIGN

System design involves structuring a new solution or replacing an existing one by defining all the system components necessary to meet specified requirements. It begins with a thorough understanding of the current system and an assessment of how best to implement computer-based improvements for efficiency.

This process converts identified problems into practical solutions through carefully planned designs. The design process is divided into several stages to streamline development:

- **Architectural Design**: Outlines the overall structure and behavior of the system architecture.
- **Logical Design**: Focuses on representing how data flows within the system. It uses modeling tools like **Entity Relationship Diagrams (ERDs)** to create abstract depictions of inputs, outputs, and processes.
- **Physical Design**: Defines how data will be entered, validated, processed, stored, and displayed. Key areas addressed include:
  - Input requirements
  - Output requirements
  - Storage requirements

- Processing requirements
- System controls and backup/recovery processes

The physical design can be broken down into:

1. **User Interface Design**
2. **Data Structure Design**
3. **Process Flow Design**

3.6 INPUT DESIGN OF THE SYSTEM

Data entry into the system will be handled through input devices like a keyboard and mouse. The information entered relates to online accommodation allocation for flood victims. Admin users will manage data through a back-end interface, making it easier for end users to access various housing centers and follow provided instructions.

3.7 OUTPUT DESIGN OF THE SYSTEM

The output represents the functional results of the system and includes the interface through which flood victims can interact with the platform. It provides access to features such as accommodation booking, information updates, and other related services.

3.8 REQUIREMENT ANALYSIS

This phase involves identifying and defining what the system must do, the services it should offer, and the constraints under which it will operate. Requirements are categorized into **user**, **system**, and **non-functional** requirements.

3.8.1 User Requirements

For general users:

- Ability to log in to the platform
- Access learning materials and system guides
- Make secure online payments
- Reserve nearby accommodation centers

For Admin users:

- Assign permissions to users

- Upload and manage accommodation listings
- Update user information
- Delete listings or remove users

3.8.2 System Requirements

- Users should be able to store items securely through the system
- Users should view available accommodation centers in real time
- The system must be web-based to reflect live updates from the admin panel

3.8.3 Non-Functional Requirements

- **Efficiency** in system performance
- **Data Security** for protecting sensitive user information

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3.9 RESEARCH METHODOLOGY

This section outlines the systematic approach and techniques used to analyze and provide solutions to the identified software challenges. There are three major software process models in software engineering:

- **Waterfall Model**
- **Incremental Development**
- **Reuse-Oriented Software Engineering**

For this research, the **Waterfall Model** is adopted.

3.9.1 The Waterfall Model

This is one of the earliest and simplest models in software engineering. It is a linear, sequential model where each development phase must be completed before the next begins. Its structured nature makes it ideal for documenting every stage of development and ensuring clarity throughout the process.

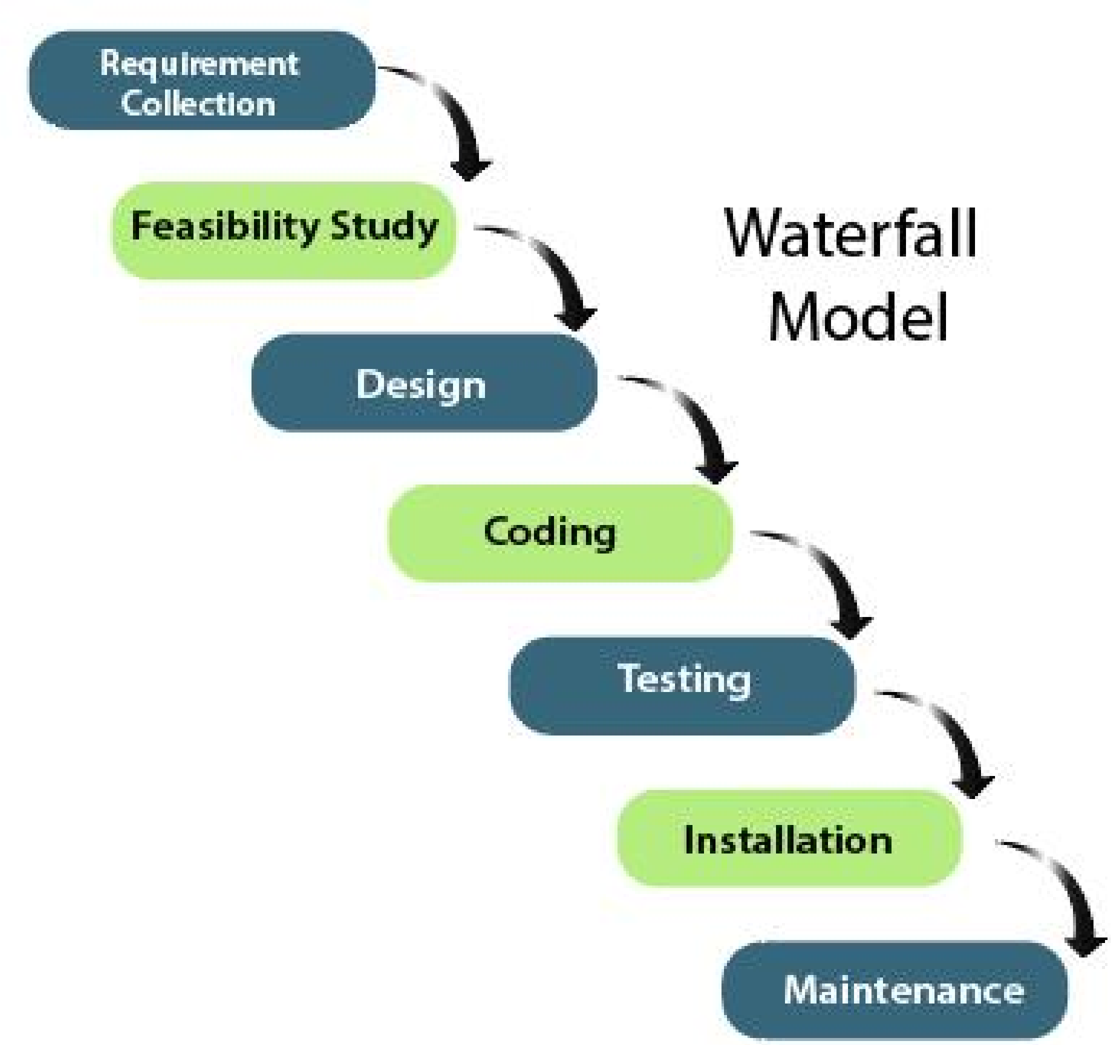


Fig 3.1 showing the waterfall model (sommerville, 2011).

3.9.2 Incremental Development

Incremental development is a method of software engineering where the system's requirements are divided into smaller, manageable modules that can be developed independently. The process begins with a basic implementation, which is then presented to users for feedback. Based on this feedback, the system evolves through multiple versions until it fully meets user needs. Activities such as specification and validation are carried out concurrently, enabling faster iterations and continuous improvements (Sonerile, 2011).

3.9.3 Reuse-Oriented Software Engineering

This approach emphasizes building new systems by incorporating and adapting existing software components. It has become increasingly popular in the 21st century due to its efficiency in reducing development time and costs. Reuse-oriented development integrates pre-built functionalities and frameworks into new systems with necessary customizations.

For this project, the **incremental development approach** was chosen because the system requirements were not entirely clear from the outset. Incremental development reflects the natural way humans solve problems—progressing step-by-step, adjusting along the way. This approach allows for easier and more cost-effective changes during the development process.

3.10 SYSTEM MODELLING

System modelling involves creating simplified representations of the proposed system from various perspectives. These abstract models assist analysts in understanding system functionality and serve as effective tools for communicating design ideas with stakeholders (Somerville, 2011).

The key modelling tools used in this design include:

- **Use Case Diagram**
- **Data Flow Diagram (DFD)**
- **Entity-Relationship (ER) Diagram**

3.10.1 Use Case Model

A use case model outlines the intended features and user interactions of the proposed system. It defines distinct interactions between a user (actor) and the system, with each use case representing a meaningful task or process. Use cases also include descriptions of the specific functionality that will be implemented. In some cases, a use case can reference or extend another to include more complex behavior.

Key Components of a Use Case Model:

- **Actor:** Represented by a stick figure, an actor is any external entity that interacts with the system, such as a user or another system.
- **Use Case:** Illustrated with an oval, it captures the various processes or tasks involved in the new system.
- **Directional Arrow:** Indicates the relationship and flow of interaction between the actor and the system processes.

Figure 3.1: Use Case Diagram for Online Accommodation Allocation System (Cloete and Kotze, 2012).

3.10.2 Entity-Relationship (ER) Diagram

The Entity-Relationship (ER) diagram is used during the analysis stage of database development to help database designers communicate effectively with end users. It provides a conceptual framework for understanding the structure and constraints of the system's database. The ER model is platform-independent and not tied to any specific software. It serves as a blueprint for designing the actual database that will support the software system.

CHAPTER FOUR

SYSTEM IMPLEMENTATION AND DOCUMENTATION

4.1 Overview

This chapter outlines the implementation of a web-based accommodation allocation system. The platform is designed to be accessed via both web and mobile applications through standard web browsers. Developed for multi-user access, the system features an intuitive interface and provides users with information about available accommodation options, proximity to affected areas, and more.

This section describes the operational processes of the system, illustrated with screen captures. It also highlights the software and hardware tools required for development, the programming languages used, and the testing strategies employed during the implementation phase.

4.2 System Requirements

To ensure proper deployment and functionality of the system, certain hardware and software resources are required. These are categorized as follows:

4.2.1 Hardware Requirements

- Input Devices: Keyboard and Mouse
- Processor: Intel Pentium IV (2.0GHz or higher)
- Memory: Minimum of 1GB RAM (4GB recommended)

4.2.2 Software Requirements

- Web Server: XAMPP or WAMP for managing the database
- Web Browsers: Google Chrome, Internet Explorer, Opera Mini
- Operating System: Microsoft Windows

4.3 Implementation Tools

The system was built using several web technologies including:

- **JavaScript:** Serves as the core scripting language for client-side interaction and server communication. It enables dynamic web content and interaction with the database.
- **HTML (Hypertext Markup Language):** Provides the foundational structure of the web pages.

- **CSS (Cascading Style Sheets):** Responsible for the styling and layout of the user interface.
- **Bootstrap and jQuery:** Used to enhance responsiveness and user experience through predefined styles and dynamic features.

4.4 Software Testing

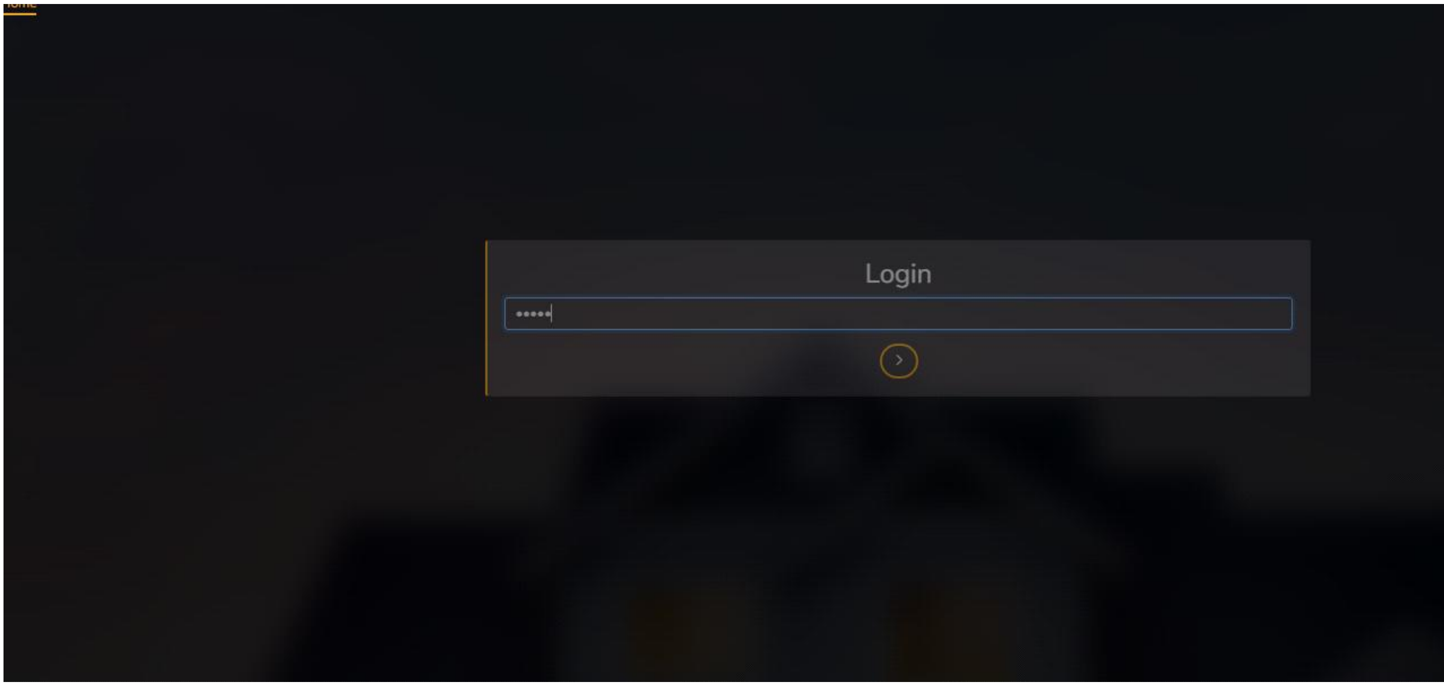
Software testing is a structured process used to ensure that the application meets the intended design specifications and performs as expected. Testing begins at the smallest components and progresses toward the complete system. The types of testing conducted include:

- **Unit Testing:** This involves testing individual software components or modules to verify that they function correctly. It focuses on internal logic and data flow, ensuring each unit behaves as intended.
- **Integration Testing:** This stage combines tested units into a complete system, ensuring that modules interact properly and data flows between them as designed.
- **System Testing:** This form of testing examines the complete system—including hardware, software, databases, and user interactions—to confirm that it meets functional and performance requirements. It also evaluates the system's security and its ability to recover from errors.
- **Structural Testing:** Validates that the implemented software aligns with user and system requirements. It ensures all functional and behavioral specifications are fulfilled.
- **Pilot Testing:** This involves the gradual introduction of the new system alongside the existing one. The aim is to test each module in a real-world environment. If any part fails, it can be corrected and reintegrated without disrupting the entire system.

4.5 Implementation Model

This section documents the functionality of each system module. It includes visual representations (screenshots) of the user interface, showing how various features operate within the system. These visuals provide insights into how users interact with the system and how data is presented and processed.

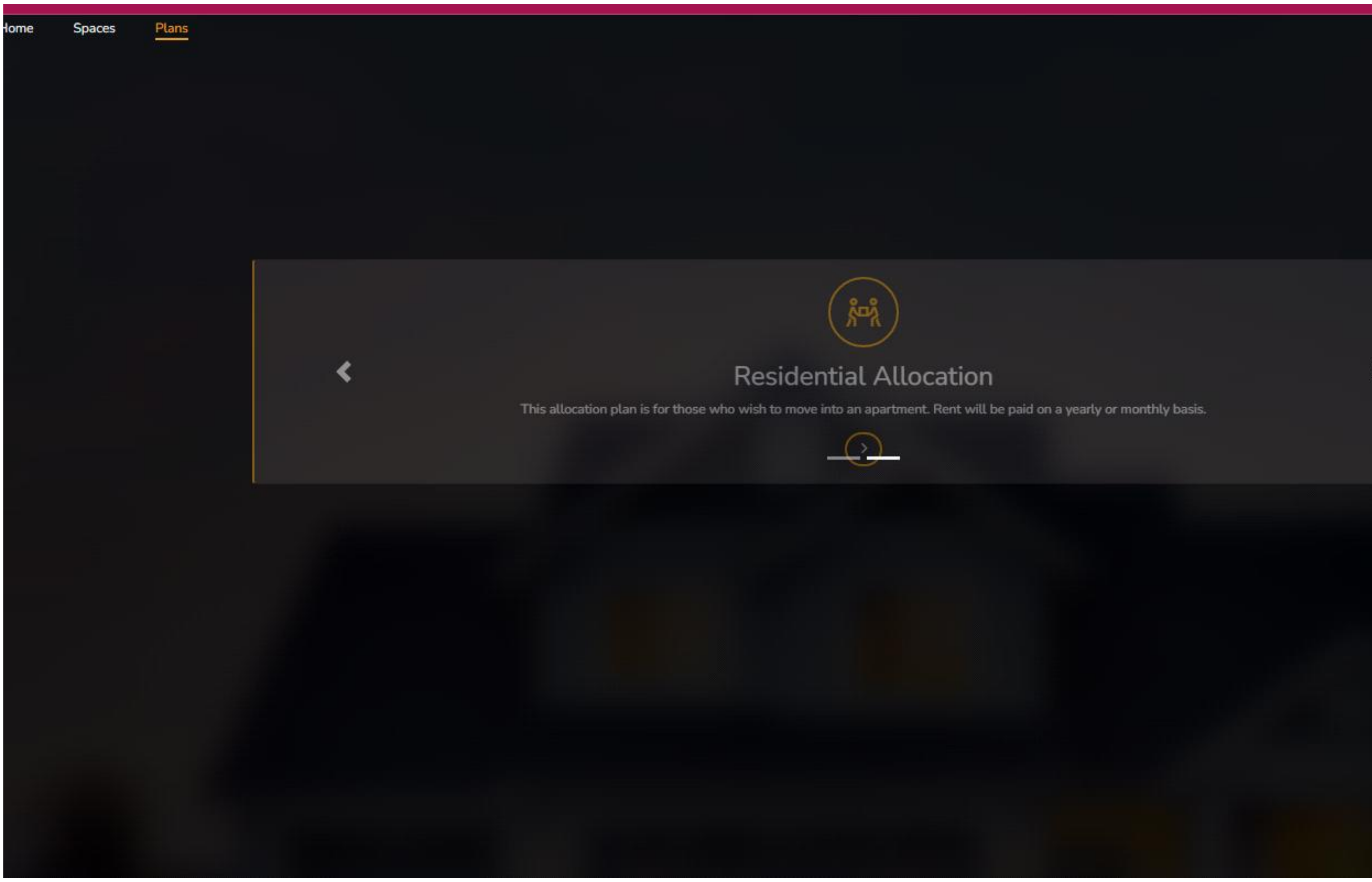
4.5.1 LOGIN PAGE



The login page is the front page an Admin receives when the software's back-end is accessed. It shows a message and require a security login and password. The user must provide a user ID and password before being allowed into the system. If the login information is valid, the system Home Page is displayed. Otherwise, the user is led to an error page.

Login page

DASHBOARD



This is a page a page after successful login of Admin, this shows the Menu items and navigation in the Admin back-end.

Figure 4.12 View of the Administrative Dashboard Page

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 SUMMARY

Online allocation accommodation Website is a computerized system designed and programmed to anchor humanitarian activities Nigeria, helping to solve issues boarding allocation of accommodation and storage facilities for flood victims, also enable flood victims save their properties from lost before and after the disaster may have occurred etc. The program is designed to give total access to authenticated user to book and view various accommodation/ storage facilities available online from their mobile devices.

5.2 CONCLUSION

Information Technology, as well as the internet, has dramatically changed the way educational sectors carried out day to day activities. The influence of information Technology and internet can be seen on all dimension of an organization like strategic objectives, structure, business processes and people.

From this project work, we can say there is a significant impact of Information Technology on our environment during natural disasters. The result of the Online Allocation of Accommodation Website brings about security, reliability and many other outstanding performance features. This Online Allocation of Accommodation website brought about increase of timeliness of booking and easy of allocating storage facilities and other accommodation.

5.3 RECOMMENDATION

I recommend that the system be put to use. That the manual or physical means of Allocation of Accommodation should be eradicated, so as to ease flood victims access to online Allocation of Accommodation/ storage facilities.

APPENDIX

```
<!DOCTYPE html>
<html lang="en">


<head>
    <meta charset="UTF-8">
    <meta http-equiv="X-UA-Compatible" content="IE=edge">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <link rel="stylesheet"
href="https://maxcdn.bootstrapcdn.com/bootstrap/4.5.2/css/bootstrap.min.css">
    <link rel="stylesheet"
        href="https://maxst.icons8.com/vue-static/landings/line-awesome/line-
awesome/1.3.0/css/line-awesome.min.css">
    <link rel="stylesheet" href="https://fonts.googleapis.com/css?family=Nunito">
    <link rel="stylesheet" href="css/plans.css">
    <title>Plans</title>
```

```
    <style>
        body {
            font-family: Nunito;
        }
    </style>

</head>

<body>
    <div class="overlay py-1">
        <div class="nav">
            <a href="/" class="text-light mr-5 ml-2">Home</a>
            <a href="/residents" class="text-light mr-5">Spaces</a>
            <a href="/plans" class="text-light mr-5 active-nav">Plans</a>
        </div>

        <div class="container text-center plans text-light">
```

```
<div id="carouselExampleIndicators" class="carousel slide" data-ride="carousel">
    <ol class="carousel-indicators">
        <li data-target="#carouselExampleIndicators" data-slide-to="0"
class="active"></li>
        <li data-target="#carouselExampleIndicators" data-slide-to="1"></li>
    </ol>
    <div class="carousel-inner">
        <div class="carousel-item active">
            <div class="card">
                <div class="card-body">
                    <i class="la la-box la-3x icon p-3 mb-3"></i>
                    <h2>Storage Allocation</h2>
                    <p>This allocation plan is for those who wish to store their things for just a
period of time.</p>
                    <a class="btn proceed text-light" href="/storage">
                        <i class="la la-angle-right"></i>
                    </a>
                </div>
            </div>
```

```
    </div>

    <div class="carousel-item">

      <div class="card">

        <div class="card-body">

          <i class="la la-people-carry la-3x icon p-3 mb-3"></i>

          <h2>Residential Allocation</h2>

          <p>This allocation plan is for those who wish to move into an apartment.
Rent will be paid on a yearly or

            monthly basis.</p>

          <a class="btn proceed text-light" href="/residence">

            <i class="la la-angle-right"></i>

          </a>

        </div>

      </div>

    </div>

  </div>

  <a class="carousel-control-prev" href="#carouselExampleIndicators" role="button"
data-slide="prev">

    <span class="carousel-control-prev-icon" aria-hidden="true"></span>
```

```
                <span class="sr-only">Previous</span>
            </a>
            <a class="carousel-control-next" href="#carouselExampleIndicators" role="button"
data-slide="next">
                <span class="carousel-control-next-icon" aria-hidden="true"></span>
                <span class="sr-only">Next</span>
            </a>
        </div>
    </div>

  </div>

  <!-- jQuery library -->
  <script src="https://ajax.googleapis.com/ajax/libs/jquery/3.5.1/jquery.min.js"></script>

  <!-- Popper JS -->
  <script
src="https://cdnjs.cloudflare.com/ajax/libs/popper.js/1.16.0/umd/popper.min.js"></script>
```

```
    <!-- Latest compiled JavaScript -->

    <script src="https://maxcdn.bootstrapcdn.com/bootstrap/4.5.2/js/bootstrap.min.js"></script>



    <script src="js/index.js"></script>

</body>

</html>



<!DOCTYPE html>

<html lang="en">



<head>

    <meta charset="UTF-8">

    <meta http-equiv="X-UA-Compatible" content="IE=edge">

    <meta name="viewport" content="width=device-width, initial-scale=1.0">

    <link rel="stylesheet"
href="https://maxcdn.bootstrapcdn.com/bootstrap/4.5.2/css/bootstrap.min.css">

    <link rel="stylesheet"

        href="https://maxst.icons8.com/vue-static/landings/line-awesome/line-
awesome/1.3.0/css/line-awesome.min.css">
```

```html
    <link rel="stylesheet" href="https://fonts.googleapis.com/css?family=Nunito">

    <link rel="stylesheet" href="css/residents.css">

    <title>Residents</title>



    <style>

        body {

            font-family: Nunito;

        }

    </style>



</head>



<body>

    <div class="overlay py-1">

        <div class="top-nav">

            <a href="/" class="text-light mr-5 ml-2">Home</a>

            <a href="/residents" class="text-light mr-5 active-nav">Spaces</a>

            <a href="/plans" class="text-light mr-5">Plans</a>
```

```
    </div>

    <div class="container text-center text-light plans">
      <ul class="nav nav-pills text-light mb-3">
        <li class="active"><a data-toggle="pill" href="#storage" class="mr-3 p-
2">Storage</a></li>
        <li><a data-toggle="pill" href="#residential" class="p-2">Residential</a></li>
      </ul>

      <div class="tab-content">
        <div id="storage" class="tab-pane active">
          <h3>Storage</h3>

            <div class="card mb-3">
              <div class="card-body">
                <div class="d-flex">
                  <b class="mr-3">First Name:</b>
                  <p class="m-0 text-warning">
                    Emmanuel
```

```
    </p>
</div>
<div class="d-flex">
    <b class="mr-3">Last Name:</b>
    <p class="m-0 text-warning">
        Chukwuka
    </p>
</div>
<div class="d-flex">
    <b class="mr-3">Surname:</b>
    <p class="m-0 text-warning">
        Eni
    </p>
</div>
<div class="d-flex">
    <b class="mr-3">Email:</b>
    <p class="m-0 text-warning">
        Eni@gmail.com
```

```
    </p>
</div>
<div class="d-flex">
    <b class="mr-3">Phone:</b>
    <p class="m-0 text-warning">
        08143567854
    </p>
</div>
<div class="d-flex">
    <b class="mr-3">Items:</b>
    <p class="m-0 text-warning">

            2spoons,

            3plates,

            5cups,
```

```
            </p>
          </div>
          <div class="d-flex">
            <b class="mr-3">Group Name:</b>
            <p class="m-0 text-warning">
              G4
            </p>
          </div>
          <div class="d-flex">
            <b class="mr-3">Location:</b>
            <p class="m-0 text-warning">
              St. Patrick&#39;s Church, Ugbowo road, +23490766534
            </p>
          </div>
        </div>
        <button class="btn btn-outline-danger btn-block w-50 mr-auto ml-auto mb-3
text-light" id="deleteBtn">
          Delete
          <p id="surnameID" style="display: none;">Eni</p>
```

```
            <p id="firstnameID" style="display: none;">Emmanuel </p>

            <p style="display: none;">storage</p>

          </button>

        </div>

        </div>

<div id="residential" class="tab-pane fade">

  <h3>Residential Allocations</h3>

   <div class="card mb-3 text-center">

          <div class="card-body">

            <div class="d-flex">

              <b class="mr-3">First Name:</b>

              <p class="m-0 text-warning">Daniel</p>

            </div>

            <div class="d-flex">

              <b class="mr-3">Last Name:</b>

              <p class="m-0 text-warning">Doe</p>

            </div>

            <div class="d-flex">
```

```
    <b class="mr-3">Surname:</b>
    <p class="m-0 text-warning">
        Dexter
    </p>
</div>
<div class="d-flex">
    <b class="mr-3">Email:</b>
    <p class="m-0 text-warning">
        dexter@gmail.com
    </p>
</div>
<div class="d-flex">
    <b class="mr-3">Phone:</b>
    <p class="m-0 text-warning">
        09076544432
    </p>
</div>
<div class="d-flex">
```

```html
                    <b class="mr-3">Location:</b>
                    <p class="m-0 text-warning">
                        Lex house, No.1 Luther Street, GRA, +2348033458900
                    </p>
                </div>
                <button class="btn btn-outline-danger btn-block w-50 mr-auto ml-auto mb-3
mt-3 text-light" id="deleteBtn">
                    Delete
                    <p id="surnameID" style="display: none;">Dexter</p>
                    <p id="firstnameID" style="display: none;">Daniel</p>
                    <p style="display: none;">residence</p>
                </button>
            </div>
        </div>
    </div>
  </div>
 </div>
</div>
<!-- jQuery library -->
```

```
    <script src="https://ajax.googleapis.com/ajax/libs/jquery/3.5.1/jquery.min.js"></script>
    <!-- Popper JS -->
    <script
src="https://cdnjs.cloudflare.com/ajax/libs/popper.js/1.16.0/umd/popper.min.js"></script>
    <!-- Latest compiled JavaScript -->
    <script src="https://maxcdn.bootstrapcdn.com/bootstrap/4.5.2/js/bootstrap.min.js"></script>
    <script src="js/residents.js"></script>
</body>
</html>
```