HYDROFLEET WEB APPLICATION

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A PROJECT SUBMITTED IN FULFILMENT OF THE REQUIREMENTS FOR THE

DIPLOMA OF COMPUTER SCIENCE, SCHOOL OF COMPUTING SCIENCES RIARA UNIVERSITY

NAIROBI, KENYA

DECEMBER 2024

DECLARATION

I declare that this or any other University has not previously submitted this work for the awarding of the course marks. To the best of my knowledge and belief, this work contains no material previously published or written by another person except where due reference is made. Student Name: **MOHAMMED OSMAN ISMAIL**

Signature: …….

Date: …….

APPROVAL

This project of Mohammed Osman Ismail was conducted under our supervision and is submitted with our approval as university supervisors.

Supervisor Name: **MATTHEW THIONG'O**

Signature: ……

Date: …….

DEDICATION

I would like to dedicate this project to my family and friends as well as my supervisor (Matthew Thiong’o).

ACKNOWLEDGEMENTS

I would like to acknowledge my family, friends and lectures for my project if it wasn't for them, I wouldn't have completed my project and gotten the resources for the project or the knowledge to do the project and help to finish my project.

ABSTRACT

Hydro Fleet is an innovative web application designed to streamline the delivery of water across various regions within Nairobi. Modeled after the functionality of rider -hailing services like uber, hydro fleet connects users directly within reliable water suppliers. By prioritizing punctuality efficiency and convenience, the platform ensures that water delivery is not only accessible but also dependable. Hydro fleet bridges the gap between demand and supply offering a seamless solution to water distribution challenges in urban areas.

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DEFINITION OF TERMS

Water supplier: a person responsible for delivery of water

User: this is a person who is using a website

Water Scarcity: is the lack of fresh water to meet the standard

Water Rationing: the act of limiting everyday water use when the resources is in scarce supply

Hydro Fleet: A web application designed to facilitate the delivery of water to underserved areas by connecting users with local water suppliers.

User Registration: The process by which individuals create an account and provide necessary information in order for the to access the website

Request Processing: The system within the hydro Fleet application that handles user requests for water delivery, including details such as quantity and delivery location.

Supplier Management: The management of water suppliers within the hydro Fleet website, allowing suppliers to register, and respond to delivery requests.

Water Tankers: Vehicles that transport large quantities of water from centralized sources to individual households or community storage points, often used in areas without reliable pipeline infrastructure.

Boreholes: Deep, narrow wells drilled into the ground to access underground water sources, often used as an alternative water supply in areas without reliable municipal water systems.

High-Rise Buildings: Tall buildings, typically found in urban areas, that require advanced pumping and storage systems to ensure water reaches all floors.

LIST OF ABBREVIATIONS AND ACRONYMS

App: Application.

Hr: Hour.

Misc: Miscellaneous.

Km: Kilometer.

ETA: Estimated Time of Arrival.

WHO: World Health Organization.

NCWSC: Nairobi City Water and Sewerage Company.

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CHAPTER ONE: INTRODUCTION

1.1 BACKGROUND INFORMATION

According to the World Health Organization (2019), water scarcity is a major global problem affecting 2+ billion people. Water rationing, a standard policy in water distribution due to infrastructure, floods and poor drainage system this reason has become common place especially as the cities continue to grow and more people need access to. Eastlands, Embakasi and some parts of Westland's are part of the areas which hardly have enough water running in them leaving thousands at their mercy for water tankers to deliver water to their door step

The water crisis in Nairobi has been worsened by the infrastructure of tall buildings. For instance, high-rise buildings need complex pumping and storage systems to ensure that water is distributed at all floors. Unreliable water provision for the majority of buildings, either due to a weak pressure or storage. This has caused the residents to go for days or weeks without water, especially during times of rationing.

The Hydro Fleet web application has a simple yet potentially life-changing goal to make sure every household in every part of Nairobi receives potable water on demand. The web application

Figure1.1.1: Water tankers. (Sguazzin, 2022)

takes after those of ride-hailing applications like Uber web application as well as the mobile application and users can find water suppliers in their vicinity. This website will supply timely and reliable deliveries as long as you request the delivery the supplier will take your request and if he is able, he will accept the request and later own deliver your water to your door step.

1.2 PROBLEM STATEMENT

Most communities in Nairobi lack access to a reliable water supply. Traditional methods of water distribution are inefficient and cannot effectively serve the demanding populations in most cases, particularly during times of rationing. In most cases, the infrastructural background of tall buildings further complicates water distribution, with issues like busting of the water pipes, blocking of the pipes because of pollution by the construction workers causing significant trouble to the residents. People then tend to call the water suppliers to supply water to their homes; however, look keenly and you may find that the supplier may not be in your area. This makes people panic and try bargaining with him in order for him to deliver the water. Before you know it, the water will be there in almost 2 hours, disrupting your schedules of the day. Hydro Fleet seeks to close this gap by connecting consumers with water suppliers through an easy-to-use website that ensures efficient and timely delivery of water. With its reliable and effective water delivery service, Hydro Fleet looks to attenuate the impact of water shortage.

Figure1.1.2: The hydro fleet logo. (brandcrowd, 2024)

1.3. OBJECTIVES

The objectives of Hydro Fleet include:

- Develop a web Application version for Water Delivery Requests.

- Connect Users with Water Suppliers.

- Ensure Timely and Efficient Delivery of Water.

1.4. JUSTIFICATION

This project deploys modern technology in response to a compelling need in underprivileged areas, enhancing the quality of life of residents by ensuring access to clean water. Improved logistics for delivering water mean's that Hydro Fleet contributes to better health outcomes, economic stability, and overall well-being in the community. The innovative approach will set the stage for further investment in technology with solving fundamental infrastructure problems in developing regions.

1.5 SCOPE

The scope of the Hydro Fleet project includes the following components:

- **User Registration:** Develop a secure and straightforward user registration process that includes authentication and verification mechanisms. (user)
- **Request Processing:** Implement a system for users to request water deliveries, including specifying the quantity of water needed and the delivery location. (home page)
- **Supplier Management:** Create a management system for water suppliers, allowing them to register, and respond to delivery requests. (supplier page, supplier request page)
- **Location Services:** Integrate autocomplete map using the google maps API keys functionality to accurately determine user's exact location optimizing delivery routes and times.
- **Payment Integration:** Incorporate a secure payment system method where users can pay their payment upon delivery of their water ensuring no forms of theft.
- **Feedback and Rating System:** Develop a feedback mechanism that ensures users can contact us as well as the supplier for any issues about anything (contact us page)

- **Data Security and Privacy:** Ensure the application complies with data protection regulations, safeguarding user information and maintaining privacy.

CHAPTER TWO: LITERATURE REVIEW

2.1 INTRODUCTION

Nairobi, Kenya's rapidly growing capital city is facing an acute water scarcity problem. For homes in Nairobi, the water supply shortfall is estimated to be 25% but many residents rely on kiosks or buying it from vendors and cling onto city authorities for illegal connections. A rationing system has been in operation since 2017, with specific city areas receiving water on set days of the week; some for a few days and others just for a few hours. Past Researches in Water Delivery Services and web Applications Among all of the on-demand website like Uber, some restricted applications have been outlined for tryouts (for taxi reason) while others are as a result as at present by beneficiaries with settled affiliation qualities. We set out to learn more about the existing approaches for water delivery, how well on-demand service models are working and where there is room for a solution like Hydro Fleet to fill in gaps and improve access among urban poor households of Nairobi.

2.2 BODY

2.2.1Review of Current Water Delivery Methods

The capital city of Kenya, Nairobi, has huge problems with water supply. This is mainly caused by rapid urbanization, increased population, and bad infrastructure. Municipal water systems are found in the urban areas where there is centralized and slightly reliable water supply. However, this system is normally overstretched leading to frequent water shortages and rationing. Many residents living in Eastlands, Embakasi, and some parts of wetlands complain of frequent water shortages that force people to look for alternative sources such as water vendors and boreholes.

Distribution water in Nairobi is handled by the Nairobi City Water and Sewerage Company (NCWSC). Their good efforts notwithstanding, the supply often falls short of the demand due to aging infrastructure and limited sources for this commodity. This worsens during dry seasons, causing rationing that bites many residents.

2.2.2Water Tankers and Alternative Sources

In areas not adequately served by the municipal water system, water tankers play a crucial role in supplying water. These tankers transport water from centralized sources to individual households or community storage points. However, this method is often plagued by inefficiencies such as high costs, inconsistent delivery schedules, and variable water quality. Additionally, the infrastructure of tall buildings in Nairobi exacerbates these challenges, as high-rise buildings require sophisticated pumping and storage systems to ensure water reaches all floors.

Water tankers, while essential, are not without issues. The cost of water delivered by tankers is significantly higher than that supplied through municipal systems. Furthermore, the quality of water can be questionable, leading to potential health risks. The unreliability of tanker deliveries also poses a significant challenge, with residents sometimes waiting for days to receive water.

2.2.3Impact of Tall Buildings on Water Supply

The trend of putting up high-rise structures in the capital further exacerbated water supply. For high rise buildings, such as tall hotel and apartment blocks (tower blocks), you need sophisticated water storage tanks and pumping to get the water all around. On the other hand, it was reported that many uprisings and buildings do not have a conduit system to deliver water consistently causing some pressure problems while delivery. The issue becomes even more pronounced when water rationing measures are implemented and scarce amounts of water need to be shared among many residents.

In response to these challenges, some buildings have found private bore-holes and built water storage tanks. This is a short-term fix and not sustainable in the long run because there are with drilling so many boreholes.

2.2.3Analysis of Mobile Applications for On-Demand Services

The rise of mobile technology has revolutionized various service industries, including transportation and food delivery. Ride-sharing applications like Uber and Lyft have demonstrated the potential of on-demand service models by leveraging real-time data processing, GPS technology, and user-friendly interfaces to provide efficient services.

In the context of water delivery, mobile applications have been primarily used for sending information and issue reporting. For instance, Next Drop in India provides real-time updates to

residents about water availability, improving access to information and resource management. Similarly, Maji Fix in Kenya allows users to report water supply issues directly to service providers, facilitating quicker response times and better resource allocation.

Despite these advancements, there are few examples of mobile applications that offer on-demand water delivery. The potential for such a model is significant, considering the success of similar approaches in other service industries.

2.2.4NextDrop and Its Impact

Many of the 9.9 million people in Bangalore, India, never know when they'll turn on the tap and find water flowing. Water is scarce and rationed. UC Berkeley graduate student Christopher Hyun spent his summer working on a research project examining how the people of Bangalore can get more reliable and timely information about when and how long they'll get water each day. His research project was prompted by the work of Next drop, a tech startup founded by UC Berkeley graduates, among others Next Drop is an innovative mobile application used in India that provides real-time information on water availability. The app sends SMS alerts to users about water supply timings, helping them manage their water usage more effectively. Next Drop has improved water distribution efficiency and reduced the uncertainty associated with water supply.

Figure 2.2.1: Next drop. (Saxena, 2014)

2.2.4MajiFix: Improving Water Management in Kenya

Water supply - Maji Fix, a mobile platform in Kenya that lets users report water problems to their service providers. This allows issues to be identified and resolved rapidly, making it easier your job of managing water even more efficiently. Faster response times and more efficient resource allocation between residents &water authorities - by using Maji Fix

With Maji Fix, it is already taking a page out of Next Drop's book and focusing on information + issue reporting over direct service delivery. Although the app is a great way to manage water, it does not solve urgent issues of providing an access point for underserved areas.

.2.2.5HydroFleet: Bridging the Gap

Even with the technological development, the efficient bridging of water suppliers and consumers is still a pending issue. Inefficiencies have left many communities underserved, traditional methods proving costly and- mutually inaccessible. Yes, there are some mobile applications which we have seen earlier and they solve one or the other part of water management but nobody is providing a well thought-on-demand delivery solution.

Hydro Fleet is designed to address this gap and works toward mitigation through the development a website that will provide water as some delivery websites. It connects the users with nearby suppliers of water sources to facilitate timely delivery and use. With features like exact location, and a safe payments method and user reviews, Hydro Fleet plans to be a dependable solution for the water scarcity problem.

2.2.6Key Features of Hydro Fleet

- **User Registration:** Registration of new users with enhanced security and mainly interface navigation and the options that relate to the authentication and verification of user credentials.

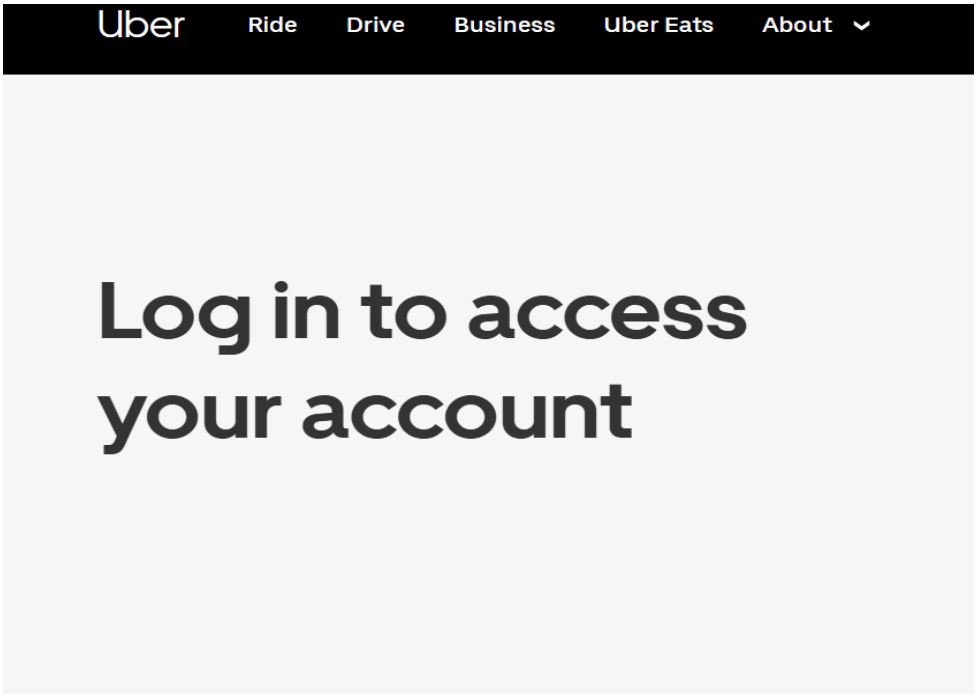

Figure2.2.2: User registration. (Doug H, Ridesharing drivers, 2024)

- **Request processing:** Process through which the consumer demands water additions, defining the volume and place.

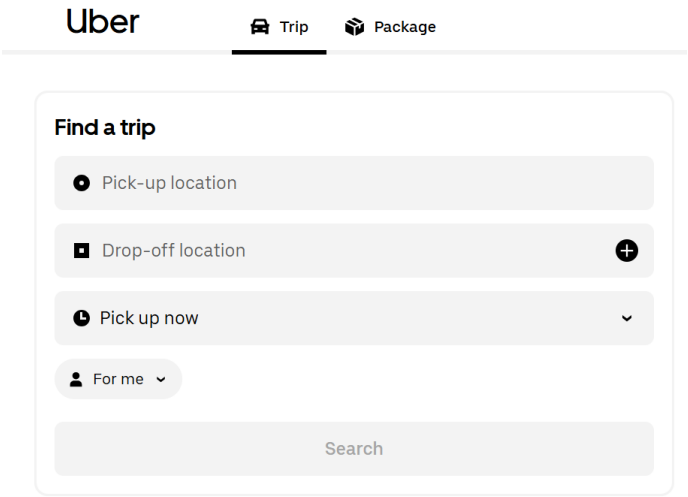

figure 2.2.3: Request Processing. (Doug H, Ridesharing drivers, 2024)

- **Drivers Management:** A system under which a management supplier of water has the ability to register and also to manage its inventories of houses, orders and also the delivery requests

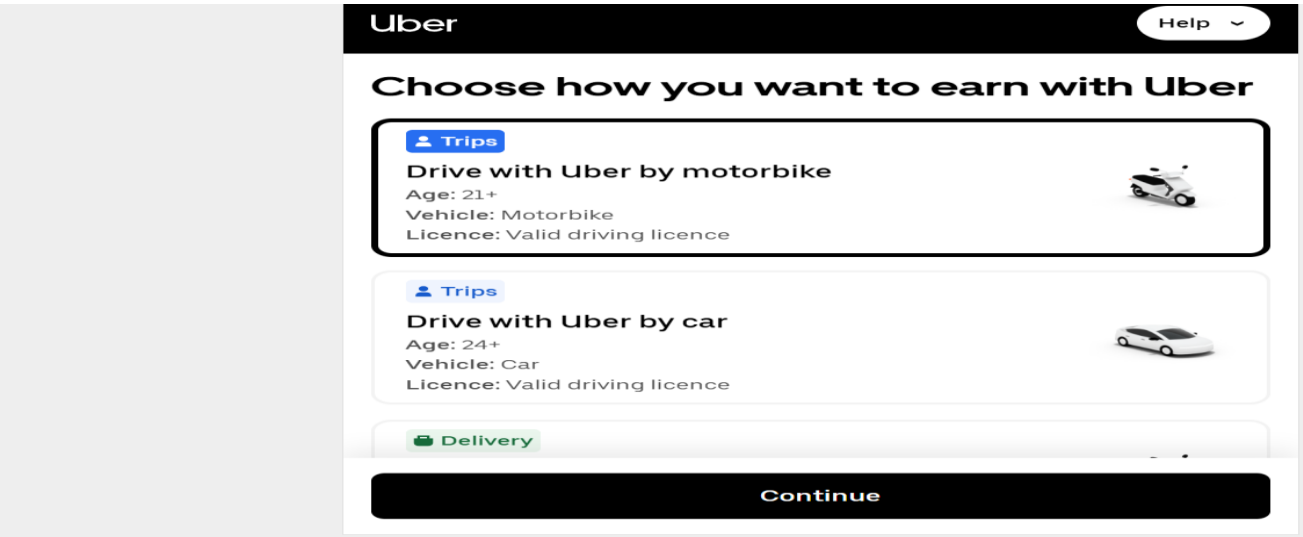

Figure 2.2.4: Driver Management. (Doug H, Ridesharing drivers, 2024)

- **Location Services:** Include GPS feature to provide precise geographical position of the user as well as the supplier to allow for determination of the most probable shortest time in delivering the goods.

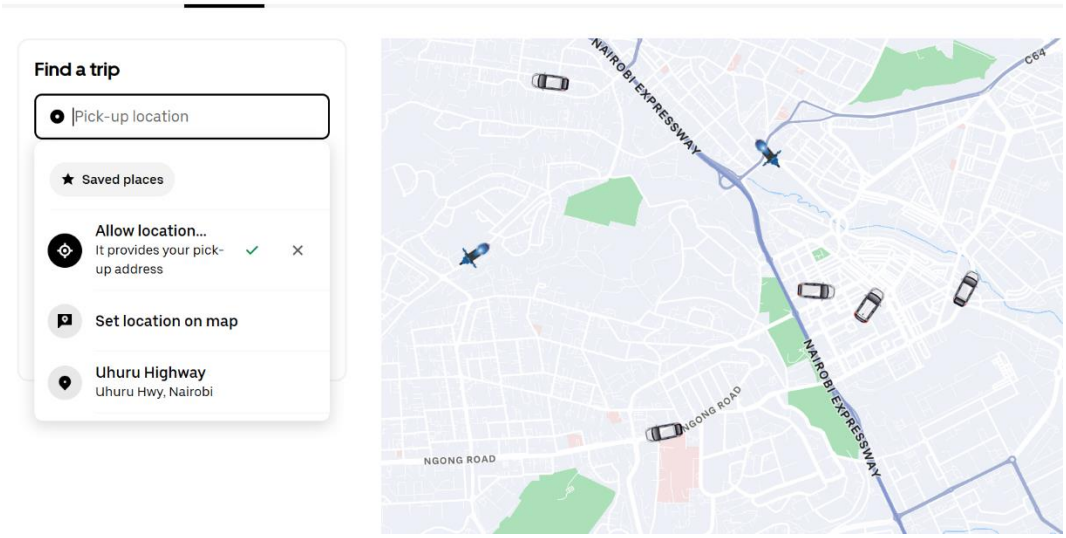

Figure2.2.5: Location Services. (Doug H, Ridesharing drivers, 2024)

- **Integration of Payment:** Proper payment system that has security because the website is still new, I will have to only use the payment which is payment on delivery which will be much safer at the moment.

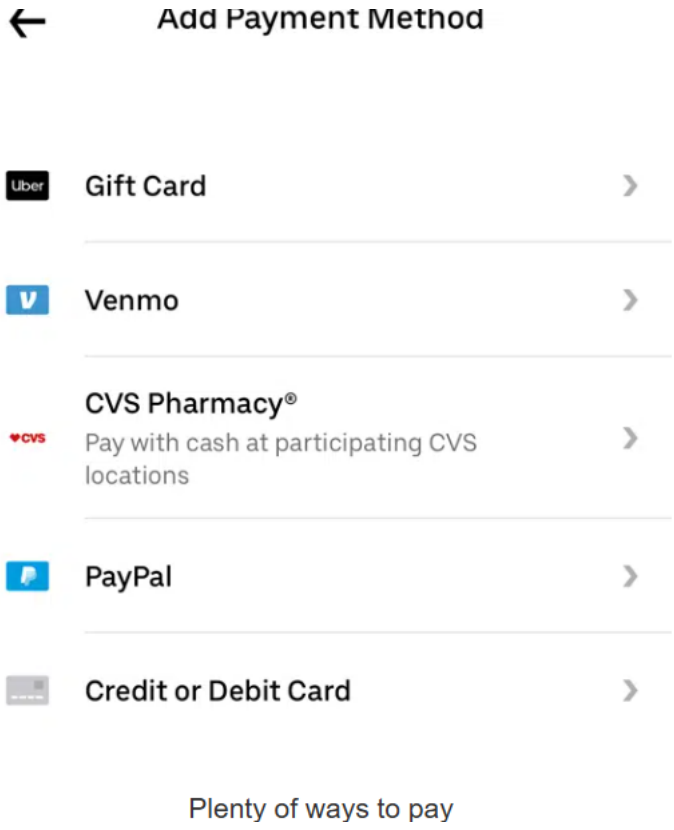

Figure 2.2.6: Payment Integration. (Doug H, Ridesharing drivers, 2024)

- **Feedback and Contact Us:** Platform for the users to send messages with the extent of their satisfaction even suggestions regarding the services.

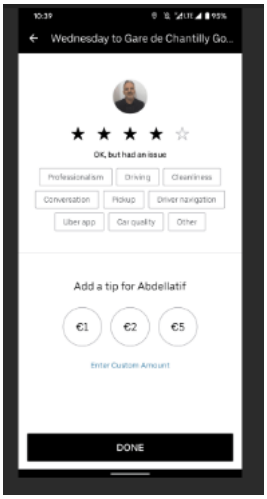

Figure2.2 7: Feedback and Contact Us. (Doug H, Ridesharing drivers, 2024)

- **Data Security and Privacy:** Data protection laws, permissiveness of user information and its protection of the same, Data protection guidelines, Data Protections considerations, Online abuse reporting and prevention, Protection of user's data and information.

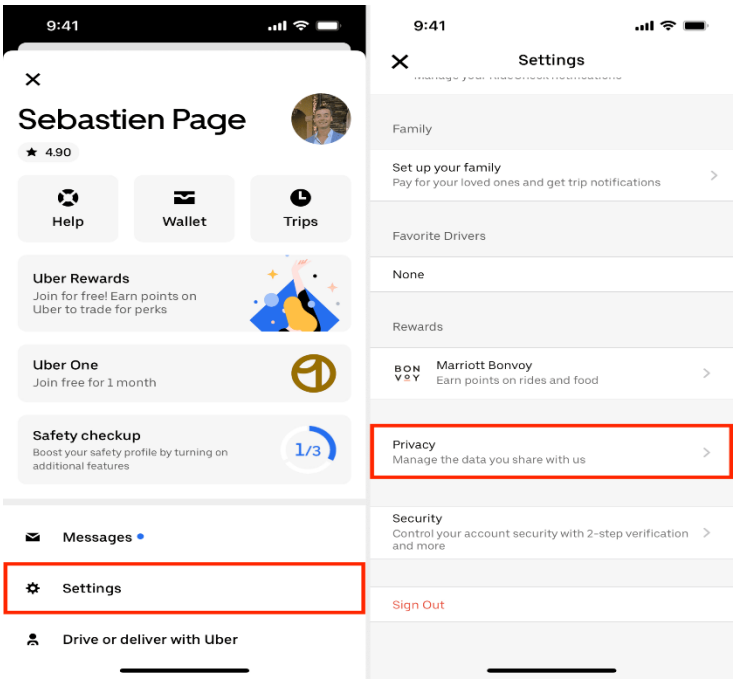

Figure 2.2.8: Data security and Services. (Doug H, Ridesharing drivers, 2024)

2.3 CONCLUSION

Literature confirms that the current water delivery methods are inefficient and that website technology holds out potential to revolutionize its service delivery. Nevertheless, while other existing websites tend to try perfecting one step in the water management chain, none can provide direct delivery services like Hydro Fleet does. As a result, Hydro Fleet provides a solution to the limitations by the current systems and does so by integrating the proven success of on-demand models with an urgent need for reliable delivery services. This, in turn, improves operational efficiency, water distribution sustainability, and safe water access. With user-centered

designs and the power of modern technology, Hydro Fleet could greatly improve access to safe water in Nairobi. The application promises to provide a reliable and effective water supply service, improving the quality of existence of people in underprivileged areas and prioritizing the use of technology toward essential infrastructure problems in tropical regions.

CHAPTER THREE: METHODOLOGY/ ANALYSIS AND DESIGN

3.1 SYSTEM ANALYSIS

System Analysis is, therefore, the most important part in the development of any project including Hydro Fleet website. This involves in-depth investigation of the present systems and processes for the determination and fixation of goals, requirements, and potential enhancements. System analysis can be defined, according to Lonnie (n.d.), as "the process of studying a procedure or business to identify its goals and purposes and create systems and procedures that will achieve them efficiently." This phase is very critical since it forms the base for coming up with a strong and effective solution.

Importance to the Development of Hydro Fleet:

System analysis enables the understanding of the existing challenges in water delivery, identification of the needs of users and suppliers, and determination of the most efficient ways to address these needs. For Hydro Fleet, system analysis will ensure that the website is designed to solve actual problems and meet the particular requirements for Nairobi residents and water suppliers.

3.2 STAGES OF SYSTEM ANALYSIS

The system analysis process for Hydro Fleet includes several stages, each are to address specific aspects of the project:

3.2.1 Investigate and Analyze the Current System

- **Current Water Delivery Methods:** In Nairobi, traditional methods like municipal water systems, water tankers, and boreholes are commonly used. These methods often fail to meet the demand due to logistical challenges, high costs, and inconsistent quality.
- **Challenges in High-Rise Buildings:** Tall buildings face significant water supply issues due to inadequate pumping and storage systems. This problem become high during periods of water rationing.

3.2.2 System Requirement Determination

For Hydro Fleet, the system requires several key components:

- **Database:** A My SQL database to store user details, supplier information, delivery requests, and feedbacks.
- **Server:** To host the application and handle real-time data processing.
- **Google maps:** For accurate delivery locations.
- **Payment method:** To help in the payment of the services.

3.2.3 Configuring and Structuring the Requirements

The requirements gathered from users and suppliers were structured to develop a coherent system design. This involves creating detailed models and diagrams to visualize the system's architecture and workflows.

3.2.4 Selecting the Best Alternative Design Strategy

After defining a set of requirements and analyze the results, multi-tier architecture is identified to be an excellent design strategy in making sure that it can incorporate new modern technologies whilst also maintaining user friendliness.

System Analysis Developer of Hydro Fleet Steps:

- **Articulate the Market Opportunity:** Clearly articulate market inefficiencies inherent in current water delivery practices that are known to fail Nairobi residents.
- **New System Functional:** Requirements and Non-Functional requirements with respect to the Hydro Fleet web application:
- **Prioritization of Requirements:** Essentially identifying the key aspects that need to be released first.
- **Requirement Elicitation and Feasibility Study:** Detail with my supervisor, collating information for the intended systems feasibility.
- **Drawing models:** Suggest entity- relationship diagram, data flow diagram and proposed system architecture model to present the system functionality of the recommended computerized payroll management.

3.3FEASIBILITY STUDY

A feasibility study is an analysis designed to determine the viability of a project. It provides information on various factors to be taken into consideration to advance, change the approach, or scrape down a project.

Types of Feasibility Studies Relevant to Hydro Fleet:

3.3.1 Schedule Feasibility

- **Definition:** The act of establishing project duration and whether the project schedule will fall within the agreed allotted time.
  - **Web application to Hydro Fleet:** Given that these dates, principally when the Hydro Fleet system starts to be designed, are supposed to be able to program with more than one month advance the design, feasibility, and system design, so that ample time remains to correct any error in the system.

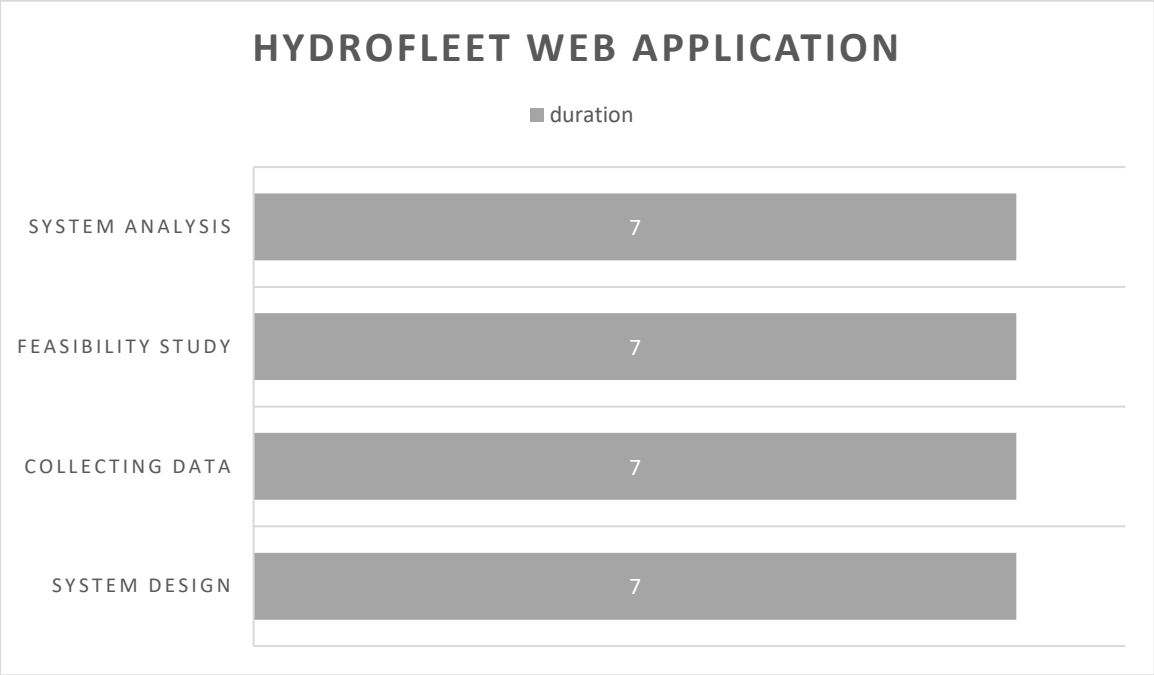

Table 3.3.1: Ghant chart.

3.3.2 Technical Feasibility

- **Definition:** It is possible to analyze whether enough technology and mandatory experience exist for a project to be completed.

- **Web application to Hydro Fleet:** This project demonstrates that the required technical ability in the levels of web application development, GPS integration, and secure payment processing exist.

3.3.3 Economic Feasibility

- **Definition:** Analyzing money requirements of the cost part and its anticipated benefits.
  - **Application to Hydro Fleet:** This project aims to make use of different open-source resources and existing infrastructures that lead to a reduction in costs. Additionally, there is a detailed cost-benefit analysis, proving the economic feasibility of this project.

Table3.3.3: Economic feasibility

RESOURCES	COSTS (ksh)
LAPTOP	65,000.00 ksh
UBER WEBSITE	700.00 ksh
ORDERING WATER	1500.00 ksh
GOOGLE MAPS SERVICES	Free
VISUAL STUDIO	10,000.00 ksh
TOTAL	77,000.00 ksh

3.3.4 Resource Feasibility

- **Definition:** The identification of hardware and software resources that are required to complete a project.
  - **Web application to Hydro Fleet:** the system application is carried out with supporting hardware, such as servers and, and software, which may be a SQL Database, Google maps services and among others.

Table 3.3.4: Resource feasibility

RESOURCES	LANGUAGES	PURPOSES
VISUAL STUDIO	HTML	FRONTEND
VISUAL STUDIO	CSS	FRONTEND

VISUAL STUDIO	JAVASCRIPT	FRONTEND AND BACKEND
XAMPP (SERVERS)	PHP	BACKEND

3.4 REQUIREMENT ELICITATION

Requirement elicitation involves researching and discovering the system requirements from users and customers. This practice is crucial for ensuring that the system meets the needs of all parties involved.

3.4.1 Requirement Gathering Methods

- Personal Experience.

3.4.1.1 Personal Experience

- **Method:** Leveraged personal experience and observations to identify common issues and user behaviors.
  - **Findings:** Highlighted the importance of a user-friendly interface and efficient delivery mechanisms.

3.5 SYSTEM DESIGN

System design is the process of designing the elements of a system such as the architecture, modules, and components, the different interfaces of those components, and the data that goes through that system. For Hydro fleet has helped me design my own design of my system and the different types of components and the data that will go in my system.

3.5.1.2 Data Flow Diagram (DFD)

- **Network Diagram:** A diagram which graphically shows the data flow into and out of a system.

- **Importance:** Clear view on how the data flow in a system and processes, where are data stored.
  - **Web application to Hydro Fleet:** DFD represents the flow of data from user input (delivery requests) over appreciation units, i.e., supplier notifications and output — delivery.

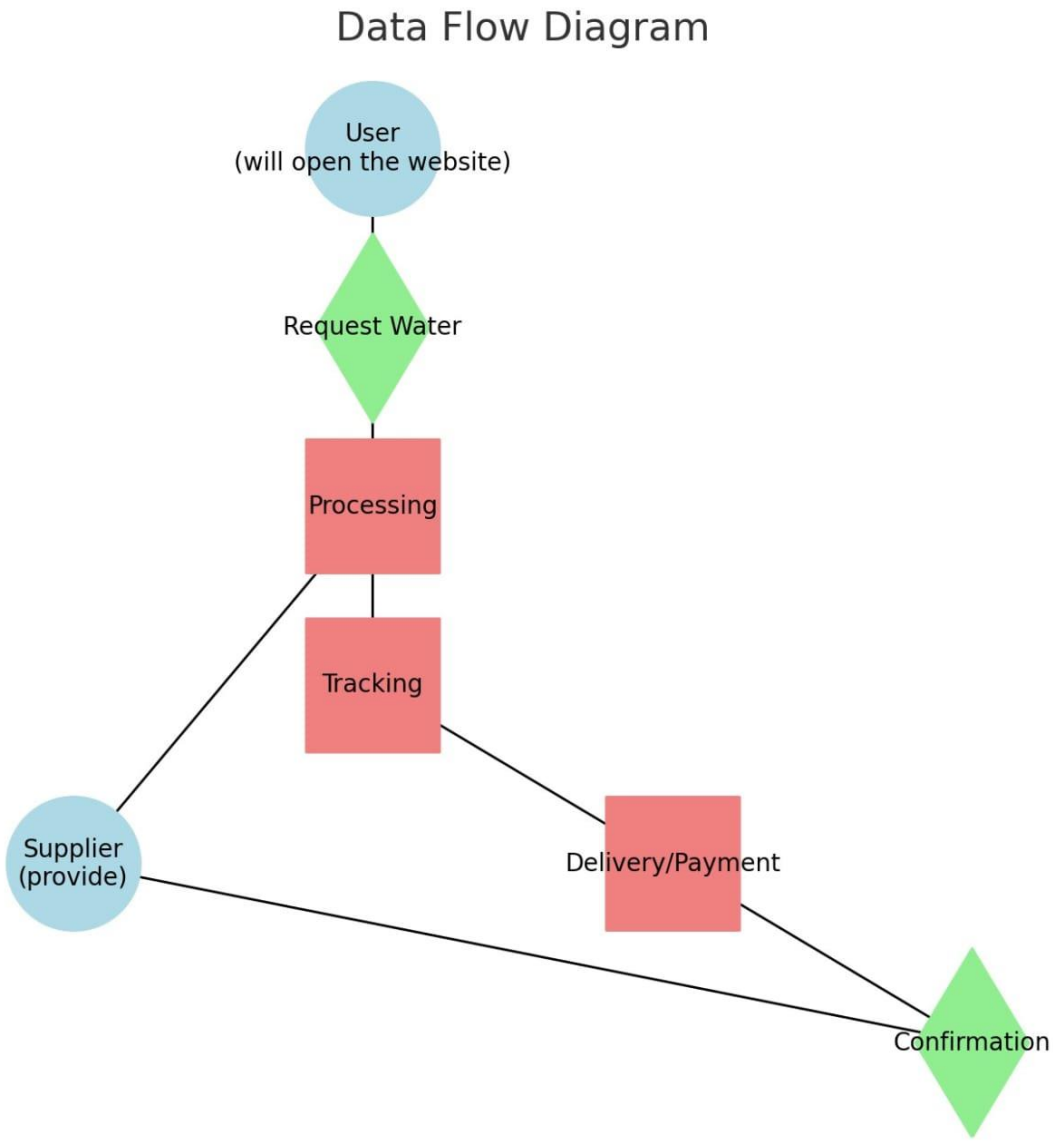

Figure 3.5.2: Data Flow Diagram

3.5.2.2 Physical design

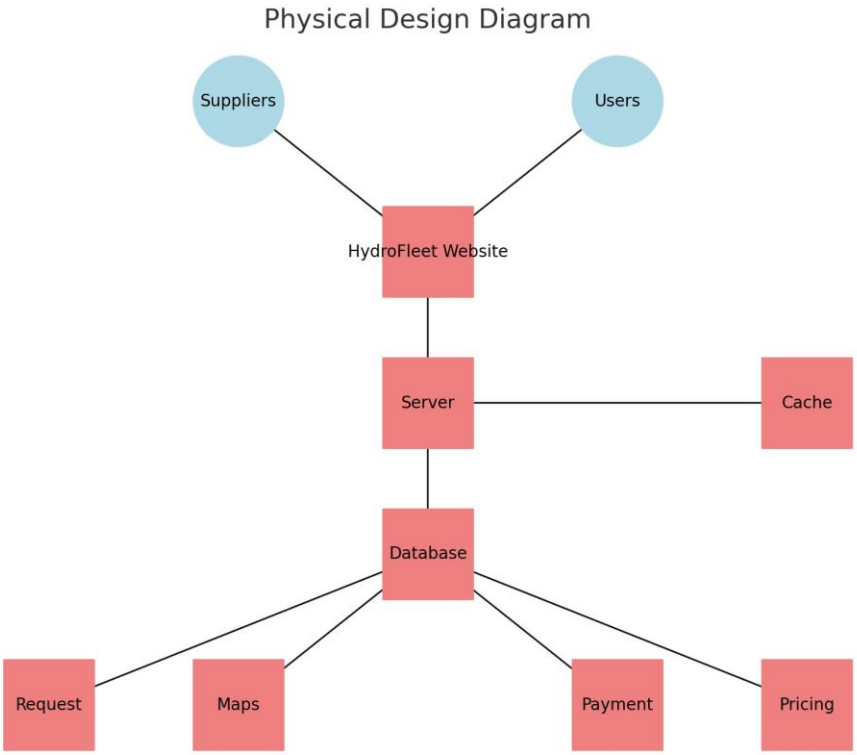

Figure 3.5.3: Physical Design

3.5.1.3 Entity Relationship Diagram (ERD)

- **Definition:** A visual representation of the relationships between entities in the database.
- **Use:** To Have a graphical representation of the data structure and make sure that all relationships need to be maintained.
  - **Web application to Hydro Fleet:** ERD for entities such as Users, Suppliers, Request and Payments along with their attributes & relationships.

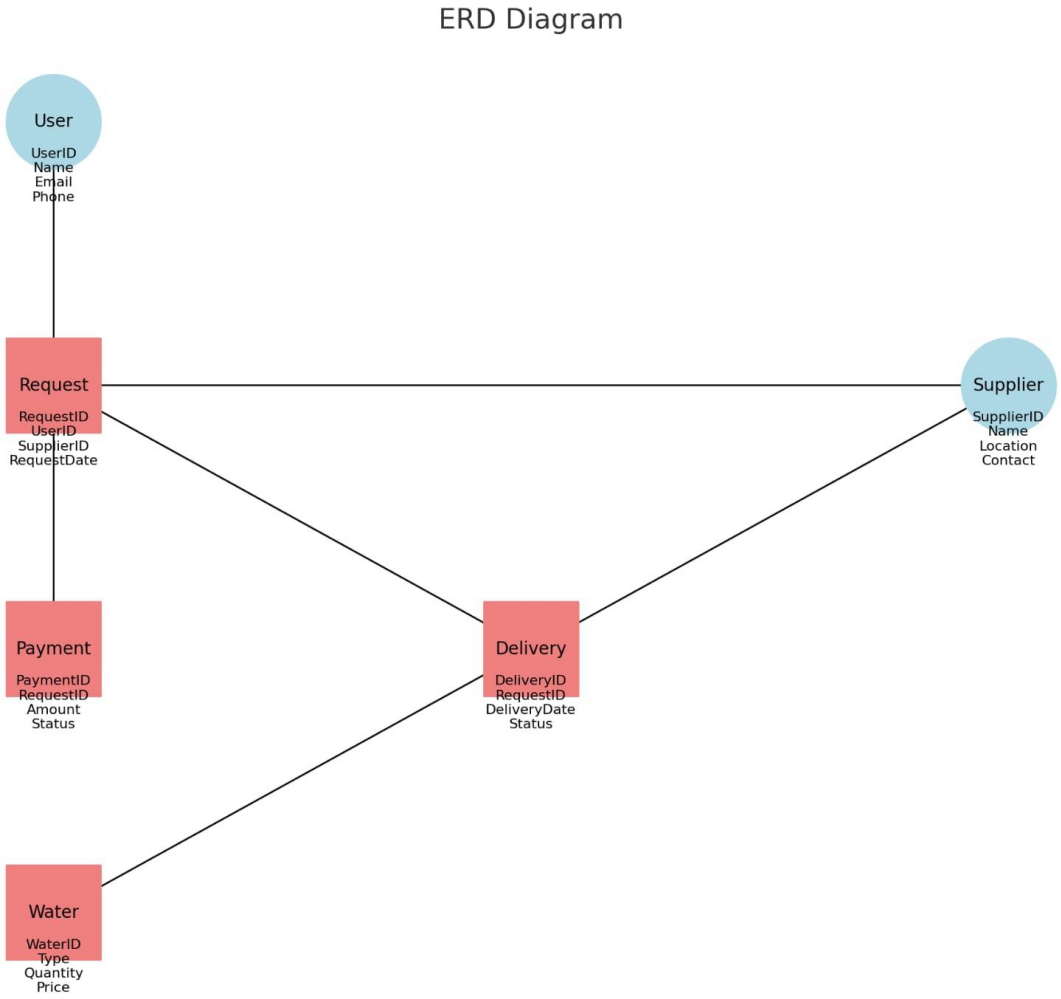

Figure3.5.4: Entity Relationship Diagram

CHAPTER FOUR: IMPLEMENTATION TESTING AND RESULTS

4.1IMPLEMENTATION APPROACH FOR HYDRO FLEET

Ultimately, the Hydro Fleet project is a web application that allows users to get water delivered from point A to point B. The basic components of the application include a Home Page, Supplier Page, Contact Page, Request Page, and a supplier sign-up/sign-in and consumer sign-up/sign-in. The design is professional and easy to use, with consistent elements and a streamlined appearance based upon water—literally blue and white because clear white water signifies potable drinking water, and blue stands for dependability and trust.

4.2DEVELOPMENT TOOLS AND TECHNOLOGIES

1. Frontend Development:

- **HTML:** Used for structuring the content on the web pages.
- **CSS:** Used to style the application, providing a visually appealing layout and consistent design. The blue and white color scheme was chosen to represent water and maintain a clean and professional aesthetic.
- **JavaScript:** Enhanced the interactivity of the web pages. For example, JavaScript ensures dynamic behavior, such as form validation and interactive elements like navigation bars. And for the sign up and sign in to be able to toggle from one to another.

2. Backend Development:

- **PHP:** Powers the server-side logic, such as handling user authentication, processing form submissions, and managing data requests. PHP ensures the functionality of sign-up and sign-in processes for both users and suppliers.

3. Integrated Development Environment (IDE):

- **Visual Studio Code:** The primary development environment used for writing and managing code efficiently. Its features, such as syntax highlighting, debugging, and extensions, streamlined the coding process.

4. Resources and References:

- **Online resources**, including tutorials and documentation, were heavily utilized to ensure proper implementation of features and to solve challenges during development.

4.3PATTERNS AND TACTICS - USE OF DESIGN PATTERNS/STRATEGIES

- Model-View-Controller (MVC) was an unintended pattern separation for data control, user interface, and application logic because code was compartmentalized in such a way.
- Compartmentalization for different devices was a responsive choice afterward.

4.4HOW THE SYSTEM WORKS

- **User login Page:** Provides an overview of the Hydro Fleet service, with navigation links to other pages. It includes the logo and navigation bar with links to Home, Suppliers, Prices, and Contact Us.

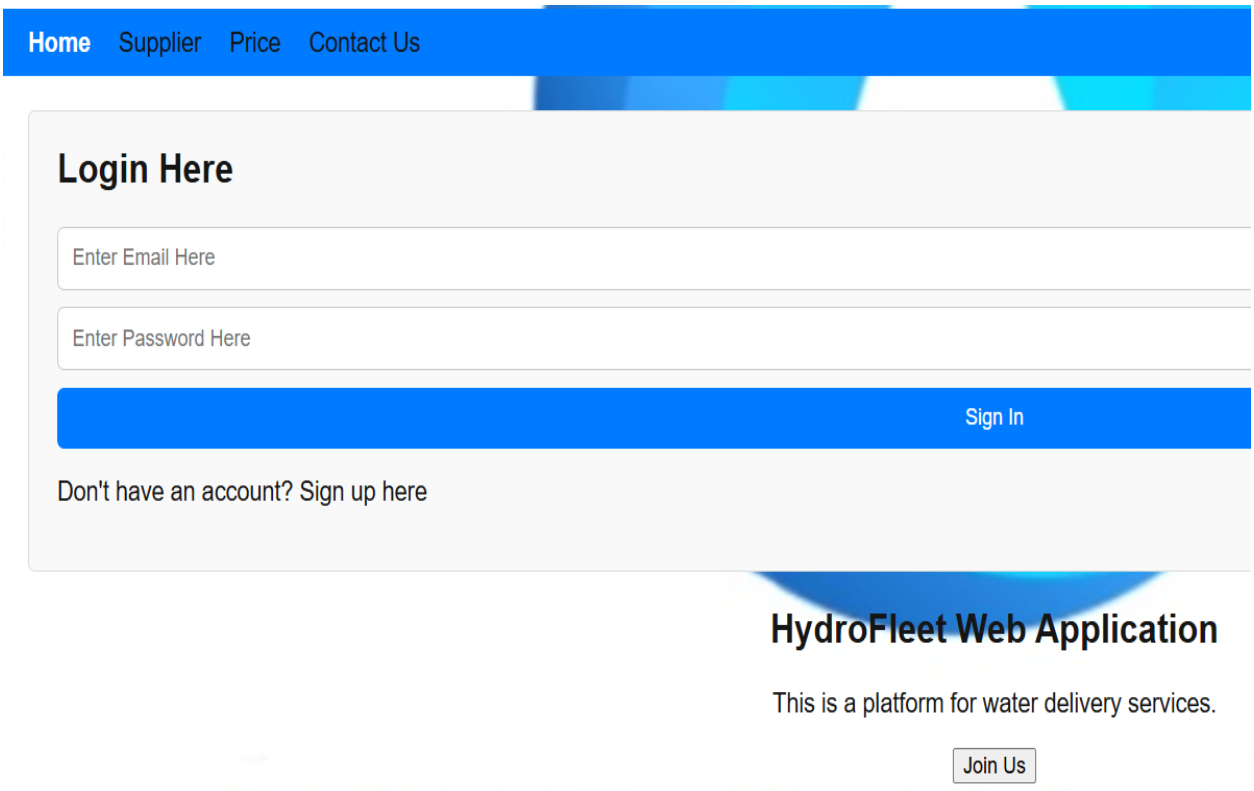

Figure4.4.1: User Login Page

- **Supplier Page:** Allows suppliers to log in or sign up. This page manages supplier data and interactions. And after signing in they will be redirected to their supplier-request, where they will be able to accept or decline request.

Figure4.4.2: Supplier Sign Page

- **home Page**: Users can request water delivery, specifying the quantity and delivery location as well as the address.

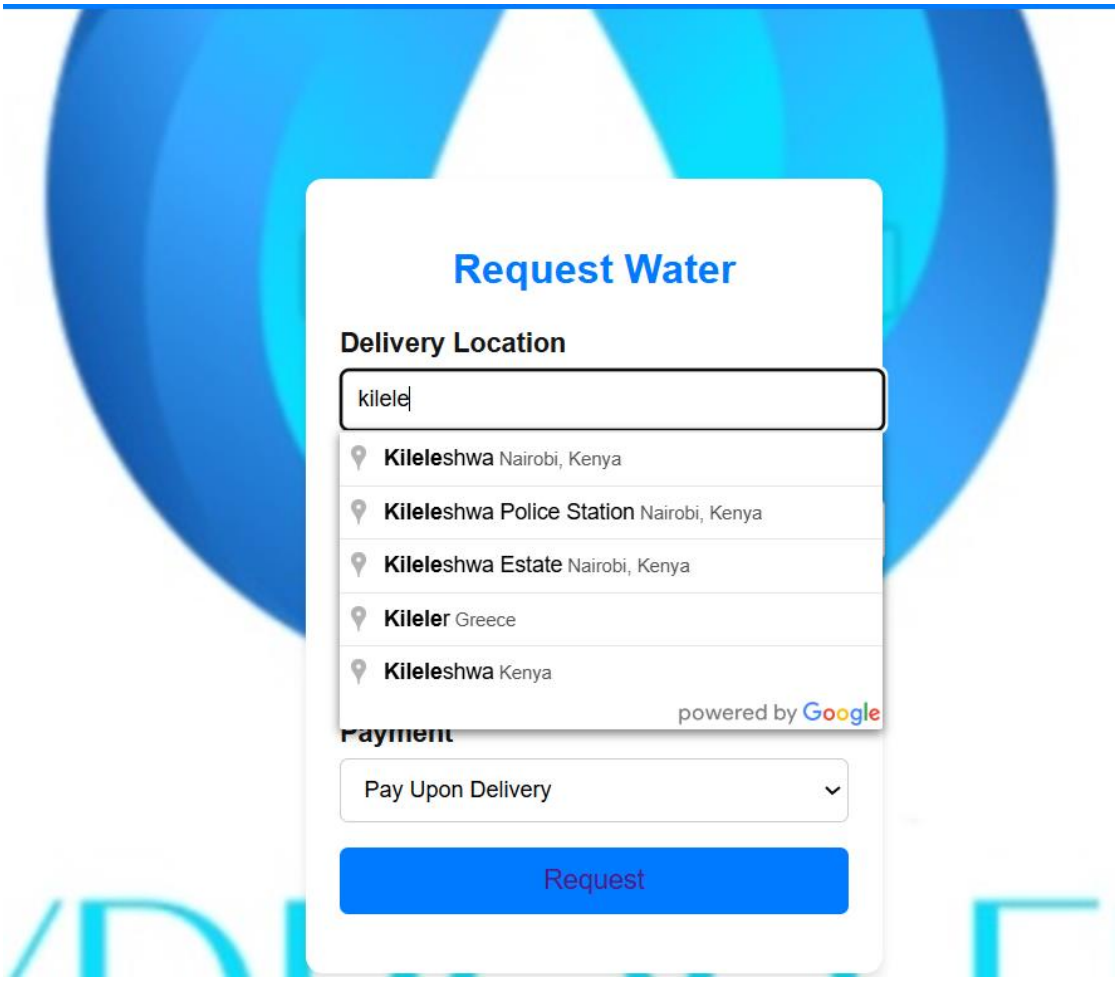

Figure4.4.3: Request Water

- **Contact Page:** Displays a name, email and a form for users to reach out with inquiries, feedback and problems regarding the website.

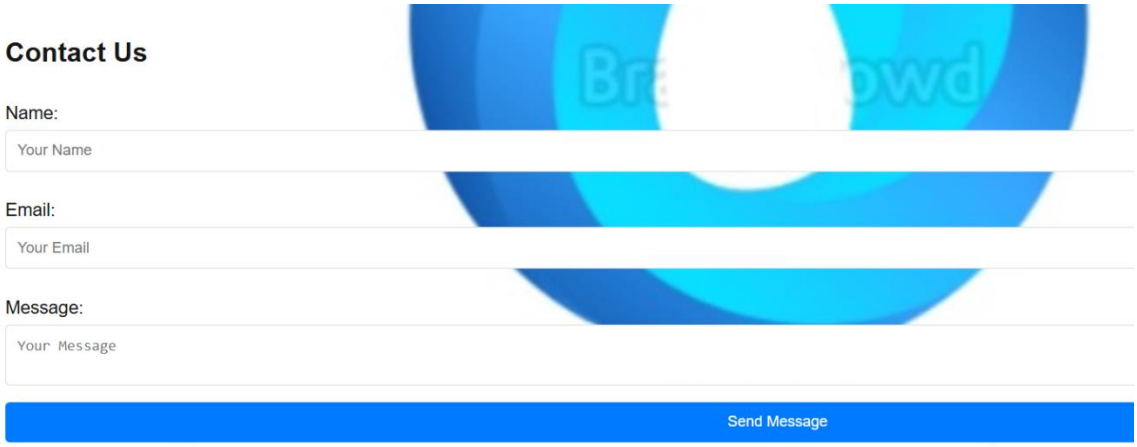

Figure 4.4.4: Contact Us Page

- **Local Host Server:** These allow users and suppliers to register or log in securely. The forms are processed by the local host to see if the user is in the database.

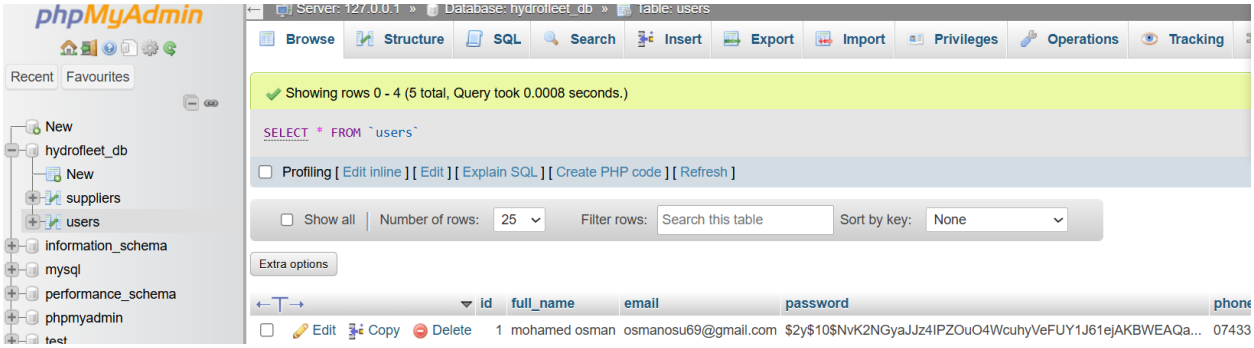

Figure 4.4.5: My Local Host for My Data for My Web Application

- **Pricing-Page:** these allows the user to see the prices of the water regarding there number of liters of their tanks.

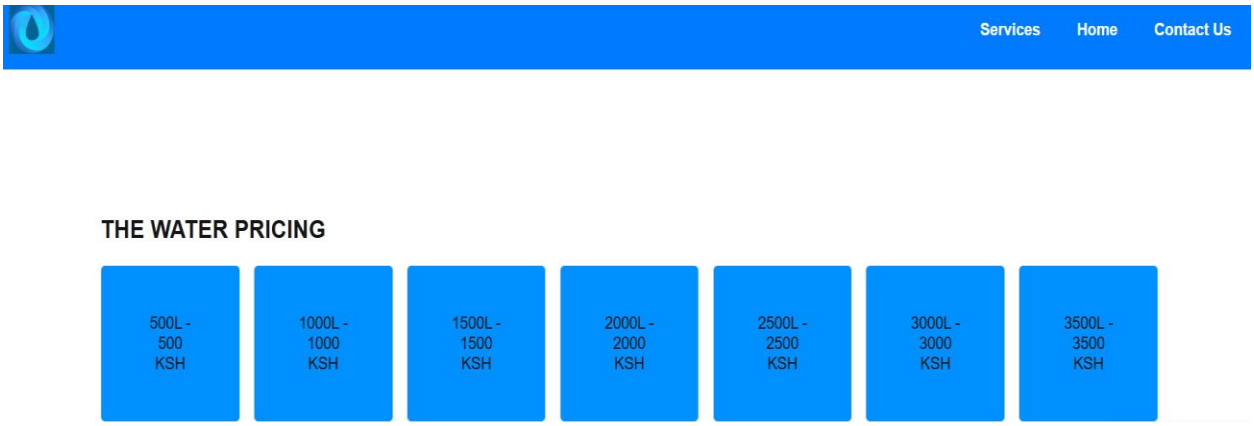

Figure 4.4.6: Pricing of the Water

4.5SPECIAL FEATURES

Color scheme is blue and white because it's representative of water, the project theme, and a color treatment was used in color choice to divert to this proper color scheme from the get-go.

- **Navigation Bar:** Allows access to all key components of the site and subsections offering additional capabilities.
- **User Interface:** Application employs a simplistic design approach so users aren't bogged down with overcrowded distraction.

1.PHP Backend Functionalities

- **Handling Requests:**
- **PHP:** is used to process user requests submitted via the Request Page. This involves capturing form data, validating it, and storing it securely in the database for further processing.
- **A local PHP API:** was integrated to streamline communication between pages. The API acts as a middle layer, ensuring data consistency and smooth transitions between:
    - The Request Page, where users submit their water delivery requests.
    - The Supplier_ request Page, where suppliers receive, review, and respond to these requests.

2. Delivery Workflow:

- **Request Processing:** When a user submits a request, the PHP API facilitates the transfer of this data to the Supplier Page. Suppliers are notified about new requests and can accept or decline them.
- **Response Handling:** After a supplier responds to a request, the API communicates the decision back to the user, displaying whether the request was accepted or declined.
- **Real-Time Updates:** The system ensures that both users and suppliers are kept informed throughout the request lifecycle, fostering efficient communication.

3. Data Management:

- **PHP** enables secure storage and retrieval of user and supplier data in the database. This includes water delivery requests, supplier responses, and other relevant records.
- **The memory** management feature of PHP was utilized to efficiently process and handle large datasets, ensuring a seamless user experience even under high demand.

4.HTTP APIs and long polling

- **A HTTP APIs with long polling** were used because they are easy to set up and maintain while the simulating real time notification effectively it is a little bit slow but it will work well compared to web socket developed specifically for Hydro Fleet, ensuring tight integration between the frontend and backend components.

- The API manages routing and logical flow for all major interactions, ensuring that:
    - Data from the Request Page is correctly sent to the Supplier Page.
    - Decisions from suppliers (accept or decline) are accurately relayed back to the users.

CHAPTER FIVE: CONCLUSION, EVALUATION AND FURTHER WORK

5.1 INTRODUCTION

This chapter summarizes the development and outcomes of the Hydro Fleet web application. It provides a critical appraisal of the work completed, discussed challenges faced, and outlines further developments that could enhance the application. The following sections will address these topics systematically.

5.2 REVIEW OF OBJECTIVES

The objectives of the Hydro Fleet web application, as outlined in Chapter One, were to create a user-friendly platform for water delivery services featuring Google Maps integration that included the autocomplete instead of a full functioning map, payment options is payment upon delivery be that is the safest option to reduce any sign of fraud or theft , and a robust supplier management system where they can enter their account and be able to see incoming request nd be able to accept or decline the request. These objectives have been met as follows:

- Google Maps was successfully integrated to provide location-based services for users.
- The payment system allows for seamless transactions in Kenyan shillings.
- A combined sign-up/sign-in system for suppliers ensures efficient management of supplier accounts.

5.3 FUTURE DEVELOPMENTS

While the hydro Fleet web application meets its current objectives, several areas for improvement have been identified:

- Enhance the user interface for better accessibility and engagement.
- Introduce real-time tracking for water delivery vehicles.
- introduce a real-time map in the mobile application.
- Expand payment methods to include in and mobile money options.
- Develop a mobile app version for Android and iOS platforms.

5.4 CHALLENGES FACED

Where does it go right with the hydro Fleet web application development? - Google Maps and geolocation work reliably.

- Payment system is concurrent and compliant with the area's regulations.
- Web frontend is responsive and user-friendly for novices with little directed help.
- Development vs. anticipated timeline.

5.5 CONCLUSIONS

Thus, the Hydro Fleet web application meets the need for a cohesive water delivery application. With project objectives met, it will serve the community for years to come along with an in-time and relative location water delivery solution. Any future additions and enhancements will merely build upon this achievement.

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APPENDIX

The appendices include supplementary materials to support the thesis and provide detailed documentation for technical and practical purposes

Appendix 1: Plagiarism Report

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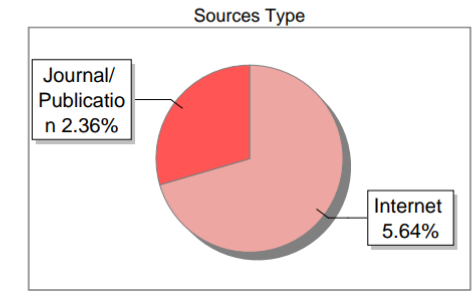

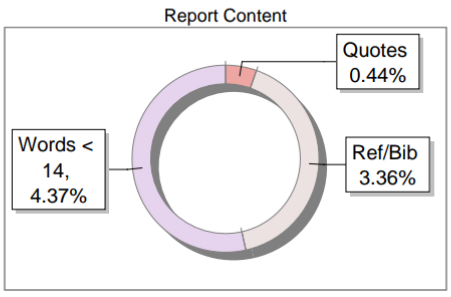

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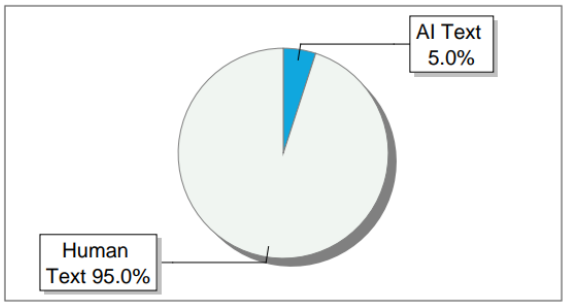

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Appendix 2: Sample Code

Below is a sample of the primary code used in the hydro fleet web application to integrate google maps API and delivery details for the home page. We look at it has html java script and PhP.

```php
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Home</title>
    <link rel="stylesheet" href="stylehf.css" />
    <script src="https://ajax.googleapis.com/ajax/libs/jquery/3.6.0/jquery.min.js"></script>
    <script src="https://maps.googleapis.com/maps/api/js?key=AIzaSyCb2ZgdCGeXxjS66exmS1cSM9F2uoB6asg&libraries=places"></script>
</head>
<body>
    <nav>
        <div class="logo">
            <img src="large.png" alt="HydroFleet Logo" />
        </div>
        <ul class="nav-links">
            <li><a href="supplierpage.php">Supplier</a></li>
            <li><a href="pricing.php">Price</a></li>
            <li><a href="contact uspage.php">Contact Us</a></li>
        </ul>
    </nav>
    <div class="container">
        <div class="request-section">
            <?php if (isset($_GET['message'])): ?>
                <p><?php echo htmlspecialchars($_GET['message']); ?></p>
            <?php endif; ?>
            <h2>Request Water</h2>
            <form action="suppliermanagement.php"  method="post">

                <label for="location">Delivery Location</label>
                <input type="text" id="location" name="location" placeholder="Enter location">

                <label for="amount">Amount (Litres)</label>
                <select id="amount" name="amount">
                    <option value="500L">500L</option>
                    <option value="1000L">1000L</option>
                    <option value="1500L">1500L</option>
                    <option value="2000L">2000L</option>
                    <option value="2500L">2500L</option>
                    <option value="3000L">3000L</option>
                    <option value="3500L">3500L</option>
                    <option value="4000L">4000L</option>
                    <option value="4500L">4500L</option>
                    <option value="5000L">5000L</option>
                    <option value="5500L">5500L</option>
                    <option value="6000L">6000L</option>
                    <option value="6500L">6500L</option>
                    <option value="7000L">7000L</option>
                    <option value="8000L">8000L</option>
                    <option value="8500L">8500L</option>
                    <option value="9000L">9000L</option>
                    <option value="9500L">9500L</option>
                    <option value="10000L">10000L</option>
                </select>

                <label for="payment">Payment</label>
                <select id="payment" name="payment">
                    <option value="delivery">Pay Upon Delivery</option>
                </select>

                <button type="submit">submit</button>
            </form>
        </div>
    <script>
        function initAutocomplete() {
            // Initialize autocomplete for location input
            const locationInput = document.getElementById('location');
            const autocompleteLocation = new google.maps.places.Autocomplete(locationInput);
        }

        // Call initAutocomplete after the API script is loaded
        window.onload = initAutocomplete;
    </script>
    <script src="https://maps.googleapis.com/maps/api/js?key=AIzaSyCWjlM5k6UDc6xbOaZ3RzwCR_NofUcAopU&libraries=places&callback=initAutocomplete" async defer></script>
</body>
</html>
```