ONLINE BIRTH CERTIFICATE MANAGEMENT SYSTEM

CASE STUDY: TORORO MAIN HOSPITAL

BY

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BU/UP/2021/0922

A PROJECT REPORT SUBMITTED TO THE DEPARTMENT OF COMPUTER STUDIES FOR PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF BACHELOR OF INFORMATION TECHNOLOGY OF BUSITEMA UNIVERSITY

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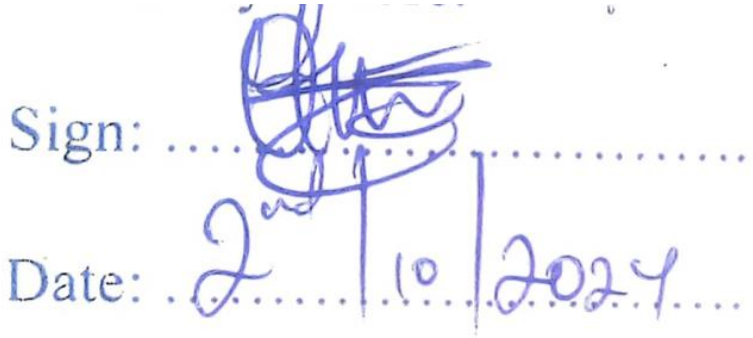
MARCH, 2024

DECLARATION

I, OTOGO TOBIAS, with Registration number BU/UP/2021/0922 hereby declare that this Project Report is original and has not been published or submitted for any other degree award to any other University before.



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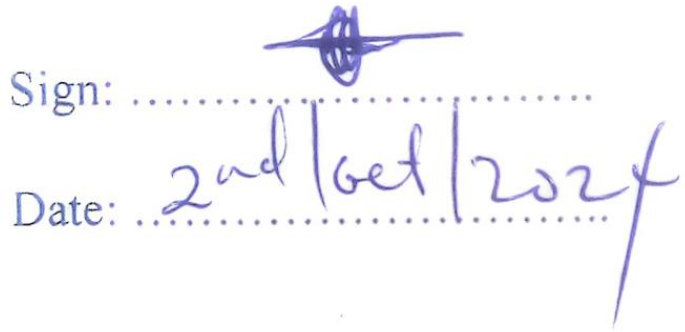
APPROVAL

This is to acknowledge that this project report is for OTOGO TOBIAS, Registeration number BU/UP/2021/0922. It was done under mu supervision and was completed successfully.



MR. OBOTH ANDREW

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DEDICATION

Firstly, I thank the Almighty God who has been with me and successfully enabled me to complete with a sound mind and good health, His Mercy is Sufficient.

I then dedicate this report to my inspiration of all times my father **OMOLLO VICENT.** Sincerest appreciacion to my lovely uncle **HIS EXCELLENCY NELSON OCHEGER** and my Aunt **JULIANA ATUBASISE** as well as my dearest siblings that is to say **OMAL JOHN BAPTIST**, **NYAPENDI KETTY**. Thank you so much for the support and may the Almighty reward you abundantly.

I also dedicate this report to my dear supervisor **MR. OBOTH ANDREW** and **MR. KISANGALA GERALD** who guided me on the dos and don'ts of making this report a success. For if it was not them, I would not successfully reach the top of this rock.

Lastly, I would like to express my sincere gratitude to my ten course mates: Etyono Isaac, Akuma Jamal, Okello Isaac Maxwell, Chesang Gloria and the rest. I dedicate this report to them too, since I wouldn't have completed this research without their help. Thank you, my dear friends once again.

ACKNOWLEDGEMENT

I would like to thank the **Almighty God** for enabling me pass through the entire period of my research and doing of my project

This attachment was successful due to the cooperation, guidance and support of a number of people who have enabled me gain much more than the scholastic aspects the program could have given

A special feeling of gratitude goes to my lovely Uncle, **HIS EXCELLENCY NELSON OCHEGER** for continuously extending his strong words of encouragement as well as financial support throughout the research period. I also acknowledge my beloved Father, **OMOLLO VICENT** for always being there for me and financial support as well.

Furthermore, I would like to also appreciate the guidance and support of my fellow coursemates especially **Etyono Isaac, Ocen Isaac Luis, Akuma Jamal, Donga Samuel, Chesang Gloria, Nandutu Hillda Kitui** and the rest throughout the entire research period. May the good God bless you all abundantly.

In a special way, I also thank my supervisor and a friend, **MR. KISANGALA GERALD** for his support and kind words before and during my research and developing pf the project.

Lastly, I would like to thank my Supervisor, **MR. OBOTH ANDREW** for his un-ending encouragement and guidance and support during my entire research. You will forever be my Hero.

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LIST OF ACRONYMS

OBCMS	Onilne Birth Certificate Management System
RAD	Rapid Application Development
RAM	Random Access Memory
DFD	Data Flow Diagram
ERD	Entity Relationship Diagram
HTML	Hyper Text Markup Language
CSS	Cascading Style Sheet
SAD	System Analysis and Design
PHP	Hyper Text Pre-Processor
GUI	Graphical User Interface
ROM	Read Only Memory
NIN	National Identification Number

ABSRACT

Online birth certificate management system was designed to allow the parents of the new born babies to easily acuire their birth certificates with delay, errors among others.

The main objective of this project was to develop online birth certificate management system.

The methodologies used include the Structured System Analysis and Design (SSAD) which was used for analysis and designing the system as well as the RAD (Rapid Application Development) which was easy to deliver a working system with all the modules worked upon one after the other.

For the development of the online birth certificatemanagement system, PHP was utilized for server-side scripting to handle data processing and logic. MySQL was employed as the relational database management system to store and manage birth certificate records efficiently.

Together, PHP and MySQL enabled the creation of a dynamic, responsive and robust system capable of handling multiple requests and maintaining data integrity.

In conclusion, from the various tests carried out, the designed online birth certificate management system was found to be reliable and practical thus meeting the intended objectives of the researcher. The system also makes it easy to track the birth records fluently and print them.

CHAPTER ONE

1.0 Introduction

A birth certificate is an official document issued by government authority that records the details of a person's birth, including their name, date, place of birth, parents name among others(Pais 2002).

A birth certificate serves as legal documentation of one's identity and age, essential for various activities for instance marriage, employment, and legal proceedings(Laub and Sampson 2001). In many developing nations, lacking a birth certificate can deny access to healthcare, social security, and education (World Bank, 2018). Moreover, accurate registration of births aids in population statistics crucial for effective planning, notably in healthcare (World Health Organization, 2015).

An online birth certificate management system allows users of an organization to manage the birth certificates of their new born babies(ISAH 2017).

In recent years, the digitization of essential governmental services has emerged as a paramount initiative to streamline processes, enhance accessibility, and mitigate bureaucratic complexities(Latupeirissa, Dewi et al. 2024). One such critical service is the management and issuance of birth certificates, a fundamental document that serves as a cornerstone in establishing one's identity and accessing various rights and privileges(Apland, Blitz et al. 2014).

Across various nations, the management of birth certificates has traditionally relied on burdens of paper work based systems. Citizens would typically apply for birth certificates through physical forms, which would then be processed manually by government agencies(Cohen and Eimicke 2001). This manual process often led to errors, delays and inefficiencies, hindering the timely issuance of crucial documents(Hughes 2008).

However, with the coming of digital technologies, several countries have embraced online birth certificate management system to address these challenges. These systems bring about internet-based platform to allow citizens to conveniently apply for, track, and obtain their birth certificates from the comfort of their homes(Patra, Bhattacharya et al. 2021). By digitizing the process, governments aim to streamline the workflows, reduce processing times and enhance overall service delivery(Latupeirissa, Dewi et al. 2024).

Recognizing these shortcomings, the implementation of an Online Birth Certificate Management System presents a transformative solution that leverages digital technology to revolutionize the issuance and management of birth certificates(Gelb and Metz 2018). This system integrates user-friendly online platforms with robust backend infrastructure to facilitate seamless interactions between citizens and government agencies(Karantjias and Polemi 2009).

1.1 Background of the study

Tororo Main Hospital, located in the heart of Tororo district, Uganda, servers as a crucial health care hub for the local population. With a growing number of births occurring within Tororo district annually, the hospital plays a pivotal role in the issuance and management of birth certificates of the newborns. However, like many other health institutions in the region, Tororo main hospital deals with outdated and inefficient methods of birth certificate management, leading to various challenges.

Currently, the process of obtaining a birth certificate in Tororo main hospital is all about paper-based approach. When a child is born, the parents or the guardians are required to fill out manual forms provided by the hospital's administrative staff. These forms collects essential information such as the child's name, date of birth, parent's details and other necessary data required for the issuance of birth certificate.

Once the forms are completed, they undergo manual processing by hospital personnel, this process involves data entry into physical registers and the preparation of hand written documents, including birth notifications records and other administrative paperwork. Due to the manual nature of these tasks, delays and errors are common occurrences, resulting in prolonged waiting times for parents seeking for birth certificates of their newborn babies.

With that, one of the primary problem that need urgent attention at Tororo main hospital is the inefficiency and the ineffectiveness of its current birth certificate management system. This does not only affect the hospitals ability to provide timely and accurate services to its patients but also undermines the overall integrity and reliability of the birth certificate issuance process.

Addressing these challenges requires a fundamental shift towards a more modern and streamlined approach to birth certificate management, by implementing an online birth certificate management system, Tororo main hospital will overcome the limitations of its current paper-

based processes and improve the efficiency, accuracy and accessibility of birth certificate services for the entire local community. Such a system would not only enhance the hospitals operational efficiency, but also ensure the timely and secure issuance of birth certificates thereby contributing to improved health care delivery and administrative effectiveness in Tororo district.

1.2 Problem statement.

Over the years, birth certificate processing has advanced notably in developed nations, yet progress in developing nations remains insufficient. Further research is required to bridge this gap and automate the process. Tororo Main Hospital exemplifies this need for improvement.

The manual processing of birth certificates applications results in prolonged waiting times for parents and guardians, causing frustration and inconvenience, delays occur at various stages of the process from form submission to data entry and document generation, hindering hospitals ability to provide timely services to its patients.

The reliance on manual data entry contributes too errors and inaccuracies in birth certificate records. Spelling mistakes, typographical errors undermine the reliability of the documents issued by the hospital raising concerns about the accuracy and integrity of the information provided to service users.

There was therefore need to design and implement an online birth certificate management system to modernize and transform digitally in the birth certificate system at Tororo Main Hospital to improve efficiency, accuracy and data security and also to eliminate paperwork and delays in the time of processing.

1.3 Main objective

The main objective is to develop an online birth certificate management for health facilities and other government authorities

1.4 Specific Objectives.

i. To review the literature and gather the requirements for developing an online birth certificate management system
ii. To analyze the requirements and design an online birth certificate management system
iii. To implement an online birth certificate management system
iv. To test and validate the online birth certificate management system

1.4 Significance of the Study

The significance of the Online Birth Certificate Management System lies in its transformative potential to modernize service delivery, enhance citizen experiences, and strengthen administrative capabilities

The main justifications for an Online Birth Certificate Management System were;

i. To Enhance Accessibility and Inclusivity: By offering online birth certificate services, the system ensures that citizens, regardless of location, can easily access vital documentation without the need for physical visits to government offices.

ii. To Improve Efficiency and Streamlined Processes: Through digitization, bureaucratic processes are streamlined, reducing paperwork and processing times, thereby optimizing resource allocation within government agencies.

iii. To Ensure Enhanced Data Integrity and Security: Centralized databases and encryption protocols ensure the accuracy, confidentiality, and integrity of birth records, bolstering citizen trust in government services.

iv. To Empower Citizens with Self-Service Options: Citizens can independently track application status, request amendments, and download digital certificates, fostering empowerment and accountability.

v. To Achieve Cost Savings and Resource Optimization: Digital processes reduce reliance on manual tasks and paper-based documentation, resulting in cost savings and more efficient resource allocation.

vi. To Align with Digital Governance Trends: Implementation reflects a commitment to leveraging technology for improved service delivery, demonstrating responsiveness to citizen needs and technological advancements.

vii. To Facilitate National Development Goals: Access to accurate birth certificates is crucial for individuals to access various rights and opportunities, contributing to broader national development objectives such as social inclusion and economic growth.

1.5 Scope of the Study

The scope provides for the boundary of the research in terms of depth of investigation, content, and methodology, geographical and theoretical coverage as below;

1.6 Depth of Investigation:

The research aims to search deeply into various aspects of the Online Birth Certificate Management System, including its design, implementation, functionality, user experience, and impact on citizen engagement and administrative efficiency. It involves a comprehensive analysis of system features, processes, and outcomes to uncover insights into its effectiveness and areas for improvement.

1.6.1 Content:

The research will cover a wide range of content related to the Online Birth Certificate Management System, such as its technological infrastructure, user interfaces, data management protocols, security measures, user feedback mechanisms, and policy implications. It will explore both the technical aspects of system development and the socio-economic implications of its adoption and usage.

1.6.2 Geographical Coverage:

The study will have a geographical scope that encompasses the jurisdiction(s) where the Online Birth Certificate Management System is implemented. It may involve multiple regions, districts, or municipalities within a country, depending on the scale of system deployment and the diversity of user populations. Comparative analyses across different geographical areas may also be conducted to identify variations in system performance and user experiences.

1.6.3 Theoretical Coverage:

The research will draw upon relevant theoretical frameworks and concepts from fields such as information systems, public administration, governance, and technology adoption. Theoretical perspectives such as user-centric design, digital governance, technology acceptance, and organizational change will inform the analysis and interpretation of research findings, providing a theoretical lens through which to understand the dynamics of system implementation and usage.

1.6.4 Research Contributions.

Developing an Online birth certificate Management System contributes a lot in different ways in the management of birth records and accessibility in many ways including;

1) Technological Innovation: Research on the development and implementation of the Online Birth Certificate Management System contributes to technological innovation in the field of e-government and digital service delivery. It explores new methodologies, frameworks, and technologies for digitizing administrative processes, enhancing user experiences, and improving the efficiency and effectiveness of government services.
2) Administrative Efficiency: By examining the impact of the Online Birth Certificate Management System on administrative processes, the research contributes to insights into streamlining bureaucratic procedures, reducing paperwork, and optimizing resource allocation within government agencies. It identifies best practices and lessons learned for improving administrative efficiency and service delivery in other domains.
3) Citizen Empowerment: Research on the Online Birth Certificate Management System contributes to understanding the role of digital platforms in empowering citizens to access government services, participate in governance processes, and exercise their rights and responsibilities. It explores the implications of self-service options, transparency measures, and user-centric design for citizen engagement and empowerment.
4) Data Management and Security: By investigating data management protocols, encryption mechanisms, and security measures within the Online Birth Certificate Management System, research contributes to advancements in safeguarding sensitive information, protecting privacy rights, and ensuring compliance with data protection regulations. It informs strategies for mitigating risks of data breaches, identity theft, and unauthorized access in digital governance systems.

1.6.5 Conclusion.

The implementation of an online birth certificate management system holds immense potential to streamline processes, improve accessibility, and enhance transparency. By addressing the shortcomings of the existing manual system, the online system can significantly benefit both citizens and government authorities.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter presents the state of art and the operation in the online birth certificate management system. It described the following sections;

2.2 BIRTH CERTIFICATE

Birth certificates are vital documents issued by governmental authorities to officially record the birth of a child. They serve as legal proof of identity and citizenship, providing essential information such as the individual's name, date and place of birth, parentage, and other pertinent details. Birth certificates play a fundamental role in various aspects of life, including obtaining identification documents, enrolling in educational institutions, accessing healthcare services, and establishing eligibility for social benefits. (National Center for Health Statistics. (2019))

The issuance and management of birth certificates have traditionally been conducted through paper-based systems, wherein records are manually processed and stored in physical archives. However, the coming of digital technologies has opened the way for the development of online birth certificate management systems, revolutionizing the way vital records are collected, processed, and accessed (World Health Organization, 2019).

2.3 SYSTEM

A system is a group of components (people, objects and processes) that work together to achieve a common goal, or multiple goals, by accepting input, processing it and producing output in an organised manner (McCallister, 2004). There are people, objects and processes in computer systems, the processes are for example computer programs and the objects are the computer hardware. Every system be it computer based or not has to accomplish the activities required for it. Therefore, what all systems have in common is a goal out of some desire to overcome a certain set of tasks (Webster & Watson, 2002).

A system consists of three major components including the input which implies something that goes into the system, the processes which is defined as type of work that must be accomplished in the system and lastly the output which is a desired product that must be produced (Einsenhower, 1997). Regarding online logistics management system, the input includes the

product ordered by the customer, the process includes the weighing, packaging and loading of the product ordered in case of delivery to be carried out. Lastly the output is the product that is given to the customer to achieve satisfaction (Creek, 2006). The output can also be a delivery note or invoice.

2.3.0 ONLINE

The word online means anything connected to, served by or available through a system and especially a computer or telecommunications system such as the internet (Webster, 2002). This implies that the system is to operate under the direct control of a computer thus the ordering and transaction phases are to be done online

2.3.1 ONLINE SYSTEMS

Online systems are computer programs or applications that are accessible through the internet(Peterson and Davie 2007). They allow users to interact with data and services remotely, from any device with a web browser and an internet connection. These systems enable users to interact with data, perform tasks, and access services through a web interface (Houlem, 2017). Examples of online systems include: Websites: These are static or dynamic web pages that provide information or services to users. Web applications: These are interactive applications that run on a web server and can be accessed through a web browser. Examples include online banking systems, online shopping platforms, and social media sites. E-commerce platforms: These are online systems that allow businesses to sell products and services online. Online learning platforms: These are systems that allow users to access educational resources and courses online. Cloud-based applications: These are applications that are hosted on remote servers and can be accessed through a web browser{Miller, 2008 #20}.

2.4 DESIGN AND DEVELOPMENT OF ONLINE SYSTEMS

The design and development of online systems have become a cornerstone of our digital existence, transforming the way we interact, transact, and access information. In the fast paced world of technology, the creation of these systems is a dynamic and iterative process that requires a delicate balance of creativity, technical expertise, and a deep understanding of user needs (McCallister, 2013). The design and development of online systems involves the following stages;

Requirements Analysis: The journey commences with a thorough requirements analysis, where the goals and objectives of the online system are outlined. This phase involves close collaboration with stakeholders to identify both functional and non-functional requirements, setting the stage for a blueprint that aligns with the intended purpose and user expectations (Andreas, 2017).

System Architecture: The architectural framework of an online system is akin to its skeletal structure, determining its resilience and adaptability. Architects make crucial decisions on the overall design, choosing between micro services, monolithic, or other architectures. Scalability, security, and performance considerations guide this phase, laying the groundwork for a resilient digital ecosystem (Graham, 2013).

Database Design: At the heart of every effective online system lies an efficiently designed database. Database architects work to create a robust schema and choose an appropriate Database Management System (DBMS). The goal is to ensure seamless data storage, retrieval, and management, forming the backbone for the system's functionality (Meyers, 2009).

User Interface (UI) Design: The user interface is the window through which users interact with the online system. UI designers craft wireframes and mockups, focusing on creating an intuitive, accessible, and aesthetically pleasing interface. The result is a user-centric design that fosters engagement and ease of use across various devices (Antonn, 2015).

Backend Development: The backend, hidden from the user's view, is the engine that powers the system. Backend developers implement server-side logic using programming languages like Python, Java, or Node.js. APIs are developed to facilitate communication between the frontend and backend, ensuring seamless data exchange and functionality (Ethel, 2013).

Frontend Development: Frontend developers breathe life into the design, using technologies like HTML, CSS, and JavaScript. Frameworks such as React or Angular are employed to create a responsive, dynamic user interface. The frontend is the user's portal to the system, and its design is pivotal to the overall user experience (Kellerman, 2019).

Integration: The integration phase brings together the frontend and backend components into a cohesive whole. Developers establish communication channels, ensuring that data flows

seamlessly between different parts of the system. This integration is crucial for the system to operate as a unified, functional entity (Sealsy, 2009).

Testing: The testing phase is a critical checkpoint in the development process. Various testing methodologies, including unit testing and user acceptance testing, are employed to identify and address potential issues. Developers iterate on the code, ensuring that the system meets the predefined quality standards before deployment (Museal, 2008).

Deployment: Once successfully tested, the online system is ready for deployment. Developers choose a hosting environment and configure servers and databases for public access. The deployment phase demands meticulous planning to minimize downtime and ensure a smooth transition from development to live operation (Arrior, 2012).

2.5 ONLINE BIRTH CERTIFICATE MANAGEMENT SYSTEM

An online birth certificate management system refers to the set of interrelated components that work together on a network in order to help register birth records, obtain birth certificates and also to track birth records of the citizens of the country.

2.5.1 DESIGN AND DEVELOPMENT OF ONLINE BIRTH CERTIFICATE MANAGEMENT SYSTEM

The digitization of government services has become increasingly prevalent in modern society, driven by the need for efficiency, accessibility and transparency(Latupeirissa, Dewi et al. 2024). In line with this trend, the implementation of online systems for managing vital records, such as birth certificates, has emerged as crucial endeavor for government agencies worldwide (Organization 2013)

In this chapter, we present the design and development process of an online birth certificate management system, aimed at streamlining the issuance and management of birth certificates through a secure and user-friendly online platform(Onyango 2011). The system addresses the challenges associated with traditional paper-based processes, offering stakeholders a seamless and efficient means of accessing and managing vital records(Iroju, Soriyan et al. 2013).

This comprehensive report will detail the various stages of the system's design and development in the following sections;

Requirements Analysis. The initial phase of the project involved a comprehensive requirements analysis to identify the needs and expectations of stakeholders, including government agencies,

users, and administrators(Zhang, Dawes et al. 2005). This analysis helped in defining functional and non-functional requirements such as user registration, certificate issuance, data security and accessibility.

System Architecture. The system architecture was designed to ensure scalability, reliability and performance(Iyer, Gupta et al. 2005). It consists of multiple layers including presentation layer, application and data layer. The architecture follows a client-server model with a centralized database for storing and managing birth records

Database design. The database design focused on efficiency and data integrity (Gupta & Mittal, 2018) it includes tables for storing user information, birth records, administrative logs and audit trails. The relational database model was chased for its flexibility and ease of maintenance

User interface design. The user interface was designed with a user-centric approach, considering ease of navigation and intuitive interaction (Brown, 2021). It features a simple and clean layout with functionalities categorized logically. The design follows responsive principles to ensure compatibility across various devices and screen sizes

Backend development. The backend development involved the implementation of business logic, data processing and security features (Chen et al., 2019). It was developed using robust programming languages and frameworks such as python and Django. The backend handles user requests, validates inputs interacts with the database, and generates birth certificates dynamically.

Frontend development. The frontend development focused on creating an engaging and accessible user interface (Lee & Kim, 2020). It was developed using HTML, CSS and JavaScript technologies, with frameworks like React.js for enhanced interactivity. The frontend communicates with the backend via API calls to retrieve and display data.

Integration with external systems. Integration with external systems such as government databases and payment gateways was implemented to streamline processes and enhance functionality (Wu & Chen, 2019). APIs were utilized for seamless data exchange and interoperability with other systems.

Security measures. Robust security measures were implemented to safeguard sensitive data and prevent unauthorized access (Zhang et al., 2020). This includes encryption of data in transit and at rest, role-based access control, secure authentication mechanisms such as multi-factor authentication, and regular security audits.

Testing. Comprehensive testing methodologies, including unit testing, integration testing, and user acceptance testing, were employed to ensure the system's reliability, functionality, and performance (Liu et al., 2021). Testing was conducted at each stage od development to identify and rectify issues promptly.

Deployment. The deployment process involved configuring servers, deploying application components, and conducting readiness checks (Kumar & Singh, 2018). Deployment was carried out in a staged manner to minimize downtime and ensure a smooth transition from the testing environment to production.

Training and support. Training sessions were conducted for administrators and users to familiarize them with the system's features and functionalities (Huang & Chen, 2020). Additionally, ongoing technical support and assistance were provided to address any issues or queries promptly.

Continuous improvement. Continuous improvement mechanisms, such as user feedback mechanisms and agile development practices, were implemented to enhance the system's usability, performance, and reliability over time (Park et al., 2021). Regular updates and features enhancements were rolled out based on user feedback and emerging requirements.

2.6 LOOPHOLES OF THE CURRENT SYSTEM

In this section, the weaknesses of the current system that is intended to be improved are addressed include the following;

i. **Data accuracy and verification**: in some cases, birth certificate data might not ne accurately recorded or verified. This can happen due to human error during data entry or inadequate verification processes. Incorrect information on birth certificates can lead to identity issues and administrative problems later in life{Clarke, 1994 #24}.
ii. **Forgery and froud:** birth certificates are essential documents used for variuous purposes such as obtaining identification documents, accessing government services and

establishing citizenship. Therefore they can can be targets for forgery and fraud. Loopholes in the system, such as lax authentication procedures or inadequate security features on the certificates themselves, can make it easier for individuals to create fraudulent documents{Piper, 2004 #25}.

iii. **Duplicate issuance:** weakness in the system may allow for issuance of duplicate birth certificates for the same individual. This can occur due to insufficient controls in place to prevent multiple requests for the same birth record or inadequate coordination between different agencies responsible for issuing birth certificates{Organization, 2013 #26}.

iv. **Data privacy and security:** birth certificate management systes often contain sensitive personal information, including names, dates of birth, and sometimes parents' information. Loopholes in data privacy and security measures could lead to unauthorized access to this information, potentially resulting in identity theft or other forms of misuse

v. **Inadequate record keeping:** poor record-keeping practices can lead to the loss or misplacement of birth records. This can occur due to factors such as inadequate storage facilities, lack of backup procedures, or insufficient staff training{Asogwa, 2012 #27}.

2.7 RELEVANCE OF THE ONLINE BIRTH CERTIFICATE MANAGEMENT SYSTEM

This project is aimed at developing an online birth certificate management system which can be used in all health facilities and other government authorities like sub-county headquarters.

Relevance implies the merits as well as the reasons as to why the online birth certificate management system is aimed at. The following are some of the merits of the system that is to be implemented;

i. **Accessibility:** online systems increase accessibility to birth certificates, especially for individuals living in remote areas or those mobility issues. As long as there is internet access, people can easily access their birth records and request necessary documents{Johnson, 1998 #23}.

ii. **Accuracy:** online systems can help improve the accuracy of birth certificate data by reducing human errors associated with manual data entry. Automated validation checks can catch discrepancies or inconsistancies in the information provided, ensuring that the records are more accurate{Maldonado, 2015 #22}.

iii. **Security:** implementing robust security measures, such as encryption protocols and access controls, can help protect sensitive personal information stored in online birth certificate databses. Digital systems can also track access logs, providing an audit trail to monitor who has viewed or modified the records{Bishop, 1996 #21}.

iv. **Minimizing wastage of papers.** Using the digital process of obtaing birth certificates reduces on the number of westage of papers which are used manually during registering birth records. This therefore avails the papers for other better uses in other areas.

v. **Cost-effectiveness:** by reducing the need for physical infrastrucures and paperwork, online birth certificate management systems can lead to cost savings for government agencies. Additionally, citizens may save money on transportation and other expenses associated with visiting government offices

vi. **Remote Verification:** Digital birth certificates can be easily verified remotely, allowing third parties such as employers, educational institutions, and financial institutions to authenticate individuals' identities more efficiently. This remote verification capability enhances the usability of birth certificates for various purposes.

vii. **Convenience:** online birth certificate management systems allow individuals to apply for birth certificates, request copies, and duplicate information from the comfort of their home areas. This convenience saves time and effort, as individuals no longer need to visit government offices in person

2.8 REQUIREMENTS FOR DEVELOPING AN ONLINE BIRTH CERTIFICATE MANAGEMENT SYSTEM

Requirements form the basis for initiating any task. When there is a need, then we devise an action plan and proceed towards its accomplishment

Hence requirements for a software could be classified in two broad categories- functional, non-functional. The official definition of ‘a functional requirement’ is that it essentially specifies something the system should do (Théodore, 1997). The definition for a non-functional requirement is that it essentially specifies how the system should behave and that it is a constraint upon the systems behaviour. One could also think of non-functional requirements as quality attributes for of a system (ReQtest, 2012).

2.8.1 FUNCTIONAL REQUIREMENTS FOR DEVELOPING ONLINE BIRTH CERTIFICATE MANAGEMENT SYSTEM

Users of the online birth certificate management system has to be provided with the following functionality

i. Register new birth records
ii. Data authentication
iii. Obtain payment references
iv. Profile management
v. Manage birth records(delete, update and add)
vi. Print birth certificate
vii. Issue birth certificate to the citizens

As the goal of the system was to issue the citizens with birth certificates , the functionality provided through the Online birth certificate Management System was restricted to that which was most pertinent to accomplish the desired task

The Online birth certificate Management System enabled the admin to manage the users and manage the birth records by eithers verifieng or rejecting the records in the birth certificate Management System. The functions accorded to the admin included;

i. Manage users that is to say adding, deleting and updating
ii. View birth records that isb to say new, rejected, verified and all birth records
iii. Verify or reject birth recors
iv. View reports of the records
v. User support and training
vi. Track birth records

2.8.2 NON-FUNCTIONAL REQUIREMENTS FOR DEVELOPING ONLINE BIRTH CERTIFICATE MANAGEMENT SYSTEM

Non-functional requirements of a system are the quality attributes of a system, which enable it to effectively satisfy the needs of the users (Keng, 2022), The non-functional requirements include;

Usability: The system should provide an interactive user-friendly interface that is easily understandable for all users (Smidt, 2009). Availability: The System should be available at least when every birth occurs and . The system should respond to the requests within two seconds or less (Sakasawa, 2017).

Security: Only authorized users must be able to access the system and view and modify the data (Adnan, 2012).

Dependability: The system should provide consistent performance with easy registering of birth certificates and printing of birth certificates (Garvey, 2008).

Maintainability: The software should be easily maintainable and adding new features and making changes to the software must be as simple as possible (Ludwing, 2019)

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter laid out and presented the system design, data collection methods, sampling strategies, data analysis and ethical considerations that were used in the research work.

3.1 Area of study

The study was conducted at Tororo Main Hospital because of its limitations towards the acquisition and issuance of birth certificates. Henceforth, the focus was understanding the mode of operation towards the issuance of birth certificates at Tororo Main Hospital.

3.2 Data collection

The study involved data collection from 6 respondents which include 1 doctor, 3 midwives, and 2 patients (parents)

The sample was presented purposively by interview and observation methods of qualitative research.

The sampling was done purposively because my respondents are few as shown below

Respondent	**Title**	**Number**
Doctor	professional	1
midwives	Admins, HODs	3
Patients (parents)	Clients	2

3.2.1 Data collection techniques and consideration

Below are the techniques used in the data collection;

i. **Observation method:** The researcher observed that the manual method of using papers to record down the birth details and records has resulted into wasting of papers, consumption of much time during the issuance process, errors in the details due to

illiterates who enters these data compared to using automated/computerized online birth certificate management system.

ii. **Interview method:** Tangible facts were obtained from the midwives and some other parents by taking the project to their awareness and it helps in getting meaningful suggestions.

Other methods (surfing the net): the researcher was able to gather some facts regarding the topic from different sources such as magazines, newspapers, radio (east FM) and the internet to aid in the acquisition of knowledge on the research.

The data was analyzed by consensus and presented descriptively using common verbs (verbative)

3.2.2 Data Analysis

The study considered a qualitative approach to enable the researcher to get a deeper understanding of the problems. Therefore sampling considered was purposive because the number of respondents is few and the study needs a direct response from the sample.

The interview was used to collect the data because it provides direct interaction between the interviewer and the interviewee.

3.3 System Development Methodology

The major development approach employed for this project was the Structured System Analysis and Design Methodology (SSADM). SSADM follows the waterfall life cycle model starting from the feasibility study to the physical design stage of development. One of the main features of SSADM is the intensive user involvement in the requirements analysis stage. The users are made to sign off each stage as they are completed assuring that requirements are met. The users are provided with clear, easily understandable documentation consisting of various diagrammatic representations of the system (Turner, 2000). SSADM breaks up a development project into stages, modules, steps and tasks. The first and foremost model developed in SSADM is the data model. It is a part of requirements gathering and consists of well-defined stages, steps and products. The techniques used in SSADM are logical data modelling, data flow modelling and entity behavior modelling (Shaw, 2001)

The specific methodology to be employed was the Rapid application development (RAD). It is based on prototyping and iterative development with no specific planning involved. It focuses on developing applications rapidly through frequent iterations and continuous feedback.

In general, RAD approaches to software development put less emphasis on planning and more emphasis on an adaptive process. Prototypes are often used in addition to or sometimes even instead of design specifications

3.4 System Analysis and Design

Research design refers to the overall strategy utilized to carry out research that defines a succinct and logical plan to tackle established research question(s) through the collection, interpretation, analysis, and discussion of data (Maynard, 2012). There are a number of tools that were used to represent facts from the collected data. The tools included; the System Architecture, a Context Diagram, Data Flow Diagram, Usecase Diagrams, Entity Relationship Diagram and Databases. These clearly represent the raw facts gathered during the data collection process, while defining the behavior and interactions among the various components of the system as well;

3.4.1 System Architecture

This is a conceptual model that defines the structure, behavior, and other views of a system (Cooper, 2011). This was used to clearly show the interactions and behavior among the various components of the system.

3.4.2 Context Diagram

Relationships were established between the data items to show how the different entities relate with the system. The context diagram therefore shows the basic interaction of the system with its environment

3.4.3 Data Flow Diagram

A Data Flow Diagram (DFD) is a graphical representation of the flow of data through an information system. It can as well be used for the visualization of data processing. System designers usually start by drawing a context diagram to show the interaction between the 20 system and outside entities. The Data Flow Diagram shows how the data moves /flows within the system.

3.4.4 Use-Case Diagram

A use case diagram is a representation of a user's interaction with the system that shows the relationship between users and different cases in which the user is involved. A use case diagram was used to identify the type of users of the system and the different use cases

3.4.5 Entity Relationship Diagram

An Entity Relationship Diagram is a visual representation of data entities, their attributes, cardinalities and relationships. The Entity Relationship Diagram is used in database design and development to do the following, identifying entities(tables) and their characteristics(attributes), define relationships betweem entities(tables), illustrate dataflow and dependencies as well as visualize database structure and organization.

3.5 System Implementation

The tools employed in the implementation of Online Birth Certificate Management System include the following;

i. Visual Studio Code which enabled the researcher to write the dynamically generated pages easily and very quickly because it was used as the main text editor.

ii. Hypertext markup language (HTML) used to develop user interfaces with Cascading style sheets (CSS). • The system was implemented on Windows 11 GSM Operating System environment and the back end implemented using MySQL database server. • MySQL was very useful in constructing the database of the Online Birth Certificate Management System. A database is a collection of interrelated data stored with minimum redundancy to serve many users quickly and efficiently. Database was used in order to make data access easy, quick, inexpensive and flexible for the user.

iii. The front end was implemented using Hypertext Pre- processor (PHP). PHP is a server-side scripting language embedded in the HTML used to manage dynamic content, databases and session tracking. It enabled the researcher to write simple scripts directly into the HTML files. PHP made it quite easier to manage the large website by placing all the components of a web page in a single HTML file. The users were not in position to see the source code, thereby maintaining security of the source code. I used tools like PHP and HTML programming languages to implement the system interfaces in a Visual Studio Code programming environment. I also used Wamppserver64 as a server- 21 side

database tool for implementing databases. Interaction with the system interface was done by clicking and typing where asked.

3.6 Testing and Validation.

Both unit testing and integration testing were performed on the Online Birth Certificate Management System to clarify the specifications of the system to reveal possible faults and establish confidence in the system. Unit testing focused on one function at a time in that whenever the researcher designed a function, it would be tested instantly before proceeding to design another function. Integration testing was done after all the different modules had been put together to make a complete system. Integration aimed at ensuring that all the modules of the system work hand in hand and that they could be integrated to form a complete working system. In the end, user testing was performed. This involved the potential users of the system to test the system if it met their requirements. Software validation was done by the researcher to check whether the software product satisfies or fits the intended use i.e., if the software met the user requirements, not as specification artifacts or as needs of those who would operate the software only; but, as the needs of all the stakeholders (such as parents (patients, midwives, operators and administrators of the system).

3.7 Ethical Considerations during Data Collection and Analysis.

The ethical issues that were considered during data collection and analysis include the following;

i). Honesty: The data results, methods, procedures and publication status were reported honestly by the researcher. The researcher did not falsify or fabricate data and neither did he deceive the public nor colleagues on the data collected and the reasons for collecting data.

ii). Integrity: The researcher endeavored to be sincere and consistent in all his actions during the research process and kept his promises and agreements with all the users of the Online Birth Certificate Management System.

iii). Respect for intellectual property: During the course of this research project, the researcher endeavored never to copy, or plagiarize other people's work but instead considered text citation and referencing in a bid to acknowledge the source of the information, that is, statistics, tables, expressions and phrases.

iv). Objectivity: The researcher endeavored to avoid any form of systematic bias in all aspects such as natural bias in reporting data, avoided defective measuring devices, ensured proper sampling and carefully observed the respondents considering the indeterminacy principle.

v). Confidentiality: The researcher protected any piece of sensitive information that was provided by respondents and as well followed the guidelines that govern protection of confidential communications.

CHAPTER FOUR

FIELD STUDY AND SYSTEM DESIGN

4.0 Introduction

This chapter explains the results from the study of the field. It brings out the strength and weaknesses of the current system. It also describes system requirements that is to say user requirements, functional requirements abd non-functional requirements and also the design of the system (system architecture, context diagram, data flow diagram, entity relationship diagram and flow chart diagrams).

4.1 System study and analysis

The study was carried out at Tororo Main Hospital. The main purpose of the study was to find out the challenges patients get when acquiring their birth certificates when a child is born. It involved studying the current way on which parents obtain their birth certificates to identify the weaknesses and strengths. This information acquired from the study was done by employing a number of data collection methods which included observation, interview guide where the questionaires were analysed to give the basis to design a new system.

Findings from the interview

A total of 6 respondents were interviewed and the responses were presented as below;

The opinions of the respondents were solicited based on the question; how do citizens get their birth certificates when a child is born?

All the respondents pointed out that they use manual way of registering the birth records using paperswork.

The opinions of the respondent based on the question; what are some of the challenges that parents get when acquiring birth certificates; respondents included long time period before getting the birth certificate, errors emerge in due to manual way of paperwork which are difficult to change, among others

The opinions of the respondent based on the question; how long does it take for parents to acquire the birth certificates when a child is born, respondents said it can take like a month or more before issuance.

The opinions of the respondent based on the question; what measures can be taken to solve the above listed challenges, include

Many of the respondents suggested that there is a need to design an online application system

At health institutions like Tororo Main Hospital to aid citizens obtain their birth certificates as soon as the child is born and not to bring errors during the entry of the birth record. Additionally, it should improve on the efficiency, timeness, availability at Tororo Main Hospital.

The opinions of the respondent based on the question; "which features can be put in the online birth certificate management system in order to make your work far much easier during the issuance of birth certificates?"

This question was directed to the staff members at Tororo Main Hospital; the respondents suggested that I should make the administrater of the hospital to be the one to register the users of the system in order to promote data accuracy and reduce forgery by the users. That was not all, the midwife suggested that there should be a feature for the users to register the birth records and after it notifies the admin then it is the admin to verify the details then the user can now print the document/certificate, provide a payment gateway for the users to pay before printing the certificate

4.2 Current system

The current system for acquiring birth certificates tipically involves manual paperwork and processes. When someone needs a birth certificate, they usually have to visit a government office, fill out paper forms, and provide necessary documentation. This process can be time consuming, often requiring multiple visits and long wait times.

Errors can occur due to the manual nature of the process, including typos, incorrect data entry, or misplaced paperwork. These errors can lead to delays in obtaining the birth certificates or even inaccuracies on the document itself.

Overall, the process is inefficient and prone to errors due to its reliance on manual paperwork and processes.

4.3 Advantages of online birth certificate management system

The Online birth certificate management system addressed the above mentioned challenges by;

i. **Convenience:** By allowing applicants to apply online, the system eliminates the need for physical visits to government offices. Applicants can submit their requests from the comfort of their homes or any location with internet access.

ii. **Speed:** Online applications can be processed much faster than manual paperwork. Once submitted, the system can automate many steps, such as data entry and verification, leadin to quicker processing times

iii. **24/7 access**: With the online system, applicants can submit requests at any time of the day, including weeked and holidays. This provides greater flexibility and convenience for applicants who may have busy schedules.

iv. **Cost saving:** Implementing an online system can reduce administrative costs associated with processing paper forms, such as printing, storage, and manual handling. This leads to cost savings for government agencies

v. **Accuracy:** Automated data entry and validation tools help ensure the accuracy of information provided by applicants. This reduces the risk of errors compared to manual data entry, leading to more accurate birth certificates

4.4 Features of an Online birth certificate management system

Basing on the data collected, some of the features to be included in the system are given in the table below.

Requirements	Features
The user should be in position to register the birth records, manage them and also print them	Provision of register birth records form for the users to register birth records, provison of certificates form where the users can view whether the birth record they registerd have already been verified by the administrater or not,
The users of the system should be added by the administrater of the health facility and he can update user, remove user and view the users	Provision of add new user form for the admin to register new users and also provision of update user for where the admin can easily update the user

The users should be in position to print the certificates	Provision of a print button on the certificate form where a user clicks on the button and prints the certificate after confirming the payment
The administrater should be in position to track the status of the birth records and to track the user who registered the above birth details for easy follow up	Provision of interfaces such as track birth record but using the NIN (National Identification Number) of the parents of the new born babies and also provision of interface where the admin can view the birth records registered by the user and he can either verify or reject the birth record.

4.5 User requirements

The major users of the system include the hospital staffs and the administrators. Their user requirements include the following;

a) **User registration and authentication**: The administrattors should be able to create accounts for the users securely ans also authentication mechanisms should ensure the security and privacy of user data.
b) **Application submission:** users should be able to fill out birth certificate application forms online. The system should accept required documents and information securely
c) **Status tracking**: users should be able to track the status of their application in real time, notifications should be sent to users when there are updates or changes to their application status
d) **Payments processing**: the system should facilitate online payment for the application fees securely, provide various payment options to accommodate different users
e) **Document storage**. The system should be able to store documents safely and ensure privacy and confidentiality.
f) **Printing the certificates.** The system should provide an option of printinf the certificates by the users from the comfort of their homes and areas

g) **Accessibility and ease of use:** The system should be user-friendly, with clear instructions and intuitive interface design. Also accesssibilty features should be included to accommodate users with disabilities.

h) **Security and privacy**: The system should comply with data protection regulations to ensure the security and privacy of user data, also secure methods should be employed for data transmission and storage

4.6 Functional requirements

Birth certificate application. Users should be able to fill out an online application form to request a birth certificate. The form should collect necessary information such as the child's name, date of birth, parents name and other relevant details

Document verification. The system should have a mechanism to verify the authenticity of submitted documents, such as identification cards or hospital records

Certificate generation. Once an application is approaved and fees are paid, the system should generate a digital bbirth certificate, the certificate should include all relevant information and be printable/downloadable by the user.

4.7 Non-functional requirements

Non-functional requirement is any requirement that is not a functional, data or process requirement concerned with defining the precision which the solution will record or produce data. They are crucial for ensuring that the system meets necessary quality attributes and performs effectively in real-world scenarios. The following are the non-functional requirements;

i. **Performance:** System performance defines how fast a system can respond to a particular user's action under a certain workload.

ii. **Reliability:** Is the probability and percentage of the software performing without failure for a specific number of uses or amount of time.

iii. **Flexibility requirement**: Each part of the system should be independent, so that changing of one part does not affect the other part and new parts can be added to increase functionality.

iv. **Accuracy requirement**: The System should be more accurate in terms of computing the total revenue accumulated after an order is successfully delivered.

v. **Usability:** This feature concerns the users i.e. it indicates how effectively they can learn and use the system

4.8 Hardware and software requirements

4.8.1 Hardware requirements

i. The hardware requirements include;
ii. Random Access Memory (RAM) not less than 1GB
iii. A universal hard disk drive
iv. A hard disk of atleast 50GB
v. An uninterruptable power supply (UPS)

4.8.2 Software requirements

The software specifications required on the computer system include;

i. WAMPP (version 6.0)
ii. Windows 7 or higher version
iii. The system should have 32/64 bits operating system
iv. Internet browser such as google chrome

4.9 System Development Approach

The requirements determined were used to design the online birth certificate management system. The major development approach to be employed for this project is the structured system analysis and design methodology

SSADM followed the waterfall life cycle starting from the feasibility study to the physical design stage of development. One of the main features of SSADM is the intensive user involvement in the requirements analysis stage

4.10 System Design

The design follows system development methods. In this study, Rapid Application Development derived from structural system analysis and design methods was invoked. The design stages included; system architecture, context flow diagram, data flow diagram and system modelling using use case diagrams

4.10.1 System Architecture

System Architecture refers to the high-level structure and organization of a complex system. It encompasses the design of a system's components, their relationships, and how they work together to achieve the overall goals and objectives of the system

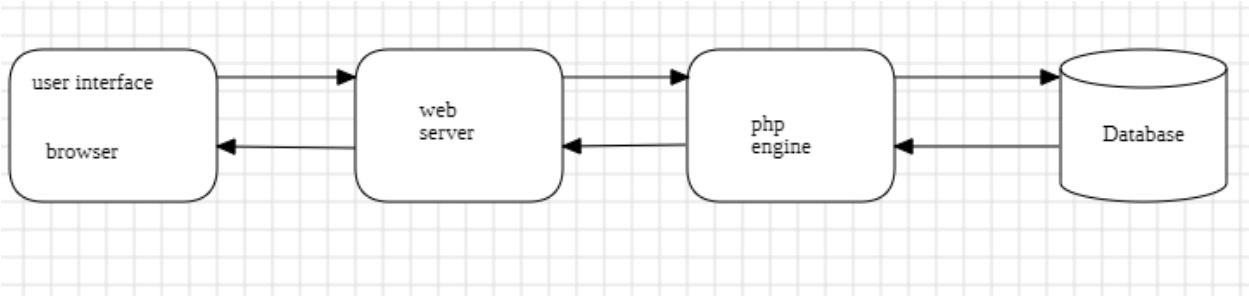


Figure 4.1: system architecture

The system user first interacts with the user interface which provides him/her with means to place a request to the database which maybe rigistering, adding user, updating, among others. The request is passed to server which processes it and include a command to link the available database, the query is executed by the database through the PHP engine which acts as a tool to transform the request to a format both the database and the server can understand. The results are passed to the user through the same process.

The Online Birth Certificate Management System proposed in the study was designed using a four layered architectural pattern which included:

Presentation layer: This represented the various ranges of devices that were used to access the Online Birth Certificate Management System via the internet.

Online Birth Certificate Management System modules. This layer represented the key features which consisted of; Administrator module, User module.

Server: This showed the server used during implementation.

Storage service: This layer covered the rapid and storage of data or information using a rational data base management system like MySQL which was used in this case.

4.10.2 Context Diagram

A context diagram is a high-level over view of the system that shows its interactions with the external entities. It is like a map that outlines the system's boundaries and its key relationships with the outside world (Webber, 2000).

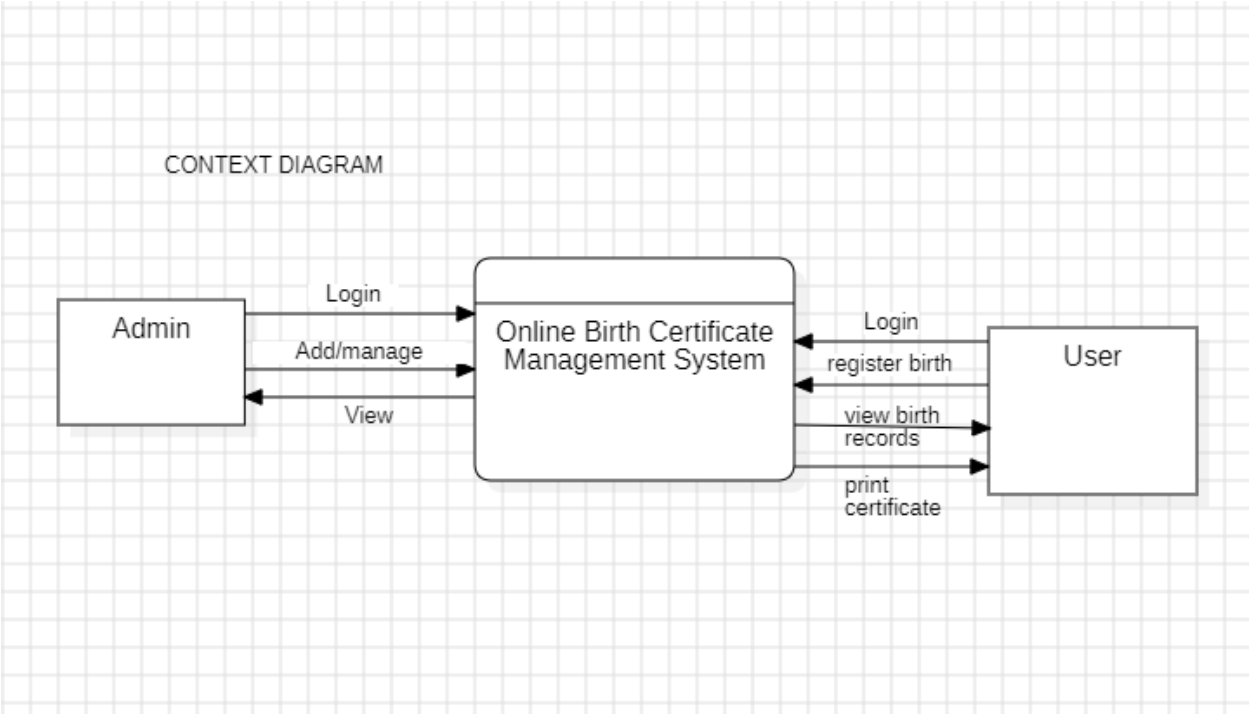


Figure 4.2: context diagram for online birth certificate management system

This diagram showed the general overview of the online birth certificate management system, and its interaction with the external entities. The main external entities were the administrator and other system users.

4.10.3 Data Flow Diagram

This is a visual representation of how data flows within a system or process. The data flow diagram summarized how data/information flowed in the system.

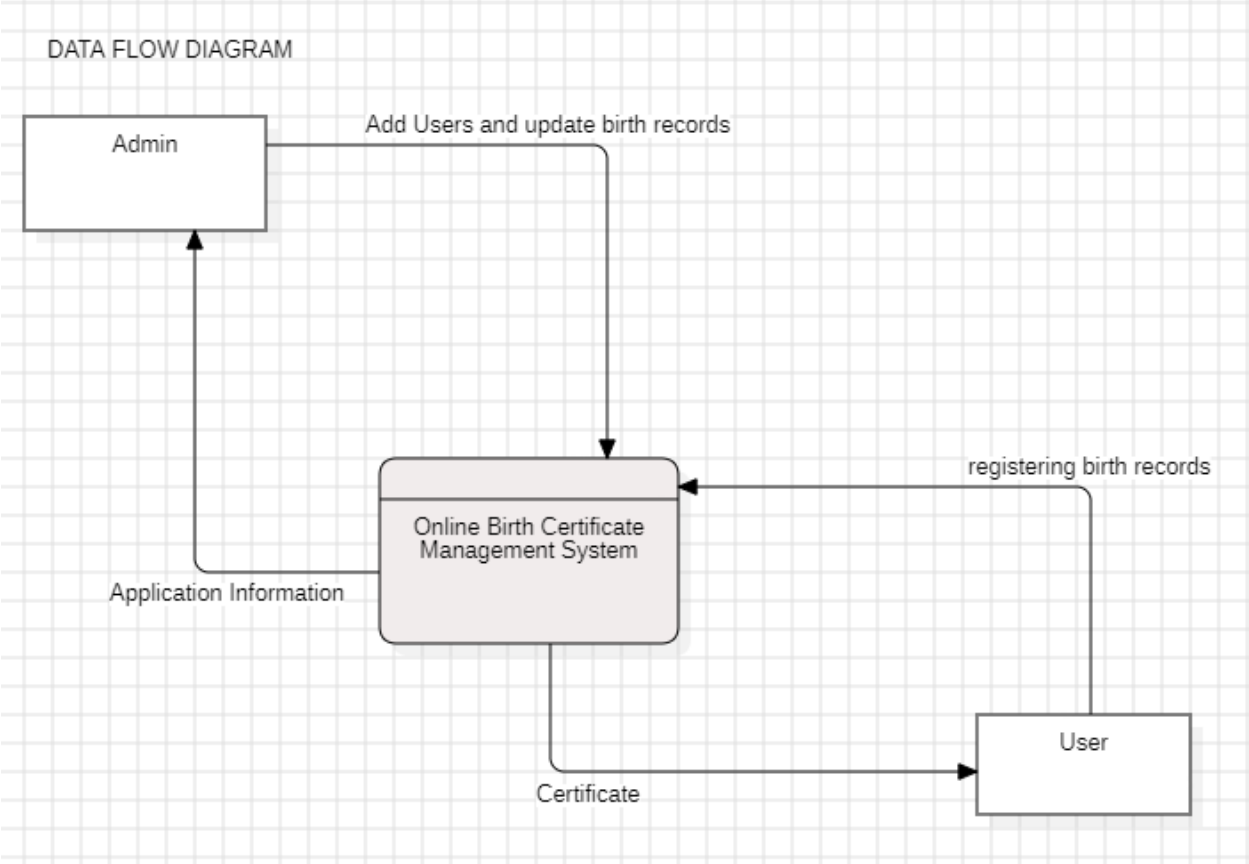


Figure 4.3: Data flow diagram for online birth certificate management system

The users could visit the form and register new birth records of different new born babies at their different pages as well as print the birth certificates after receiving it from the admin section

The administrators could Login, and register new users of the system for security purposes, as well as verifying or rejecting the birth records from the users and also could track birth records of the different users in the system.

4.10.4 Use case diagram

A use case diagram is a graphical representation of the interactions between users (actors) and a system. It visually depicts the functionalities of the system and how users will interact with the system to achieve their goals.

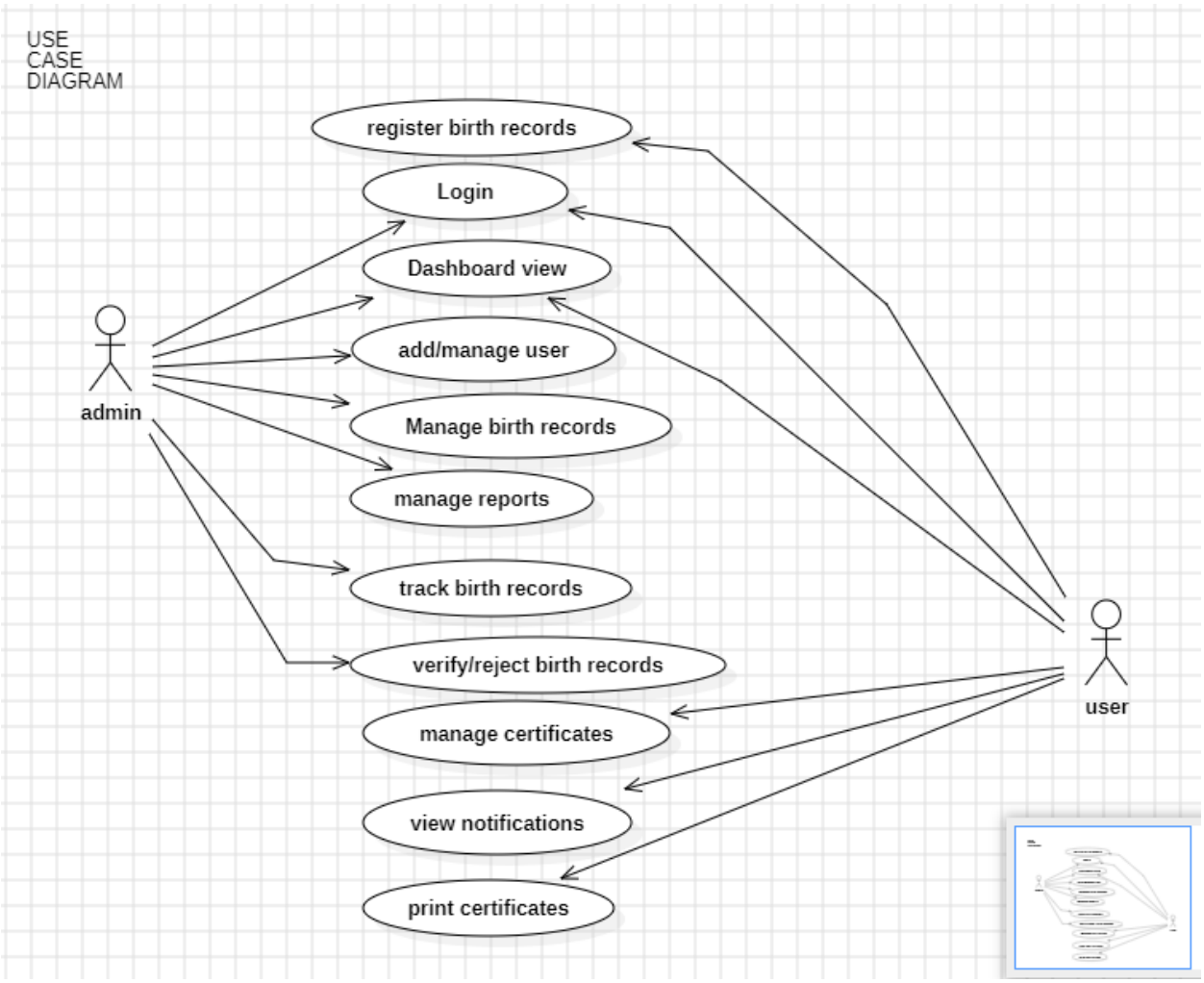


Figure 4.4: Use case diagram for online birth certificate management system

The use case diagram showed the different activities performed by the two types of users namely admin and the user

4.10.5 Entity Relationship Diagram

An entity-relationship diagram (ERD) is a type of diagram used in database design to visually represent the structure of a database. It outlines how entities (tables) in a database interact with each other and the relationships among them.

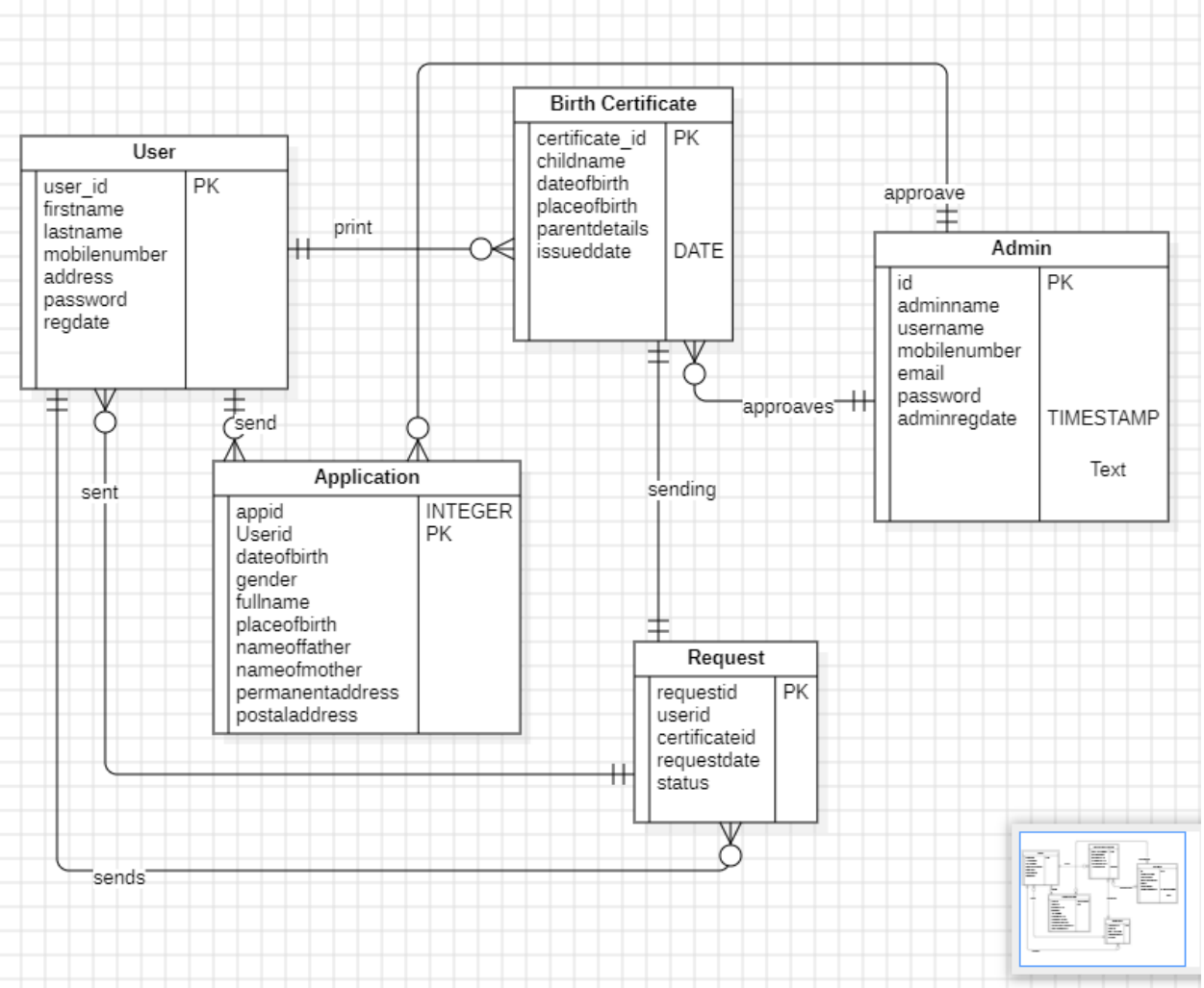


Figure 4.5: Entity relationship diagram for online birth certificate management system

4.11 Programming tools for the online birth certificate management system

These tools included;

i. Visual studio code
ii. Mysql
iii. Wampp
iv. Html
v. Php

4.12 Implementation and Testing

This is where the actual development of the online birth certificate management system happened which included developing the user interface, implementing the model htlm and php, and creating the system database using mysql. Visual studio code was used as text editor

4.13 Coding and Testing

Coding involved transforming the identified structural design specifications into actual working computer codes after which each function was designed, a test was performed to ensure that it worked properly as per the set user expectations. Coding was done using a text editor known as visual studio code, and testing was carried out on a localhost WAMPP swever software

4.14 System Documentation and Training

The system was documented after all the tests had been performed so serve as a reference point to the system administrator to maintain the system throughout its productive life and the customers. Training of the system users was done after the testing of the system

CHAPTER FIVE

PRESENTATION OF RESULTS

5.0 Introduction

This area focused on fulfilling the use of the requirements i.e functional and non-functional requirements into a working / running system. It furthermore presented implementationof the design presented in chapter four

5.1 Interface Design

The goal of user interface design is to make the users interaction with the system as simple and efficient as possible, in terms of accomplishing user goals. It is also the way through which a user interacts with an application or a website. It mainly focused on the looks and style of how a system appeared to the user referring to the customer and administrator in this case. The functional and non-functional requirements that were implemented for the online birth certificate management system include;

For the users, they are able to access the login form, he/she was able to access his/her own interface with a welcome message, and able to register a birth record

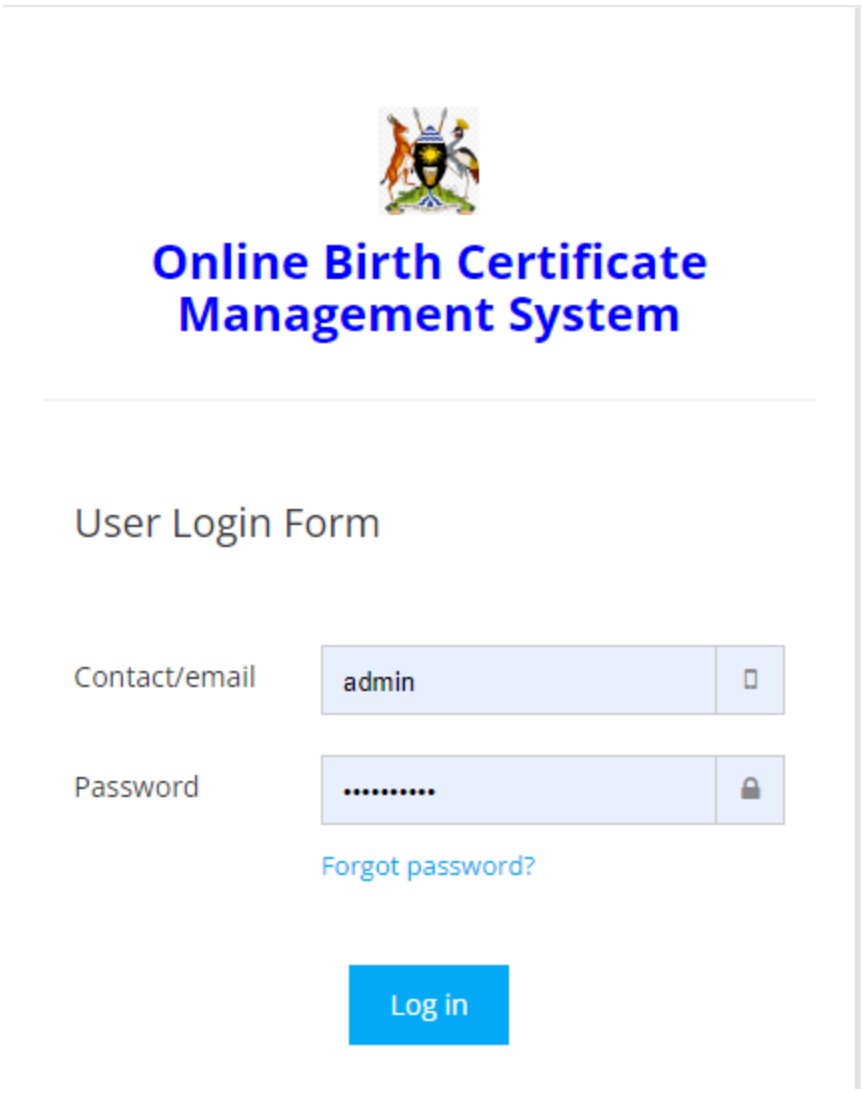


Figure 5.1: login form for online birth certificate management system

After accessing the login form, the user can access his/her own dashboard where they can do the rigisteration

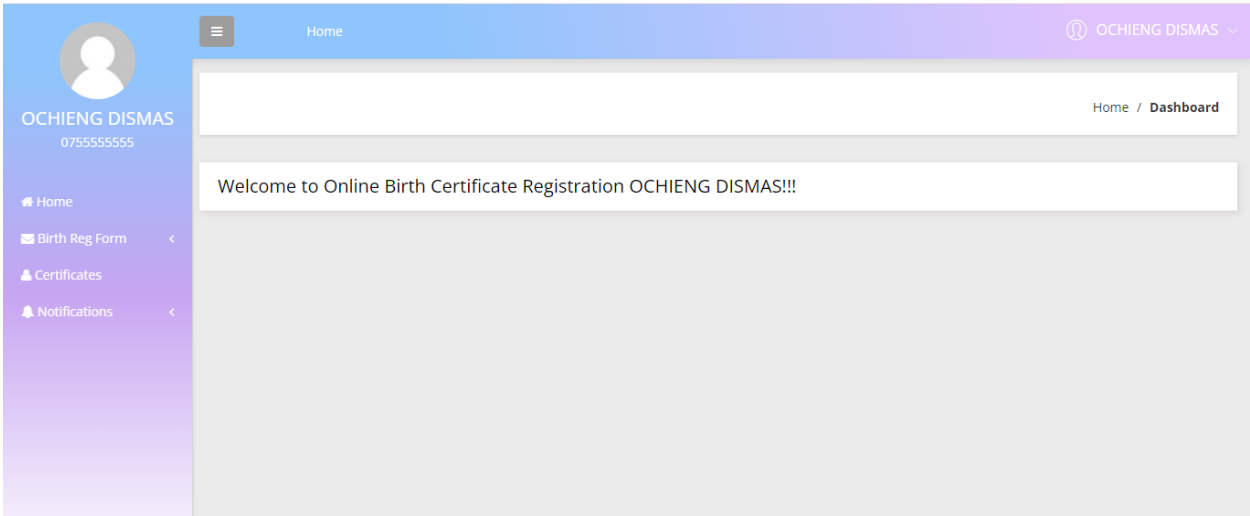


Figure 5.2: The user dashboard after signing in online birth certificate management system

This user can now access the registeration form where he can do the recording of a birth record

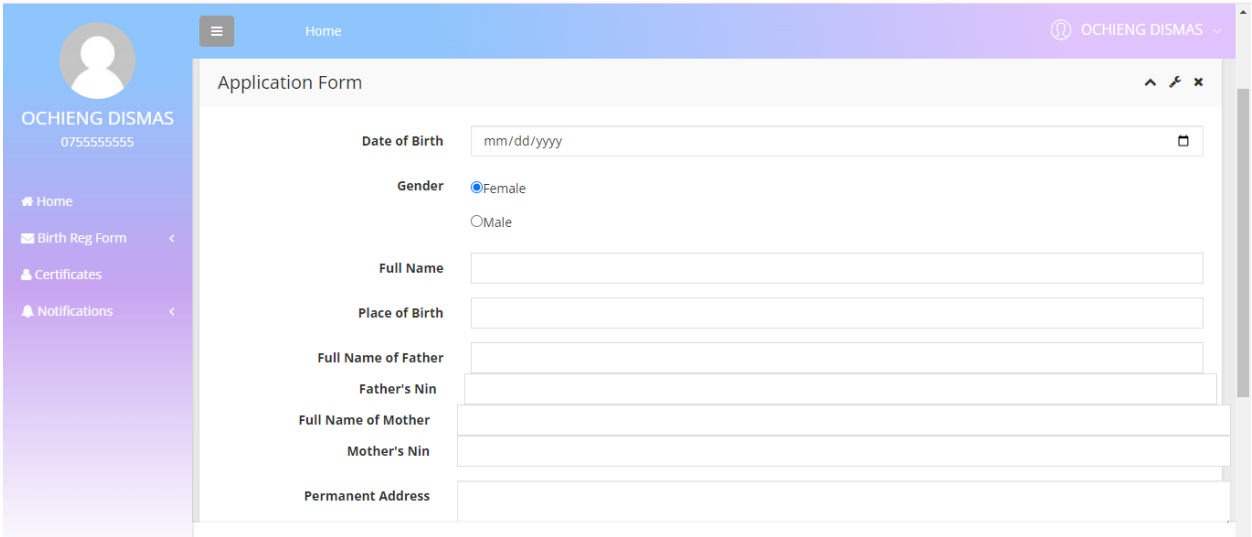


Figure 5.3: The application form for users in online birth certificate management system

The user will now wait for the birth record to be verified by the admin such that he can now print the certificate from the certificates list

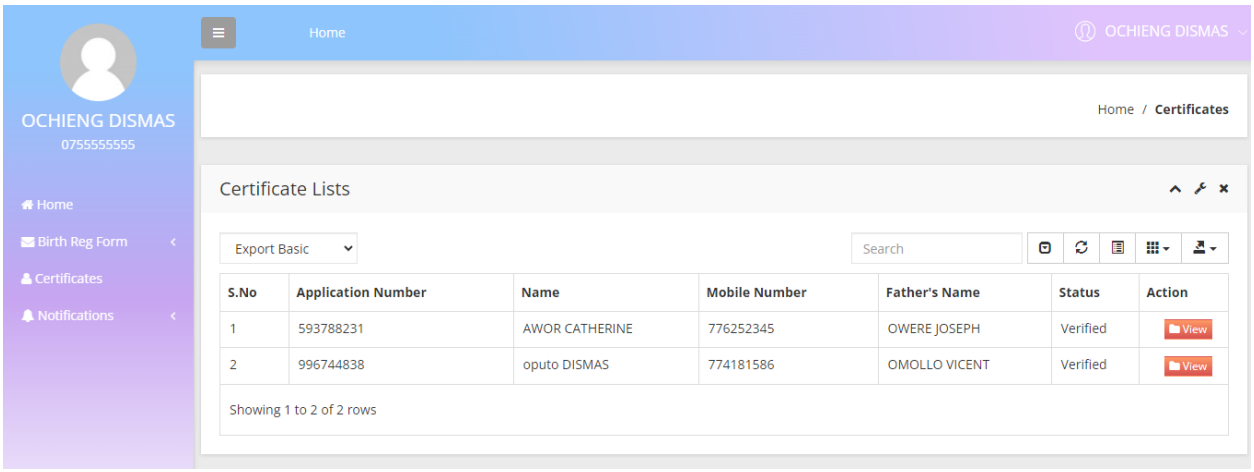


Figure 5.4:The certificates after verified by the admin

The user can now view the option of printing the certificate after the administrator verifying it

As you can now see the print button below the certificate details

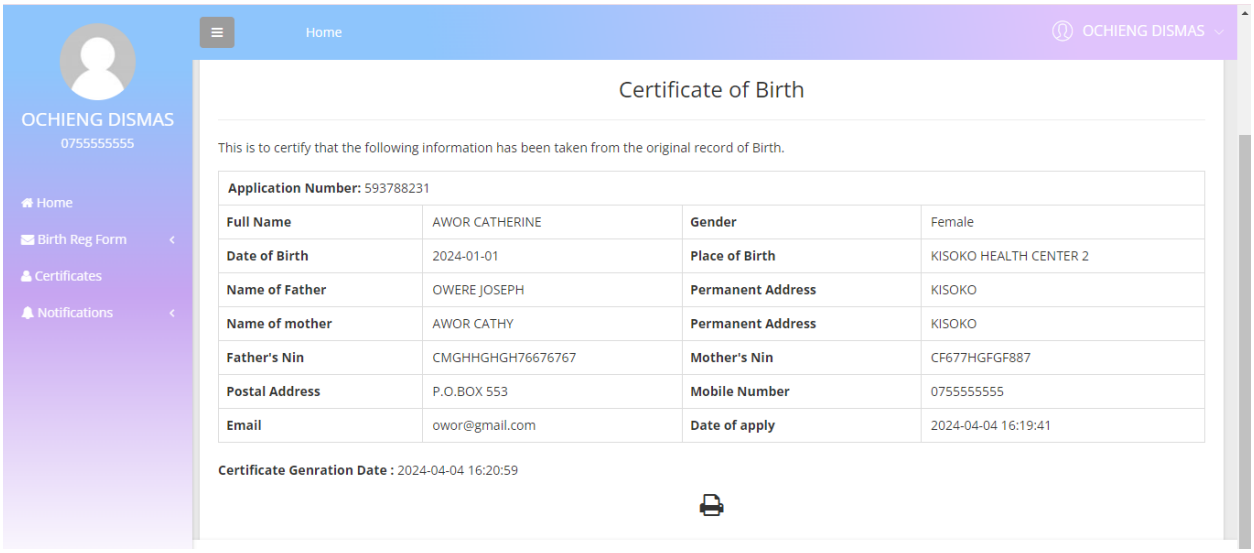
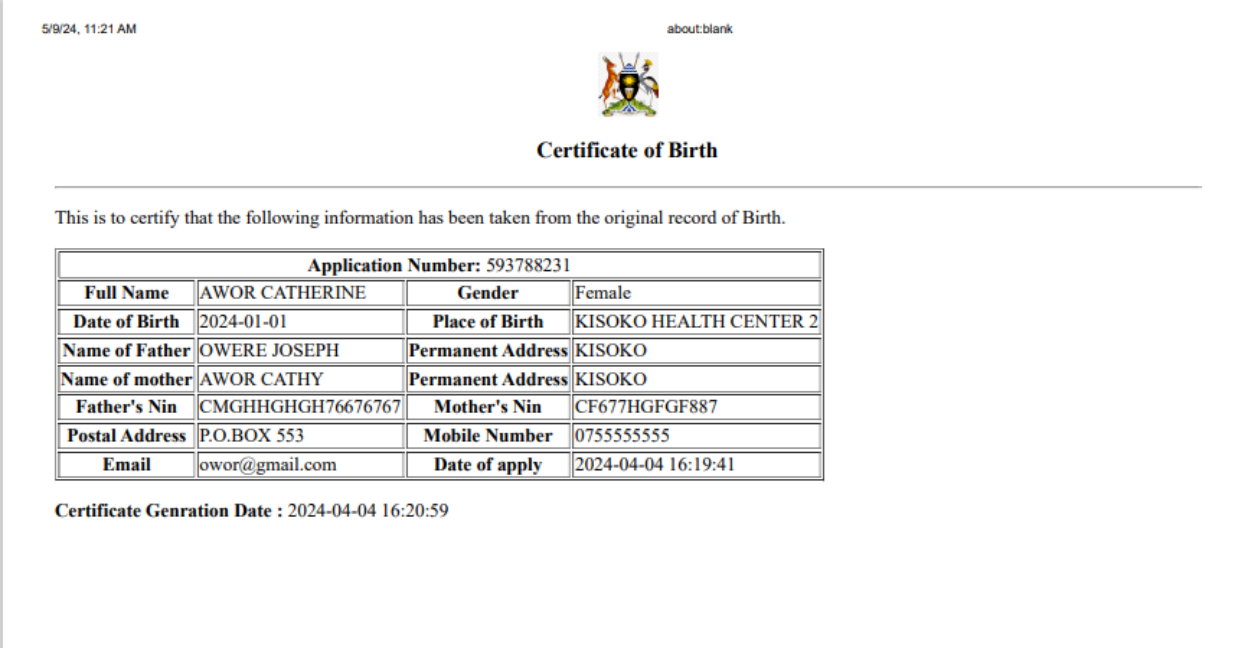


Figure 5.5: cerfifivcate ready for printing in online birth certificate management system

After you can now see the printed certificate of the very new born baby the user has beed working on



5/9/24, 11:21 AM about:blank

Certificate of Birth

This is to certify that the following information has been taken from the original record of Birth.

Application Number: 593788231			
Full Name	AWOR CATHERINE	**Gender**	Female
Date of Birth	2024-01-01	**Place of Birth**	KISOKO HEALTH CENTER 2
Name of Father	OWERE JOSEPH	**Permanent Address**	KISOKO
Name of mother	AWOR CATHY	**Permanent Address**	KISOKO
Father's Nin	CMGHHGHGH76676767	**Mother's Nin**	CF677HGFGF887
Postal Address	P.O.BOX 553	**Mobile Number**	0755555555
Email	owor@gmail.com	**Date of apply**	2024-04-04 16:19:41

Certificate Genration Date : 2024-04-04 16:20:59

Figure 5.6: Printed certificate in online birth certificate management system

The administrator can access his/her own dashboard where he/she can manage birth records, manage users, view reports, and also track the birth details using either the father or mother nin

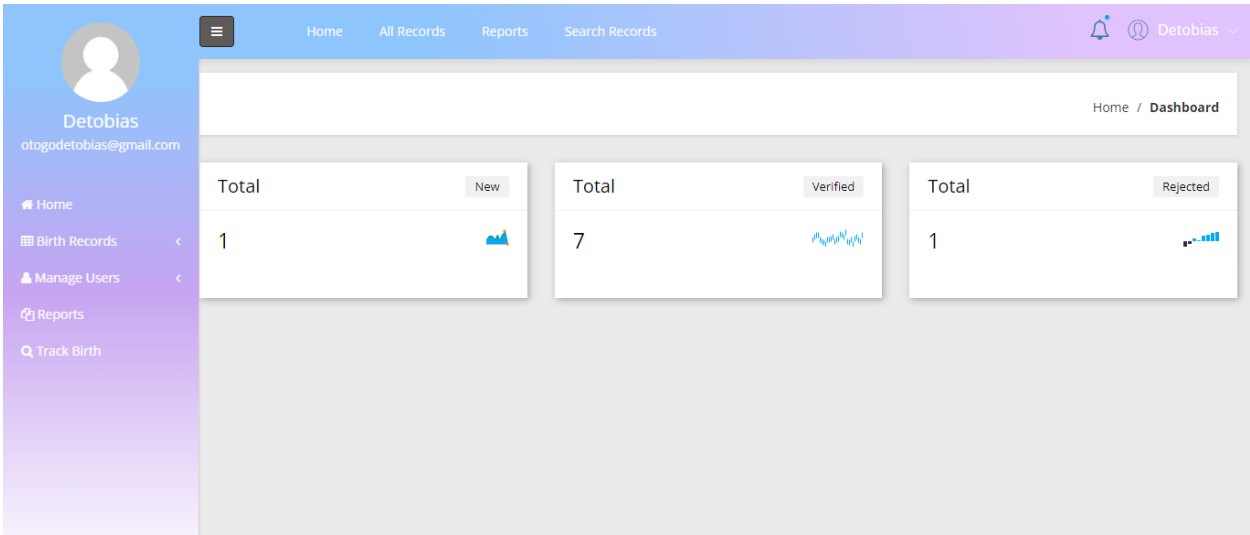


Figure 5.7: Admin dashboard for registering users in online birth certificate management system

The admin is the one who registers new users of the system

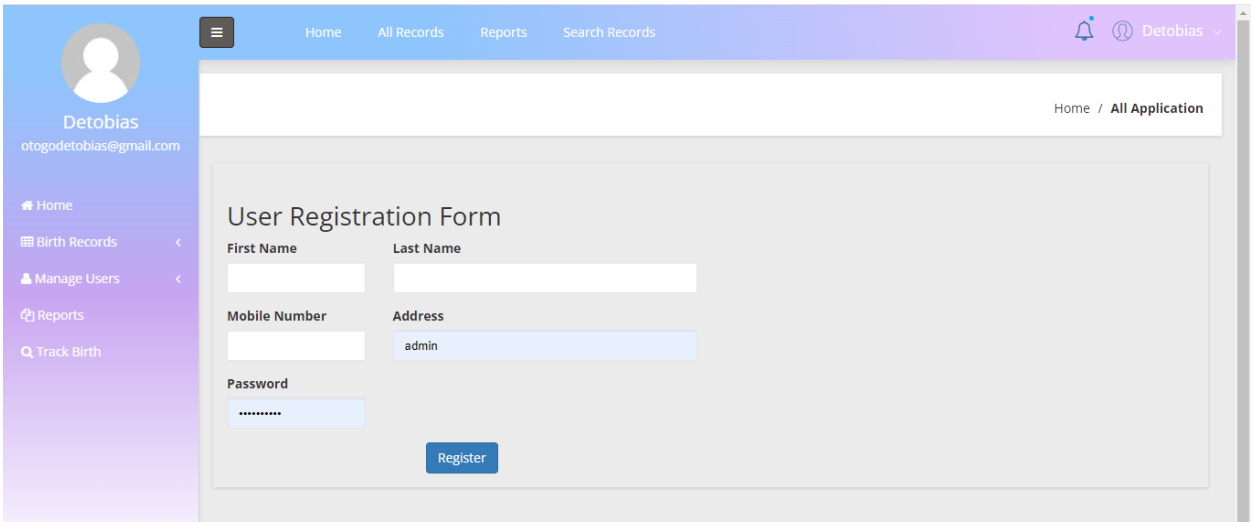


Figure 5.8: user registeration form for the admin in online birth certificate management system

The admin can view the details of the users and can also update the users by deleting, among others

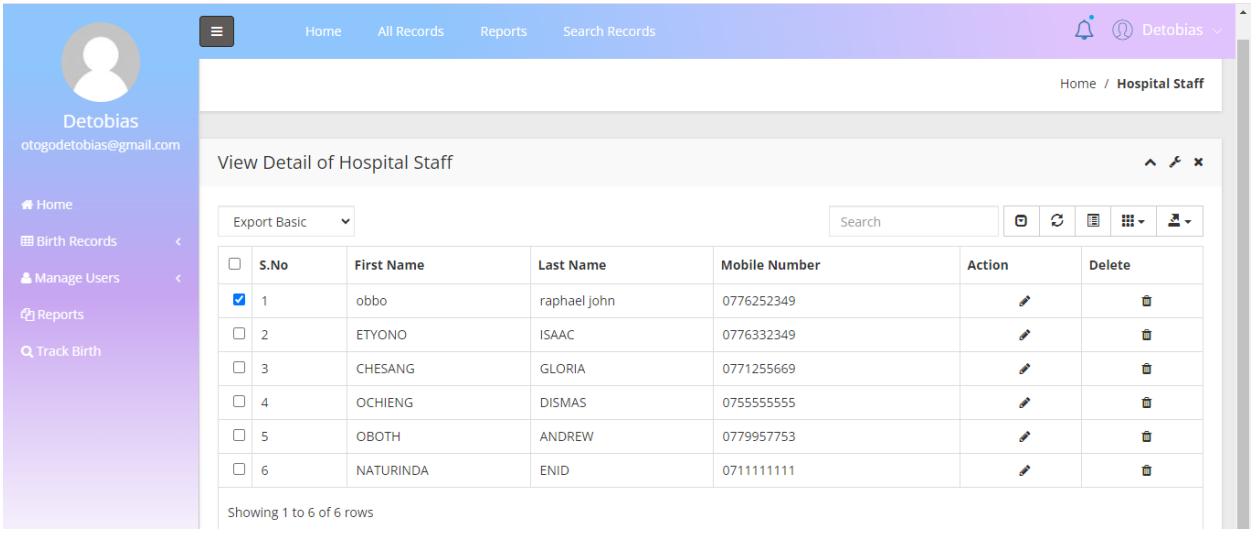


Figure 5.9: viewed the details of the hospital staff in the system by the admin

The admin can take action in a given user and edit it thereby updating the user

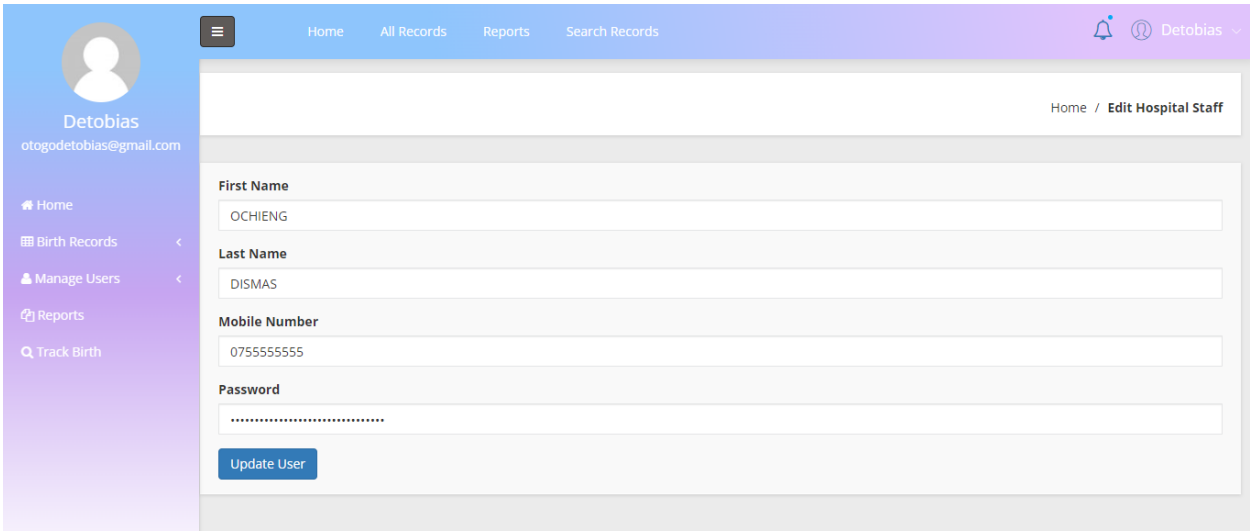
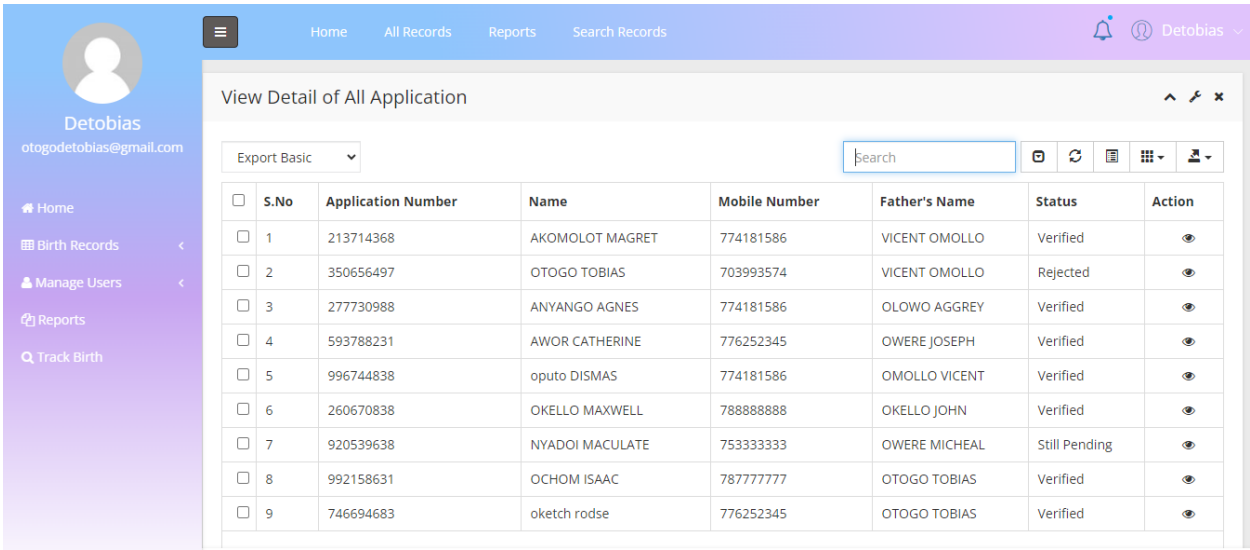


Figure 5.10: updating the users details by the admin in the birth certificate management system

The admin can view all the application or birth details where he/she can take action



	S.No	Application Number	Name	Mobile Number	Father's Name	Status	Action
	1	213714368	AKOMOLOT MAGRET	774181586	VICENT OMOLLO	Verified	
	2	350656497	OTOGO TOBIAS	703993574	VICENT OMOLLO	Rejected	
	3	277730988	ANYANGO AGNES	774181586	OLOWO AGGREY	Verified	
	4	593788231	AWOR CATHERINE	776252345	OWERE JOSEPH	Verified	
	5	996744838	oputo DISMAS	774181586	OMOLLO VICENT	Verified	
	6	260670838	OKELLO MAXWELL	788888888	OKELLO JOHN	Verified	
	7	920539638	NYADOI MACULATE	753333333	OWERE MICHEAL	Still Pending	
	8	992158631	OCHOM ISAAC	787777777	OTOGO TOBIAS	Verified	
	9	746694683	oketch rodse	776252345	OTOGO TOBIAS	Verified	

Figure 5.11: admin viewing the details of application in the system

The admin can take action in the still pending and verify them or reject as you can see the take action button in the footer

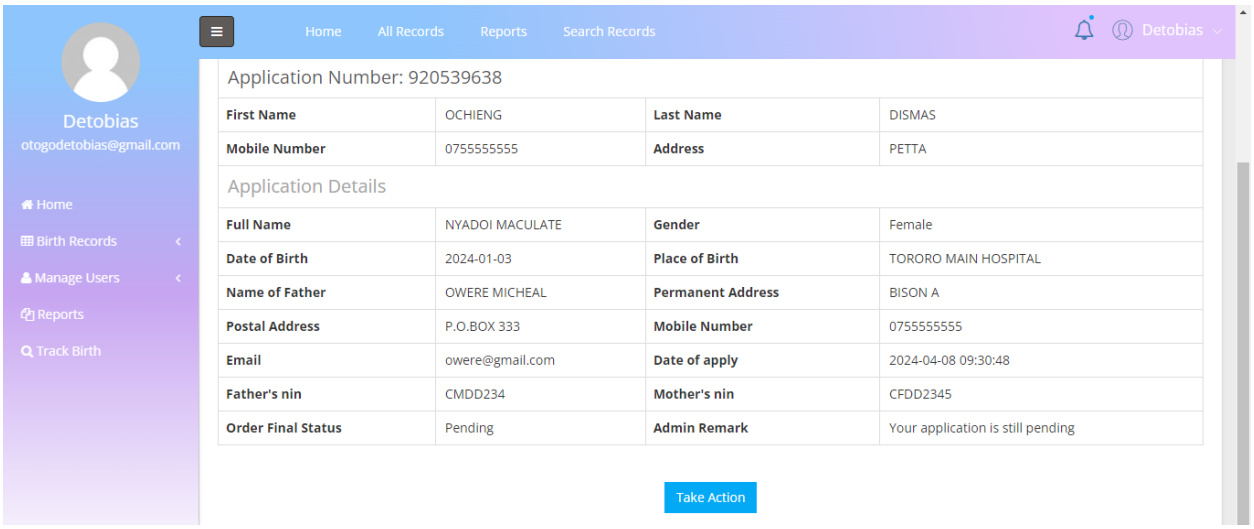


Figure 5.12: admin taking action in the birth records sent by users by verifying or rejecting

After pressing the take action button, it brings a pop up where he can put the comment and take action in the birth record either by verifying or rejecting

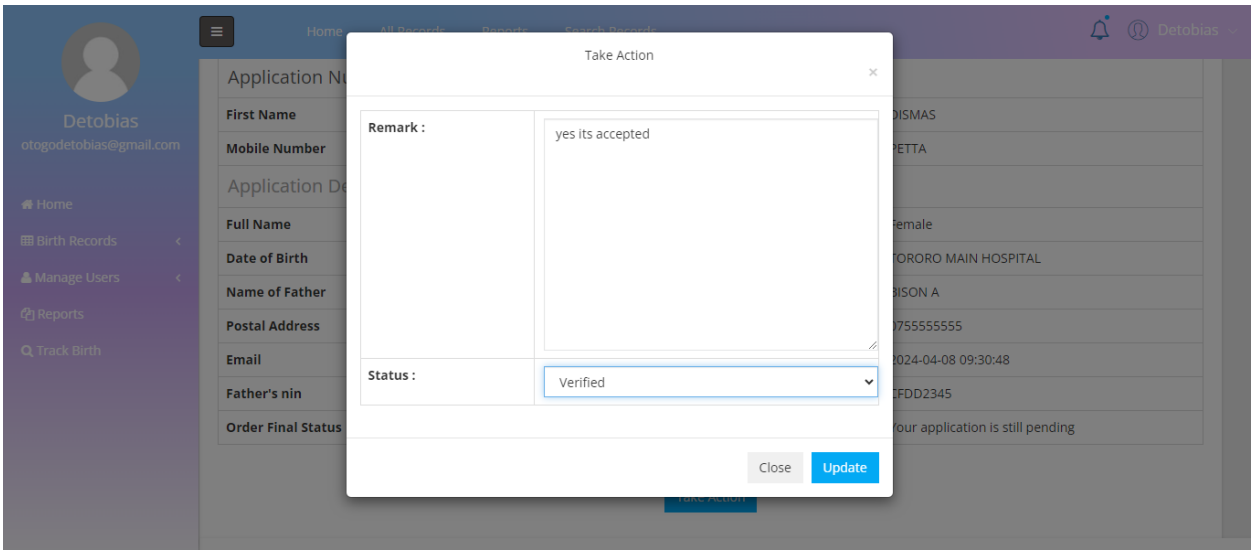


Figure 5.13: A pop up message for admin to take action in the birth record

The administrator can also tress for the date-wise report of the birth details

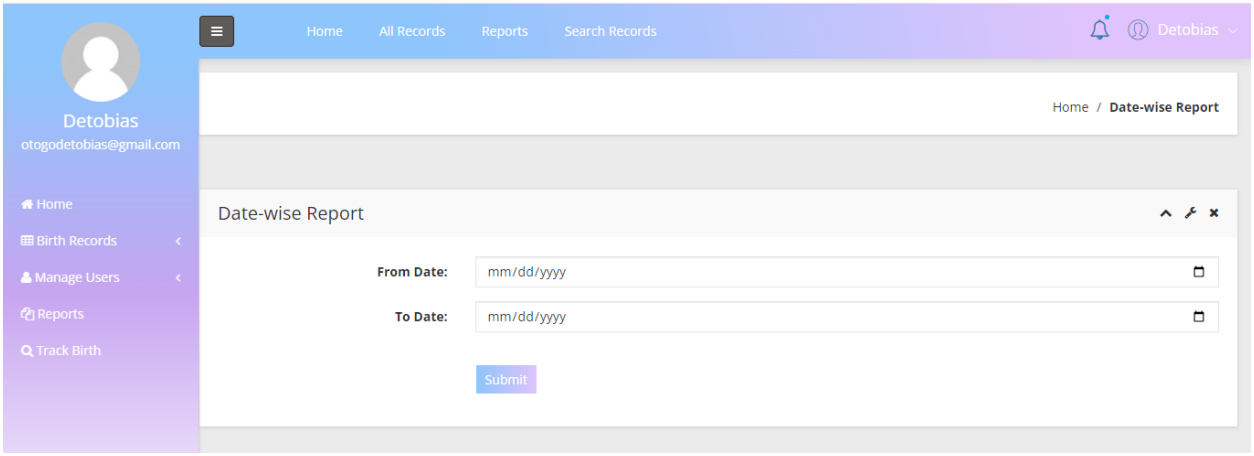


Figure 5.14: Tressing for datewise report by the admin in the online birth certificate system

The admin can track the birth record by entering the National Identification Number of bothe the parents

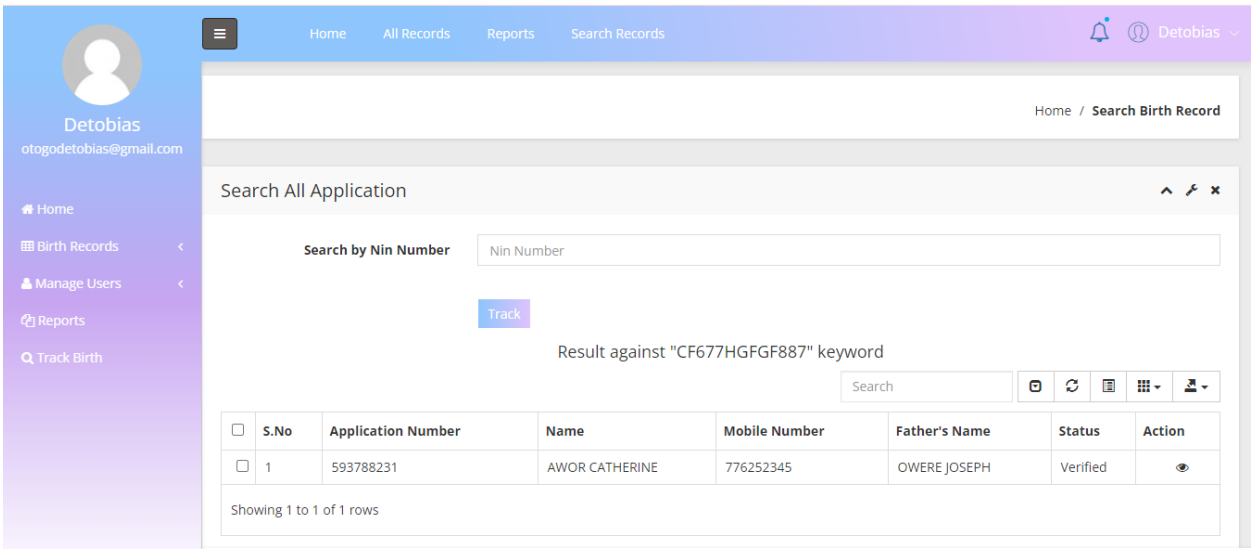


Figure 5.15: Admin tracking birth record using the NIN of the parents in the system

Incase one parent has registered for many of his/her babies, the admin can also track all the birth record details using that very NIN of that very parent

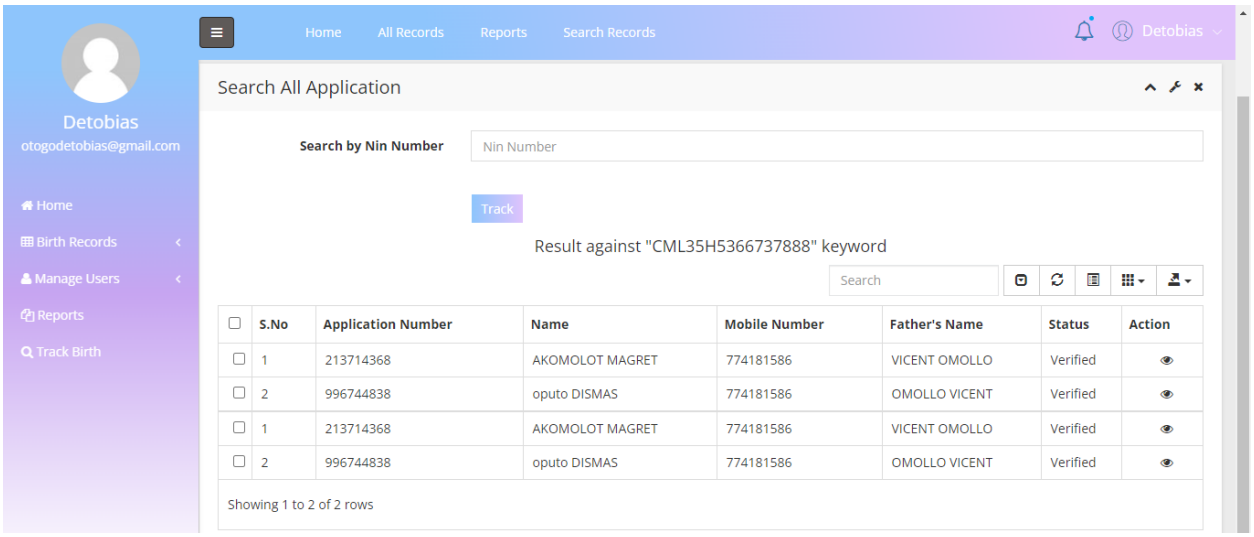


Figure 5.16: searching all the birth records registered in the same NIN in the system

5.2 Data storage

All the data in the system was stored in the databases automatically as a data storage medium in tabular form, the tables include;

Admin table (admin)

This table captured the adminId, AdminName, UserName, MobileNumber, Email, Password, AdminRegdate and UserRole

	#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
☐	1	ID	int			No	*None*		AUTO_INCREMENT	Change
☐	2	AdminName	varchar(200)	utf8mb4_0900_ai_ci		Yes	*NULL*			Change
☐	3	UserName	varchar(120)	utf8mb4_0900_ai_ci		Yes	*NULL*			Change
☐	4	MobileNumber	bigint			Yes	*NULL*			Change
☐	5	Email	varchar(120)	utf8mb4_0900_ai_ci		Yes	*NULL*			Change
☐	6	Passwordw	varchar(200)	utf8mb4_0900_ai_ci		Yes	*NULL*			Change
☐	7	AdminRegdate	timestamp			Yes	CURRENT_TIMESTAMP		DEFAULT_GENERATED	Change
☐	8	user_role	varchar(25)	utf8mb4_0900_ai_ci		No	Admin			Change

Figure 5.17: Admin table in the database of online birth certificate management system

The application table (tblapplication)

	#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra
☐	1	ID	int			No	*None*		AUTO_INCREMENT
☐	2	UserID	int			No	*None*		
☐	3	ApplicationID	varchar(200)	utf8mb4_0900_ai_ci		Yes	*NULL*		
☐	4	DateofBirth	varchar(200)	utf8mb4_0900_ai_ci		Yes	*NULL*		
☐	5	Gender	varchar(50)	utf8mb4_0900_ai_ci		Yes	*NULL*		
☐	6	FullName	varchar(200)	utf8mb4_0900_ai_ci		Yes	*NULL*		
☐	7	PlaceofBirth	varchar(200)	utf8mb4_0900_ai_ci		Yes	*NULL*		
☐	8	NameofFather	varchar(200)	utf8mb4_0900_ai_ci		Yes	*NULL*		
☐	9	PermanentAdd	mediumtext	utf8mb4_0900_ai_ci		Yes	*NULL*		
☐	10	PostalAdd	mediumtext	utf8mb4_0900_ai_ci		Yes	*NULL*		

☐	10	PostalAdd	mediumtext	utf8mb4_0900_ai_ci		Yes	*NULL*	
☐	11	MobileNumber	bigint			Yes	*NULL*	
☐	12	Email	varchar(200)	utf8mb4_0900_ai_ci		Yes	*NULL*	
☐	13	Dateofapply	timestamp			Yes	CURRENT_TIMESTAMP	DEFAULT_GENERATED
☐	14	Remark	varchar(200)	utf8mb4_0900_ai_ci		Yes	*NULL*	
☐	15	Status	varchar(50)	utf8mb4_0900_ai_ci		Yes	*NULL*	
☐	16	UpdationDate	timestamp		on update CURRENT_TIMESTAMP	Yes	*NULL*	ON UPDATE CURRENT_TIMESTAMP
☐	17	fnin	varchar(25)	utf8mb4_0900_ai_ci		No	*None*	
☐	18	mname	varchar(25)	utf8mb4_0900_ai_ci		No	*None*	
☐	19	mnin	varchar(25)	utf8mb4_0900_ai_ci		No	*None*	

Figure 5.18: the application table in the database for online birth certificate management system

The user table (tbluser)

	#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
☐	1	ID 🔑	int			No	*None*		AUTO_INCREMENT	Change
☐	2	FirstName	varchar(200)	utf8mb4_0900_ai_ci		Yes	*NULL*			Change
☐	3	LastName	varchar(200)	utf8mb4_0900_ai_ci		Yes	*NULL*			Change
☐	4	MobileNumber	varchar(20)	utf8mb4_0900_ai_ci		Yes	*NULL*			Change
☐	5	Address	mediumtext	utf8mb4_0900_ai_ci		Yes	*NULL*			Change
☐	6	Passwordw	varchar(200)	utf8mb4_0900_ai_ci		No	*None*			Change
☐	7	RegDate	timestamp			Yes	CURRENT_TIMESTAMP		DEFAULT_GENERATED	Change
☐	8	user_role	varchar(25)	utf8mb4_0900_ai_ci		No	Staff			Change

Figure 5.19: The user table in the database for online birth certificate management system

The notification table

	#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
☐	1	notification_id	varchar(250)	utf8mb4_0900_ai_ci		No	*None*			Change
☐	2	user_id	varchar(25)	utf8mb4_0900_ai_ci		No	*None*			Change
☐	3	message	varchar(250)	utf8mb4_0900_ai_ci		No	*None*			Change
☐	4	timestamp	varchar(12)	utf8mb4_0900_ai_ci		No	*None*			Change

Figure 5.20: The notification table in the database for online birth certificate management system

5.3 System Testing

The entire system was tested using codes, class modules and modules. This stage of implementation ensured accuracy and efficiency operation of the system before it was given to the users. It required a series of different tests which varied at different system levels. The system tester assumed that if all parts of the system were correct then the goal would have finally been achieved

Tesing is the process of executing the program in order to identify errors or bugs. Testing shows the software errors. Therefore, testing was done after completion of the system. This was done in two formats including unit testing and integration testing

5.3.1 Unit Testing

Unit testing was done on individual codes of the system to ensure that they fully yield the functional units. This was done by examining each unit, that is to say the code for code for registering the birth recods. This was done to ensure that the bbirth records was registered successfully without errors

Successfully achieving that encouraged me to go ahead with the integration testing after all the identified errors were worked on individually

5.3.2 Integration Testing

This was done after all the different modules had been put together to make a complete system. Integration aimed at ensuring that all the modules of the system worked hand in hand and that they could be integrated to form a complete working system

5.3.3 Validation of the System

Validation of the system was done in order to confirm whether the system met its intended requirements and functionalities as intended. It involved a series of evaluations to ensure that the system is correct, complete, traceable, consistent and very secure.

Functional validation was done in order to test the system's core functionalities and ensure they meet the specified requirements

Non-functional validation was also done to test the system's usability, performance, security, compatibility and other quality attributes or non-functional aspects

Integration validation was also done to test how well the system interacts with other systems it depends on

CHAPTER SIX

DISCUSSION, CONCLUSION, RECOMMENDATION AND FUTURE WORK

6.0 Introduction

In this chapter, we talk about the findings for developing an Online birth certificate management system in relation to the set objectives and methodology. The study found out that birth certificate are issued manually by the government officials and also in the health facilities using paperwork which are provided by those government officials to be field by the parents which ofteign takes a lot of time and also a lot of errors occur when entering these birth records . the online birth certificate management system that was developed focuses on replacing the manuall way of issuing birth certificates for efficient issuanceas well as accuracy in data storage.

6.1 Discussion

The discussion of this chapter is based on the theme of objectives stated in chapter one

Objective 1: To review the literature and establish the requirements for developing an online birth certificate management system

The literature review was carried out in order to understand the existing systems and practices related to birth certificate management. Through thios review, we aim to identify the key requirements for developing an efficient and user-friendly online birth certificate management system. By establishing these requirements, we can lay the foundation for the successful development and implementation of the system, ensuring it meets the needs of both administrators and users while adhering to legal and regulatory standards.

I conducted the field research which helped me to get to know the manual issuance of birth certificates , the respondent's view and perception towards the online birth certificate management systemwhich also generated the requirements, such as text editors like visual studio code and CSS libraries like BBootstrap, which can be downloaded online, that were used for designing the interfaces

Objective (2): To design an online birth certificate management system

The system was designed depending on the requirements followed by the RAD from the SSADM. The stage of design included Architecture, context diagram and data flow diagram,

use-case diagram and database design, which enabled the smooth flow of data. Design and evaluation of the effectiveness of online birth certificate issuance, encouraged the use of different stages of design (McKener, 2021)

Objective (3): To implement an online birth certificate management system

The implementation of the system design was carried out using the implementation tools which included; visual studio code editor, google chrome, mysql, html, wampp server and windows 11 gsm to fulfill the implementation where I came up with the interfaces in chapter five, which interfaces included: login, user dashboard, administrator dashboard, application form, certificate verification form, manage users, track birth records, notification page, certificate printing form amon others.

The system was implemented using parallel implementation to enable users to use the manual system as they got used to the new system (Liamson, 2001).

Objective (4): To test an online birth certificate management system

The system was tested during and after implementation each component was tested (unit testing) and the whole system was also tested (system testing)

Unit testing was used to test individual parts/modules of the code whereby every part of the interface was as well tested to check whether it works properly. This was essential during the identification of errors in specific units of the code thereby making debugging quite an easy task

Integration testing was done after all the different modules had been put together to make a complete system. Integration aimed at ensuring that all the modules of the system worked hand in hand and that they could be integrated to form a complete working system

Validation results

After developing and testing of the system, it was taken bback to Tororo Main Hospital and given out for testing to the midwives, doctors and some parents in order to look at its performance, appearance, security, integrity, efficiency, effectiveness and other quality

attributes, after which the overall percentage acceptance of the system was 90% and percentage rejection of the system was 10%.

This was because most of the user(midwives, doctors and parents) agreed that the system will bbe able to effectively suit their needs and eradicate paperwork. Some of the parents still argued that the system will still require data charges for use

6.2 Conclusion

The online birth certificate management system should be deployed for use since most of the users agreed that the system performs its functions that suit their needs especially when it came to addressing majority of the challenges that the existing manual issuance of birth certificates presented as already discussed in in this write up in the previous chapters, specifically in problem statement well-stated in chapter 1. This implies that the online birth certificate management system is believed fit for adoption in Tororo Main Hospital, Tororo.

6.3 Recommendations

I recommend that my online birth certificate management system should be adopted by the different health institutions especially those that are still issue birth certificates manually to support online issuance especially to avoid unnecessary movement from one place to another and to furthermore reduce on the errors and delay to issue birth certificates

I also recommend the government to adopt my online birth certificate management system especially health officials so that it can be deployed in various sectors of health and other necessary sectors to eradicate paperwork, enable proper issuance of birth certificates and reduce time.

6.4 Limitations and future work

i. The system has been optimized for few mobile and therefore more work should be done to optimize the system so that various mobile users can be able to access it
ii. System maintenance should be done through in order to improve on the system performance

iii. The researcher should try using other programming languages so as to improve on the system

iv. The system should be hosted on commercial we-hosting platform in order to enhance its security and improve on its accessibility to the users

v. Other features should bbe added on the system for example integrating it with the NIRA database such that the details of birth certificate can easily tressed when registering for National Identity Card

APPENDIX

Appendix I: Requirements collection interview guide

During this interview process, interviewers will first greet and politely ask permission before they ask questions to the interviewers.

Topic: ONLINE BIRTH CERTIFICATE MANAGEMENT SYSTEM

Dear Respondent;

Iam Otogo Tobias, a student of Busitema University pursuing a Bachelor's Degree in Information Technology. I am carrying out a reseach study on Online birth certificate management system at Tororo Main Hospital, Tororo.

This survey is to guide me into understanding the current way of issuing birth certificates at Tororo Main Hospital. I kindly request for your cooperation in answering the following questions. Any information provided will be for academic purposes only and will be treated with absolute confidentiality.

I hope that my humble request may meet your kind consideration.

Thank you.

Appendix II: Questionnaire

QUESTIONNAIRE FORM (for the midwives, parents and some government workers)

TOPIC: ONLINE BIRTH CERTIFICATE MANAGEMENT SYSTEM

Dear Sir/Madam,

My name is Otogo Tobias, a student of Busitema University pursuing a Bachelor's Degree in Information Technology. I am carrying out a reseach study on Online birth certificate management system at Tororo Main Hospital, Tororo.

I kindly request you to report appropriately to the questions provided to enable me gather credible data for the above topic.

Your responses will be used for academic purposes only and will bbe treated confidentially.

Use spaces provided to answer the questions given

1. What si your position of responsibility at Tororo Main Hospital, Tororo? (for the staff)

……
……

2. How do the parents of the new born babies acuire birth certificates?

……
……

3. What are the challenges faced during the issuance of birth certificate at Tororo Main Hospital?

.....
.....
.....
.....

4. How do you think an online birth certificate management system should operate so as to address some of those challenges stated above?

……
……..

5. How do you see if I integrate this online birth certificate management system with the NIRA database?

……

THANK YOU

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