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**PROJECT PROGRESS FOR FINAL YEAR STUDY IN
BACHELOR OF SCIENCE IN COMPUTER SCIENCE**

BY

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PROJECT TITLE

**INCIDENT AND CRIME MANAGEMENT SYSTEM
A CASE OF SONDU POLICE STATION**

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Submitted in partial fulfillment of the requirement for the Degree in Computer Science

DECLARATION

I, Kibet Gilbert Korir, hereby declare that this research project titled, Incidence and criminal Management system, is based on my original work done from my research except for the citations and quotations which have been duly acknowledged. I also acknowledge that this research has not been previously and concurrently submitted in the Catholic University of Eastern Africa or Any other institution. This project documentation has been partially submitted to the Catholic University of Eastern Africa in Partial fulfillment of the requirement to be awarded the degree of Bachelor of science in Computer science.

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ACKNOWLEDGEMENT

I wish to acknowledge everyone for the success of the project including my supervisor. Mr. Nandasaba for the guidance and comments on this project for this I am extremely privileged to have gotten the content to do the research with the assistance of my supervisor.

I give deep gratitude to my family for their support in prayers and not only that but also, forgetting my friends who have given me the motivation to pursue this research.

DEDICATION

I dedicate this project to my lovely family, my beloved parents Mr. Wilson Ng'eno and Mrs. Mary Ng'eno who have given me the moral support during this project. This research is also dedicated to my research supervisor Mr. Chrispinus Nandasaba who has guided me through this project.

ABSTRACT

In recent years, there has been a noticeable increase in crime rates across various regions. This research project, titled Incidence and Criminal Management System: A Case of Sondu Police Station, seeks to address this issue within the context of Sondu Police Station. The study aims to investigate the patterns of crime incidence and the effectiveness of the existing management system if there is one, identifying potential gaps and areas for improvement.

This research project delves into the crime incidence and management methods at Sondu Police Station, with the ultimate objective of improving the efficiency and effectiveness of law enforcement activities. The study adopts a holistic approach to scrutinize the existing systems and processes, pinpointing potential shortcomings and areas that need enhancement.

The project's aim is dual-pronged: firstly, it evaluates the incidence reporting and criminal management practices at Sondu Police Station, scrutinizing the current manual systems and procedures; secondly, it suggests the creation of a sophisticated Incidence and Criminal Management System customized to the station's specific requirements. This suggested system is designed to simplify the documentation, tracking, and management of criminal incidents, resulting in improved response times, data precision, and overall operational efficiency.

The research will utilize a mix of qualitative and quantitative methodologies, including interviews, surveys, and data analysis. The results will lead to a deeper comprehension of the obstacles Sondu Police Station encounters in managing criminal incidents and will lay the groundwork for the design and development of a novel Incidence and Criminal Management System.

At the project's conclusion, the goal is to equip Sondu Police Station with a custom technology solution that aligns with modern law enforcement standards, empowering the station to augment its crime management abilities and contribute to the wider objective of preserving public safety in the community.

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Terms and abbreviations

DFDS- Data Flow Diagram

UI/UX – User Interface/ User Experience

ERDs- Entity Relationship Diagram

I.B.E.A.- Imperial British East Africa Company

IC3- Internet Crime Complaint Center

NW3C- National White Collar Crime Center

FBI- Federal Bureau of Investigation

EIS- Europol Information System

DNA- Deoxyribonucleic acid

CAFC- Canadian Fraud Center

SMS- Short Message Service

DCI- Directorate of Criminal Investigation

NCIC- National Crime Information Center

LEEP-Law Enforcement Enterprise Portal

N-DEX-National Data Exchange

NGI-Next Generation Identification

NICS- National Instant Criminal Investigation System

NLETS-International Justice and Society. Safety nets

NF- Normal Form

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CHAPTER ONE INTRODUCTION

1.1 Introduction

The Background of the chapter sets out the case for the research, which marks the opening of this chapter. We then point out issues in the problem statement, and later the Objectives outline our goals, following which is the Justification that defines the significance of research. The Scope defines the area of the research, and the Research Organization is a road map for the study. In brief, this chapter provides a guideline to move from the research's motivation to its execution.

1.2 Motivation and background

Research on the Incidence and Crime Management System for Sondu Police Station is motivated by the objective of increasing efficiency and effectiveness of the system (Shenoy & Salaka, et, al 2021)). The process involves logging, handling, and accounting for the incidents of crime within the geographical jurisdiction of the police station. This is an important aspect of law enforcement as it provides data that will allow the law enforcers to devise strategies in the prevention of crime and the provision of public safety and order (El-Khatib & Mattfeld, et, al 2021).

There is a requirement to improve the Incidence and Crime Management System in the case of Sondu Police Station as well as a decrease in the rate of misreporting and mismanagement of crime (Mugarura & Ojula et, al 2022). This is important in the sense that it provides that there is enough information within the police station to enhance essential safety services to the people and to maintain security in the area. It can also improve the level of transparency and accountability that the data regarding the crimes is being managed and the citizens being entrusted by the local authorities. The study seeks to find out the current challenges that are faced in the Incidence and Crime Management System at Sondu Police Station and recommend feasible solutions that may be applied to improve efficiency and effectiveness in the recording and management of crime (NGARE et, al (2020)).

The research will provide insights into the best practices and strategies that the police station should adopt to enhance the recording and management of crime at the facility. In conclusion, the study on the Incidence and Crime Management System at Sondu Police Station is derived from the need to enhance the efficiency and effectiveness of the system (Islam & Islam et, al 2020). The

findings of this study will thus have great impacts on how the police station discharges its provision of essential safety services to the residents and helps in creating a secure environment in the region and, overall, will contribute to the body of knowledge in crime management.

1.3 Background of research

Sondu Police Station, like many other law enforcement entities, is responsible for providing a broad spectrum of safety services to its citizens and managing its resources efficiently to meet the needs of its constituents. In recent years, there has been a growing interest in using technology to streamline the processes involved in crime management, reporting, including the use of online crime management systems (Phiri, et, al 2020).

The main objective of an online automated Incidence and Crime Management System is to offer a convenient and efficient method for the police station to record and manage its crime data. This includes tasks such as tracking incidents, processing crime reports, and generating statistical data. By automating these processes, the police station can improve the accuracy and speed of its crime management, reduce the risk of human error, and increase transparency and accountability in its operations (Mugari & Obioha, et, al 2021).

In addition to enhancing the efficiency of crime management, the use of an online system can also offer several other benefits. For instance, it can make it easier for officers to record incidents, as they can do so from the comfort of their station using a computer or mobile device. It can also make it easier for the police station to monitor its crime data in real-time, allowing it to make more informed decisions about its operations (Tundis & Mühlhäuser et, al 2020).

The creation and execution of an online automated Incidence and Crime Management System for Sondu Police Station would likely necessitate a substantial investment of time, resources, and expertise. However, it is probable that the advantages of such a system would surpass the costs in the long run, by enhancing the efficiency, transparency, and accountability of the police station's crime management processes (Simmler & Schedler, et, al 2023).

1.4 Problem statement

The proposed system, unlike the manual, will entail users having to make a direct contact through the phone or by foot to get and save any of the records they wish to have. The central database in which all the data to be used by the Incidence and Crime Management System should be storable should, therefore, allow the modifications to the current system (Pływaczewski, & Guzik et, al 2021).

Some of the challenges facing the manual Incontinence and Crime Management System in the Sondu Police Station include lack of openness, inefficiency of the tool in recording and keeping track of incidents and generating of precise and timely reports. This leads to loss of accountability and trust in the system of crime management by the citizens. Even the data management in the police station does not possess a well-equipped centralized and integrated system for data management, which leads to duplication of efforts and error in the management of data. This research purposed to address these challenges by developing and implementing an online Automated Incidence and Crime Management System for Sondu Police Station (Khang & Gupta, et, al 2023).

The crime recording process will be designed to add efficiency to the transparency and accountability in the system and produce the data for real-time access of the crime data at the police station for the citizens. It is meant to enhance the efficiency, accuracy, and effectiveness in the process of crime management at Sondu Police Station leading to general safety and development in the region by and large (Khang & Gupta, et, al 2023).

1.5 Objectives of research

The three specific objectives of the research for the Incidence and Crime Management System at Sondu Police Station are:

- i. Reduce time and energy among citizens in case reporting and enhance efficiency
- ii. Reduce incidents of corruption and delay in case handling
- iii. Make case records easily available for all users

1.6 Justification of research

In effecting the Incidence and Crime Management System at Sondu Police Station, much will be realized in terms of ease of operation as the system would improve effectiveness and transparency of its operations in recording cases (Oyaro, et, al 2023). Transitioning from manual to online methods has quite a few advantages to offer. First, the online system increases the accuracy that comes about by eliminating possible errors and inaccuracies associated with manual records. This results in more accurate crime recording, which not only benefits the police station but also benefits the local community. Second, the online system brings about increased efficiency. Automating the system will quicken the process of obtaining incident reports, hence doing away with long wait times, and improving overall operational speed (NZIOKA & OCHIENG et, al 2023). Certainly, it will save not only time and resources but will, moreover, ensure that incidents are recorded more quickly to contribute to a more sensitive crime management system.

A new system whose transparency forms the other characteristic. It avails a clear and auditable record of the crime data, which makes it easy for one to track the incidents, hence identifying any potential issues. Therefore, such transparency—read with trust in the police station and between the residents—alluding to responsible and accountable usage of crime data (Kivoi & Mbae, et, al 2020).

Financially speaking, Incidence and Crime Management System implementation has cost-saving benefits. This is in terms of reduced manual work and minimizing the risks of errors and fraud that may occur (Mwanza, et, al 2021). This will allow those resources saved to be shifted towards other critically needed initiatives, thereby making the operations within the police station more effective.

In short, the introduction of the Incidence and Crime Management System in the Sondu Police Station is an important avenue for efficient, transparent, and accurate record keeping of crime (Oyaro et, al 2023). For the police station itself, as well as for the local community, it is a tremendous benefit, as a sound base has been laid for future safety and social development projects.

1.7 Scope of research

An important and valuable research topic is the study and implementation of Incident and Crime Management System of Sondu Police Station using appropriate programming language. These

efforts are expected to provide a comprehensive solution for efficient processing of criminal data. Several main areas of research can be identified in this area. First and foremost, it is critical to develop a user-friendly interface that allows various stakeholders, including police, crime analysts, and the public, to easily access and navigate the system (OBE et, al 2021). Another important aspect of research is the integration of multiple sources of crime. The system should be able to integrate various data streams such as incident reports, crime statistics and citizen reports to provide a holistic view of crime in the area. In addition, automated incident recording and report processing options designed to streamline the criminal record process and reduce the risk of error or fraud should be explored.

Ensuring data security and privacy is critical to system design, with a focus on protecting sensitive criminal information from unauthorized access or misuse. Future research should also delve into performance evaluation, evaluate system functionality, reliability, and scalability, and identify areas for improvement. Another important research area is the assessment of the impact of the system on police crime recording processes and the satisfaction of stakeholders (including police and citizens) (Watson & Miles-Johnson et, al 2021). Additionally, the system's ability to integrate with other systems, such as law enforcement databases, is critical to a smooth and efficient user experience.

In summary, the Sondu Police Department's Incident and Crime Management System has the potential to transform the effectiveness and efficiency of the criminal record process. Through careful research in the above areas, the system can provide valuable insight into its operation, benefiting both the police department and the public. It lays the groundwork for future security and social development initiatives and highlights the importance of a comprehensive and technologically advanced approach to crime management (Mukoya et, al 2023).

1.8 Research organization

The research project is divided into four main chapters: Introduction This chapter lays the groundwork for the research by introducing basic elements such as background information, problem, research objective, research rationale, research scope and research overview. Organize (Jacobsen et, al 2020). It sets the context for the following chapters and provides a solid foundation for the entire research project.

Review of Related Work This chapter is devoted to a comprehensive review of existing literature and research, starting with an introduction, and exploring the historical development of the research topic. It analyzes relevant prototypes and systems, identifies emerging trends and patterns, highlights research gaps, and concludes with a comprehensive summary linking the research to broader existing knowledge (O'Grady & Morrison, et, al 2021).

Research Methodology This chapter first introduces the research methodology and outlines the requirements specification, data collection, system analysis and system design methods. It carefully details the methodology for designing the proposed system, covering aspects such as context diagrams, DFDs, flowcharts, UI/UX design tools, prototype screenshots, and ERDs for database design. System implementation, testing and implementation methods are also systematically discussed, which determine the systematic approach used in the study (Vranopoulos, G. 2022).

Schedule, budget, and resources This chapter focuses on the practical aspects, starting with an introduction and overview of the schedule, budget and resources related to the study. It provides a detailed mission timeline, reviews budget considerations, and discusses the resources required for successful execution. The chapter concludes with a comprehensive summary that provides practical insight into the management aspects of research projects (Nicholas & Steyn et, al 2020).

CHAPTER 2: REVIEW OF RELATED WORK

2.1 CHAPTER INTRODUCTION AND RESEARCH METHODOLOGY OF LITERATURE REVIEW

This chapter provides a comprehensive literature review of the crime management system with a particular focus on Sondu Police Station. The aim of this review is to explore the global and local history of this research topic, analyze relevant systems, identify trends, and highlight research gaps. The literature review used a systematic approach, considering academic articles, case studies and authoritative sources to ensure relevance and quality (Mengist & Legese et, al 2020).

The following sections provide an in-depth look at the history of this research topic, related systems, emerging trends, and identified research gaps. The aim is to provide a solid foundation for the research questions and objectives of the study and to provide insight into the current state of the crime management system. The chapter concludes with a summary of the main findings of the literature review, which paves the way for research into the optimization of incident and crime management systems to improve performance and effectiveness (Son & Weedon et, al 2023).

2.2 History of the research topic

The history of Kenya's police force and crime management system, including the Sondu Police Service, is complex and evolving. The Kenya Police Force was established in 19071 as a British colonial police force. From 1887 to 1902, policing was provided by the East African Trading Company. After 1902, the Kenya-Uganda Railway introduced its own police force. Security personnel are mainly recruited from the Indian Police and Vigilance cadres and are subject to the Indian Police Regulations, giving the security forces a quasi-police status (Critchley, et, al 2022).

I.B.E.A. The company established an administration in 1896 with armed security forces and fortified stations to protect its trade routes, centers, warehouses, and employees (ENOCK et, al 2023). This early form of policing was primarily aimed at protecting the colonial power and its commercial interests. Kenya's crime management system has changed dramatically over time. An overview of the criminal justice systems of the world provides an overview of the Kenyan legal system as it developed from the English common law tradition (Orago, et, al 2020). Courts adhere to the principle of "stare decisis" and, as in other common law countries, the procedures of the legal system are adversarial. The colonial government in Kenya changed the ordinary courts and traditional criminal procedures. Its judicial system is aligned with the British system of indirect

rule that once existed when the colonial government allowed local chiefs to rule rural Kenya (OGERO, et, al 2022). Kenya also has an informal customary criminal justice system. The system is maintained by local chiefs and councils of elders in remote villages where the police and formal courts are not easily accessible. In recent years, Kenya has made significant progress in modernizing its crime management system. A data warehousing system is the focal point of crime data collection and analysis and is used to identify trends, patterns and securely store crime data in real time. The system ensures that criminal justice authorities and the public have easy access to crime information.

Although specific details about the history of the Sondu Police Station and the crime management system are unknown, it is likely to follow the general trends and practices of the Kenyan police force and judiciary (Mbuba, et, al 2023). In summary, the history of Kenya's incident and crime management systems, including the Sondu Police Service, reflects the country's colonial history, legal traditions, and its ongoing efforts to modernize and improve the judiciary.

2.3 Review of related prototypes and systems

2.3.1 FBI's Internet Crime Complaint Center

The Internet Crime Complaint Center (IC3) was established in 2000 as a cooperative program between the FBI and the National White Collar Crime Center (NW3C). Its primary mission is to collect, analyze, and develop cybercrime tips with an emphasis on serving federal, state, and local law enforcement agencies (Moloney et, al 2021). IC3 handles a wide range of cybercrime complaints, including cyber fraud, intellectual property infringement, computer hacking, financial espionage, child pornography, international money laundering and identity theft.

The IC3 website provides a simple reporting mechanism for cybercrime victims to notify authorities of suspected criminal or civil wrongdoing. It acts as a central referral mechanism for law enforcement and regulatory agencies at all levels (Hole, et, al 2022).

In addition to working with law enforcement agencies, IC3's priority is to build effective alliances with industry to leverage intelligence and subject matter expert resources. The partnership aims to develop a proactive, proactive approach to combating cybercrime (Lesperance & Godwin & McLaughlin, et, al 2022).

2.3.2 Europol's reporting System

The Europol Information System (EIS) was established in 2005 as Europol's central repository for criminal intelligence covering a wide range of crime areas, including terrorism. The EIS, available in 22 languages, stores detailed information on serious international crimes, suspects or convicted persons, criminal organizations, and methods of committing the crimes. It facilitates cross-border cooperation, allowing law enforcement authorities in Europol Member States and selected partner countries to check information on specific persons or objects. Access to the EIS is allowed only to authorized personnel, including Europol officials, representatives of Member States and national authorities (Gardner & Gardner, et, al 2020). The structured system design realizes the classification and interrelationship of information units and provides a comprehensive overview of criminal cases. In particular, the EIS supports the storage and cross-referencing of biometric data (including DNA) and cyber-related data to improve investigative capabilities. In essence, Europol's information systems play a key role in facilitating cooperation and responding to complex criminal problems (Xu, et, al 2021).

2.3.3 Canadian Anti-Fraud Centre

The Canadian Fraud Center (CAFC) is Canada's lead national police agency responsible for collecting fraud-related intelligence across the country. CAFC is more than just a reporting mechanism, but actively works with jurisdictional law enforcement agencies to support enforcement and prevention efforts against all types of fraud (Gundur & Topalli, & Mejía et, al 2021). Its multi-faceted role includes educating citizens and businesses, providing resources to report fraud, understand different types of fraud, identify warning signs, and implement safeguards. In addition to its national scope, the CAFC has a global role, sharing information with law enforcement agencies and governments in Canada and around the world. CAFC's overall goals include combating criminal activity, fostering stronger partnerships between the private and public sectors, and improving the overall resilience of the Canadian economy. Specifically, the CAFC operates under the joint leadership of key law enforcement agencies, namely the Royal Canadian Mounted Police, the Competition Bureau of Canada, and the Ontario Provincial Police, ensuring a coordinated and effective approach to combating fraud at the national level (Roy & Bordoloi et, al 2023).

2.3.4 Usalama

Usalama is an Android application with a back-end portal for emergency service providers that allows users to make an emergency call and send critical information to designated contacts and emergency responders in the event of an emergency. The app helps police, security companies and emergency services make informed decisions and respond providers effectively by providing real-time data. Usalama's partnership with the Nairobi Women's Gender-Based Violence Rehabilitation Center supports a gender-based violence helpline by providing dedicated emergency and counseling services (Aroussi et, al 2021). Usalama provides a free mobile emergency service to the public that provides user-friendly solutions in the play store (Mrema et, al 2020).

2.3.5 Mulika

Reporting criminal activity has become easier with the Mulika app, which solves the problem of not being able to reach regular phone numbers. The platform allows users to submit messages anonymously and free of charge via SMS (OKWOYO, et, al 2022). The process involves sending a message to 988 starting with your county name, sub-county name, location and village followed by a detailed message. Information is sent free of charge to senior officials at county and sub-county levels, including the police, the National Intelligence Service, DCI, and county commissioners. It is important that the sender number remains confidential unless the user chooses to provide contact information for research purposes. In addition to reporting crimes, the Mulika app also serves as a tool to report people who refuse to self-isolate after recent foreign trips (MWANGI et, al 2021).

2.4 Emerging trends and patterns in the research area

Crime patterns and crime management systems are evolving in Kenya, and technology is playing an increasingly important role. The Kenya National Crime Research Center plays an important role in researching crime patterns and trends, with the most common crimes being burglary, burglary, and theft. Because these crimes are so different, specialized training for Kenyan officials on new crimes could have far-reaching effects on the criminal justice system. This training equips officers with the skills and knowledge needed to respond effectively to these crimes. Around the world, technology is rapidly being used for law enforcement and crime prevention. This includes the use of drones, predictive analytics, biometrics and more. In addition to helping keep communities safer, these technologies are changing the way crimes are detected and prevented (Oloka-Onyango et, al 2020). Online systems are increasingly important in the fight

against crime. Examples include the National Crime Information Center (NCIC), Law Enforcement Enterprise Portal (LEEP), National Data Exchange (N-DEX), Next Generation Identification (NGI), National Instant Criminal Investigation System (NICS), and International Justice and Society. Safety nets (NLETS) are examples of online systems used. As the world becomes more digital, cybercrime is on the rise. Criminals use online transformation to exploit weaknesses in online systems, networks, and infrastructure. In response, law enforcement is using technology to combat these crimes. This includes digital research, data scanning tools, smartphone apps and partnerships with technology, social media, and online businesses. As crime evolves, so do the methods of fighting it. In Kenya, this includes understanding crime patterns, training officers in new crimes and using technology and online systems to prevent and combat crime (Vitus, et, al 2023). This holistic approach is essential to ensure a safer and more secure future for all Kenyans.

2.5 Research gap to be filled by your research.

The aim of the study is to address the gaps that exist in the effective and efficient handling and resolution of crime incidents. The purpose of the survey is to provide immediate data on the nature of criminal incidents and the status of their resolution, covering various areas under the jurisdiction of the Sondu Police Station (Ojalah, et, al 2021). There are opportunities in research and development to improve crime management systems to meet the specific needs of different police stations in Kenya. Such improvements may include the integration of new technologies and crime reporting pipelines that provide accessibility and convenience for citizens to report crimes. In addition, data collected through crime management systems has analytical potential to identify crime trends and patterns. This analytical insight helps develop strategies to prevent crime and improve overall law enforcement effectiveness. Similarities with the revenue management system's ability to analyze data to identify revenue trends and patterns point to the broader impact of such analytical tools in developing strategies to increase revenue and improve financial management (Bharadiya, et, al 2023).

Ultimately, this study aims to make a significant contribution to the existing knowledge of crime management systems. It aims to provide a practical tool to improve crime management not only in Sondu Police Station but potentially in other Kenyan Police Stations as well (WANYAMA, et, al 2023).

2.6 Chapter Summary

This chapter provides a comprehensive overview of the work involved in incident and crime management systems with a particular focus on Sondu Police Station. The literature review takes a systematic approach using academic articles, case studies and authoritative sources to explore the history of global and local crime management systems. The historical development of Kenya's police force and crime management system, including the Sondu Police Service, is outlined, reflecting the country's colonial past, legal traditions, and ongoing efforts to modernize the judiciary (McConkie et, al 2023). This chapter critically examines prototypes and systems such as the FBI's Cybercrime Complaint Center, the Europol Reporting System, the Canadian Fraud Center, Usalama, and Mulika, and delves into their functionality and effectiveness. It examines emerging trends in crime management globally and in Kenya, emphasizing the role of technology and online systems. The identified research gaps point to the need for an effective crime management system in Sondu Police Station and the proposed study aims to improve the system, adopt new technologies and promote greater understanding of crime management systems in Kenya (Shenoy & Gupta et, al 2021).

CHAPTER 3: RESEARCH METHODOLOGY

3.1 CHAPTER INTRODUCTION

The development, testing and implementation of the Sondu Police Department's Crime Management System is a comprehensive, systematic approach to improving law enforcement capacity. The initial phase includes detailed requirements specification and data collection through interviews and questionnaires to capture the nuances of end-user needs and requirements. This valuable information can serve as a cornerstone in subsequent phases to guide system development and implementation. The next phase of system analysis involves a detailed study, including the creation of context diagrams, level 1 DFD, level 2 DFD and standardization to level 3 NF (Tawunwoot & Chomngern, et, al 2023). These analytical tools provide insight into existing crime management systems, explain their complex processes, and identify potential problems. The insight gained at this stage forms the basis for informed decisions in the subsequent stages of the development process.

Looking ahead, the system design phase takes a multifaceted approach. This includes context diagramming, level 1 DFD and level 2 DFD formulation, as well as creating flowcharts, user interface (UI/UX) design using tools such as prototyping and screenshots and creating a database structure using entities (Hu, C. et, al 2023). Relationship Diagram (ERD). This comprehensive design approach provides a comprehensive understanding of the architecture and functionality of the proposed system. The next stage of implementation involves a thoughtful selection of back-end, front-end and database technologies to ensure that the system is not only built with the latest tools, but is also scalable, secure, and easy to maintain (Odeniran, Q. et, al 2023).

The next phase requires rigorous testing to verify the functionality, usability, and security of the system, closely aligning it with the clear needs and expectations of the end users. Finally, the implementation phase begins, which involves installation, configuration, and integration with existing systems using incremental, pilot, parallel, or direct methods (Mønsted & Søndergaard et, al 2020). A careful data migration plan ensures a smooth transition, combined with comprehensive user training that equips law enforcement agencies with the skills needed to optimally utilize the system (Sarkar & Shukla et, al 2023). This coordinated and structured

approach ensures the successful implementation of the crime management system, increasing the operational capacity of Sondu Police Station.

3.2 Methodology for requirement specification

3.2.1 Methodology for Requirements Specification

This section will provide an in-depth look at the various techniques used to collect data for the Sondu Police Crime Management System.

3.2.2 Surveys

Surveys are an effective means of collecting quantitative data. We will design the questionnaire based on the specific needs of our survey. These questionnaires will be distributed to a wide range of stakeholders, including the police, community members and other parties involved in the crime management process. These responses will provide valuable insight into perceptions of existing crime management systems and the desired functionality of new systems.

3.2.3 Interviews

Interviews provide a more personal and in-depth method of data collection. We will conduct individual and focus group interviews with key stakeholders experienced in crime management systems. These stakeholders may include the police, crime analysts and community leaders. The open-ended nature of the questions will give us an opportunity to gain insight into their experiences, perspectives, and expectations of a good crime management system.

3.2.4 Document Reviews

Document review will include a thorough review of relevant documents and reports. This includes police station criminal records, crime management reports and other relevant documents. By getting acquainted with these documents, we can gain a comprehensive understanding of the current crime management system, identify its shortcomings, and identify areas for improvement.

3.2.5 Site Visits

As part of the field trip, Sondu Police Station and other relevant offices related to crime management will be visited. These visits will provide first-hand knowledge of actual crime management processes. Observations made during these visits will help identify areas for improvement and provide context to data collected using other methods.

Overall, the combination of these data collection methods will provide the Sondu Police Department with a comprehensive, multifaceted understanding of the requirements for an effective crime management system. This will ensure that the new system is fit to meet the needs of users and effectively tackle crime in the area.

3.3 Methodology for system Analysis

3.3.1 Data Flow Diagram

A Data Flow Diagram (DFD) is a graphical representation of the data flow of the proposed system in the Sondu Police Station Crime Management System. It is a tool we use to describe system processes and data flows clearly and concisely. A DFD will be used to describe the flow of data in a crime management system, from data entry to data retrieval and analysis. This includes data entry for police incident reporting, data feeds to crime analysts for investigations and data retrieval from station managers for monitoring and planning purposes (Mugarura & Ojula, et, al 2022). Our Crime Management System Data Flow Diagram is designed to provide a comprehensive overview of the system's processes and data flows. This will help us understand how information moves through the system, identify potential weaknesses or points of failure, and create an efficient, reliable, and easy-to-use system. The specific DFD design will be determined as we advance the system analysis and design process (Favi & Mandolini et, al 2022).

3.3.2 Context Diagram

In the context of the crime management system at Sondu Police Station, the context diagram is a high-level representation of the system that shows the interaction between the system and its environment.

The context diagram can be used to illustrate the high-level interaction between the crime management system and its environment. This includes interactions with police officers who input crime data, crime analysts who process and analyze the data, and station management who use the data for decision-making and planning (Caplan, & Baughman et, al 2021)).

Our context diagram for the crime management system will be designed to provide a clear and concise view of these interactions. This will help us understand how the system interfaces with its environment and identify any potential issues or challenges. The specific design of the context diagram will be determined as we move forward with the system analysis and design process. Please note that the actual diagram will be developed during the system design phase and is not included in this text-based discussion (Costa Fernandes & Rozenfeld et, al 2020).

3.3.3 Flowcharts

In a probe police station crime management system, a flowchart will be a graphical representation of the sequence of activities or processes involved in the system. This flow chart will be used to illustrate the sequence of steps involved in crime reporting, investigation, and analysis. A crime management system flow diagram begins with a police or public report of a crime. This information will then be entered into the system. The next step will involve processing and data analysis by forensic analysts (Phiri, et, al 2020). They can use a variety of tools and techniques to identify patterns, trends, and insights.

The station management will then use the results of the analysis for decision making and planning. This flowchart will provide a clear visual representation of the sequence of activities involved in the crime management process (Bohra & Anvari-Moghaddam, et, al 2022). This will help us understand how information flows through the system, how the various components of the system interact with each other, and where potential bottlenecks or points of failure may occur.

3.3.4 Current System Analysis:

1. **Context Diagram:** This diagram is very important because it defines the boundaries of the entire system. It identifies external entities (e.g., citizens reporting crimes, police etc.) and how they interact with the current system (e.g., reporting crimes, updating case status, retrieving case details, etc.).
2. **Level 1 DFD:** This diagram breaks down the system into its main processes. For crime and incident management systems, these can be processes such as "report a crime", "assign an officer", "update a case", "close a case", etc. It also shows how data flows between these processes and data stores.
3. **Level 2 DFD:** This diagram further breaks down each process into sub-processes. For example, "Report a crime" can be divided into "Verify the reporter", "Register information about the crime", "Assign a case number", etc.
4. **Normalization (Up to 3rd NF):** This process ensures that the database structure is efficient and without duplication. This includes deduplication of data, ensuring that data dependencies make sense and that non-key attributes are functionally dependent on the primary key of each table.

3.3.5 Proposed System Design:

1. **Context Diagram:** This diagram would be like the one for the current system, but it would incorporate any new external entities or interactions that the proposed system would have.
2. **Level 1 DFD & Level 2 DFD:** These diagrams would be based on the new processes in the proposed system. If the proposed system includes new features like ‘Online Crime Reporting’, ‘Automated Case Assignment’, ‘Real-time Case Tracking’ etc., these would be represented in the DFDs.
3. **Flow Charts:** These diagrams provide a visual representation of the sequence of steps in each process. They help in understanding the control flow and can be very useful in spotting potential issues or areas of improvement in the proposed system.
4. **User Interface Design:** This involves creating an intuitive and user-friendly interface for the system. It could involve designing forms for data entry, dashboards for data visualization, menus for navigation etc. The aim is to make the system easy to use for all users.
5. **Database Design (ERD):** This involves designing the database that will store all the system’s data. It includes defining the tables, the relationships between them, and the constraints on the data. The ERD provides a clear picture of the structure of the data in the system.

3.4 Methodology for System implementation

The methodology for system implementation will involve the use of appropriate back end, front-end, and database technologies to develop our system into real implementation and functionalities.

3.4.1 Backend Technologies

For the back end, the system will be developed using a suitable programming language and server-side logic to build the system’s business logic.

3.4.2 Front End Technologies

For the front-end, the system will be designed using technologies suitable for creating an interactive user interface. The front-end will be responsible for presenting the user interface to the users and enabling them to interact with the system. The design of the front-end will be guided by the flowchart diagrams we had indicated earlier above.

3.4.3 Database Technologies

For the database, a relational database management system (RDBMS) will be implemented, which will be able to create various tables and link various information for our system. The database will be categorized in terms of accessibility whereby the authentication will grant access to the super user that's the super administrator of the system and the other system administrators.

Overall, the implementation process will involve integrating the back end, front-end, and database technologies to create a functional and user-friendly crime management system for Sondu Police Station.

3.5 Methodology for System Testing

Testing will include various types of testing, including functional and non-functional, unit, integration, system, acceptance, performance, security, and usability testing. According to the test pyramid concept, testing will prioritize more unit testing, followed by less integration and system testing, and only a small amount of acceptance testing to ensure that the system is fully functional and meets user needs.

3.5.1 Functional and Non-functional Testing

Functional requirements define what the system must do. The crime management system at Sondu Police Station has several functional requirements to ensure that the needs of the users are met. The system will include processes related to crime incidents, insight into crime trends, dashboards showing relevant indicators such as crime rates, crime types and hotspots.

The system will also integrate with other systems, including other law enforcement and community reporting systems. This means that the system must be developed using interfaces based on open standards and must be compatible with existing systems used by police stations. In addition, the system will be able to automate crime management processes including crime reporting, crime investigation and crime analysis to increase efficiency and effectiveness (Kamruzzaman, et, al 2020). Fourth, the system will have the ability to automate crime management processes, including crime reporting, crime investigation and crime analysis. This means that systems must be able to automate these processes to increase efficiency and effectiveness.

Table 1: Difference between functional and non-functional requirements (Rahy & Bass et, al 2022)

Functional requirements	Non-functional requirements
Ability to add and Update citizens police and Admin Data	Security measures such as user authentication and access control.
Ability to update criminal records	Scalability to accommodate an increasing volume of users and crime reports.
Ability to manage all the users	High availability to ensure minimal downtime.
Ability to keep system logs	Maintainability and upgradability.
Ease in case tracking and giving out case progress	Responsiveness with low latency and fast response times for quick and efficient processing of crime reporting's.

3.6 Methodology for system deployment

The system deployment plan will involve deploying the system components to a cloud hosting service. Cloud hosting services offer scalability, reliability, and enhanced security, making them an ideal choice for deploying the crime management system (Gundu & Satheesh, et, al 2022).

3.6.1 Cloud Hosting Services

The system components will be hosted on a cloud server. Cloud servers offer the advantage of scalability, meaning the system can easily be scaled up or down based on demand. They also offer high availability and reliability, ensuring the system is always accessible when needed (Banafaa, & Alhammadi, et, al 2023).

3.6.2 Domain Hosting

A domain name will be registered and connected to the cloud hosting server to enable easy access to the system. This domain name will serve as the address where users can access the system. It's important to choose a domain name that is easy to remember and reflects the purpose of the system (Mishra, & Gupta, et, al 2020).

3.6.3 System Deployment Strategies

The deployment can be done in several ways:

- **Phased:** In a phased deployment, different parts of the system are deployed in phases. This allows for testing and troubleshooting of each part before the next one is deployed.
- **Pilot:** In a pilot deployment, the system is deployed to a small group of users first. Their feedback is used to make improvements before the system is deployed to all users.
- **Parallel:** In a parallel deployment, the new system is run alongside the old system. This allows users to switch back to the old system if there are issues with the new one.
- **Direct:** In a direct deployment, the old system is replaced by the new system all at once. This is the fastest method, but also the riskiest as there is no fallback if issues arise.

Data Migration Plan

Data from the existing system will need to be migrated to the new system. This will involve exporting data from the old system, transforming it to fit the new system's data model, and then importing it into the new system.

Users Training

Users of the system, such as police officers and station management, will need to be trained on how to use the new system. This will involve creating training materials, conducting training sessions, and providing ongoing support as users get accustomed to the new system.

3.7 Chapter summary

The Crime Management System for Sondu Police Station has been analyzed and designed using a comprehensive methodology. The chapter introduction provided an overview of the system and the need for a robust deployment plan.

The methodology for requirement specification, data collection, and analysis techniques, including interviews and questionnaires, was described. The system analysis methodology involves creating DFD, context diagram, and flow charts to depict the current system (Alam, et, al 2021).

The proposed system is designed using database design, DFD, context diagram, flow charts, sequence diagram, collaboration diagrams, use case, pseudocodes, and early system prototypes. The methodology for system implementation is detailed, including back-end, front-end, and database technologies to be used.

The testing plan and techniques for system testing are also outlined. Finally, the system deployment methodology involves deploying the system components to a cloud hosting service. The chapter

summary provides an overview of the methodology used to design, develop, and deploy the Crime Management System for Sondu Police Station. This comprehensive approach ensures that the new system will be well-suited to meet the needs of its users and effective in managing crime at Sondu Police Station (Phiri et, al 2020).

CHAPTER 4 SYSTEM ANALYSIS

4.1 Introduction

In this chapter, we focus on designing an incidence and crime management system tailored for the Sondu police station. This system aims to streamline crime reporting for local residents, providing a means by which a known user reports the crime. Additionally, it will offer police officers real-time access to reported crime records. We begin by assessing the current systems in place, identifying their strengths and weaknesses. Following this, a feasibility study is conducted to evaluate the project's practicality. We then analyze the system's requirements, distinguishing between functional and non-functional aspects. Leveraging relevant methodologies, we break down the system into its components, identify users and inputs, and control data redundancy.

Finally, the chapter concludes with a summary of key insights to guide subsequent discussions.

4.2 Description of current system its strengths and weaknesses

The manual system currently employed for incident and crime management at the Sondu police station has both strengths and weaknesses. On the positive side, its simplicity is a notable strength; the system is straightforward and does not require specialized technical knowledge for operation. Moreover, its reliance on physical records ensures reliability, as it is not susceptible to technical glitches or power outages. Additionally, the physical record provided by the Occurrence Book (OB) serves as a tangible archive for incidents, facilitating easy reference when needed.

However, the manual system also exhibits several weaknesses. Its efficiency is compromised by the time-consuming and labor-intensive nature of manual data entry, particularly when dealing with large volumes of data. Moreover, retrieving specific information from past records can prove challenging and time-consuming. Furthermore, the system's susceptibility to human error introduces inaccuracies into the data, undermining its reliability. Security concerns also arise due to the vulnerability of physical records to damage, loss, or tampering. Lastly, the system's scalability is limited, posing challenges in handling a significant increase in the volume of incidents.

In conclusion, while the manual system offers simplicity and reliability, its inefficiencies and vulnerabilities necessitate modernization to enhance efficiency, accuracy, and security. Transitioning to a digital system could address these issues, providing a more robust and reliable solution for incident and crime management at the Sondu police station.

4.3 Feasibility study and its conclusion

Feasibility studies are crucial in determining the viability of implementing an incidence and crime management system at the Sondu police station. Here is how various feasibility aspects apply to this project:

4.3.1. Technical Feasibility

The technical feasibility study for the Incidence Management System at Sondu Police Station affirmed the availability of fundamental tools and technologies necessary for the project's development, specifically focusing on HTML, CSS, JavaScript, and PHP. These technologies collectively provided a robust framework for creating a dynamic and responsive system tailored to the needs of the police station. With HTML as the backbone for structuring web pages, CSS for styling and layout, JavaScript for interactivity and client-side scripting, and PHP for server-side processing and database integration, the project possessed a comprehensive toolkit for building a functional and user-friendly application.

By leveraging HTML, CSS, JavaScript, and PHP, the Incidence Management System aimed to deliver a seamless user experience while ensuring efficient data handling and processing. HTML provided the structural foundation for organizing and presenting information, while CSS enhanced the visual appeal and user interface design. JavaScript added dynamic functionality to the system, enabling real-time updates and interactive features. Meanwhile, PHP facilitated server-side operations, database connectivity, and seamless integration with backend processes. With these technologies readily available and well suited for the project's objectives, the technical feasibility study confirmed the viability of implementing the Incidence Management System at Sondu Police Station using HTML, CSS, JavaScript, and PHP.

4.3.2. Operational Feasibility

Operational feasibility evaluates the degree to which the system can meet the requirements of the Sondu police station and how easy it will be to operate and maintain after deployment. It also considers factors such as usability and whether the suggested solution by the software development team is acceptable to the stakeholders.

This evaluation primarily focuses on how seamlessly the system integrates with existing workflows, the level of acceptance among users, and the feasibility of its implementation within the operational framework of the police station. A key objective is ensuring that the system aligns

with established procedures for incident recording, management, and response at the Sondu Police Station.

4.3.3. Economic Feasibility

Economic feasibility involves analyzing the cost and benefit of the project. This includes a detailed analysis of the project's development costs, including hardware, software, design, development, and operational costs. It also assesses whether the project will be financially beneficial for the organization.

4.3.4. Legal Feasibility

Legal feasibility analyzes the project from a legality standpoint, including barriers to legal implementation, compliance with data protection acts and social media laws, and obtaining necessary certificates, licenses, and copyrights. It ensures that the proposed project conforms to legal and ethical requirements.

4.3.5. Schedule Feasibility

Schedule feasibility studies the timelines and deadlines for the proposed project, assessing how long it will take the project to be completed. Timely completion of the project is crucial, as delays could affect its effectiveness and success.

4.3.6. Cultural and Political Feasibility:

This aspect assesses how the project will affect the political environment and organizational culture at the Sondu police station. It considers factors such as the organization's culture and potential political obstacles or internal opposition to the project, ensuring that cultural and political factors are taken into account for successful project execution.

4.3.7. Market Feasibility:

Market feasibility evaluates the market's willingness and ability to accept the proposed software system. It involves analyzing the target market, understanding consumer wants, and assessing potential rivals to determine whether there is a feasible market for the system.

4.3.8. Resource Feasibility:

Resource feasibility evaluates whether the resources needed to complete the project successfully, including financial, technological, and human resources, are adequate and readily available. This ensures that sufficient hardware, software, trained labor, and funding are available to complete the project successfully.

4.3.9. Conclusion

For our incidence and crime management system we can say that the system is a feasible system after consideration of the various studies starting from the technical, operational, economic, legal, schedule, cultural, market and the resource feasibility

4.4. Requirements analysis

4.4.1. Functional

The incidence management system for the Sondu police station necessitates a comprehensive array of functional requirements to effectively handle incident and crime management. Primarily, the system must incorporate robust user authentication mechanisms to ensure secure access, allowing authorized personnel to log incidents, update case information, and track the progress of investigations. Additionally, efficient data management capabilities are imperative, encompassing features such as data validation to ensure accuracy, error handling to address invalid inputs, and input restrictions to maintain data integrity. Workflow and business logic functionalities should facilitate seamless processes, including user authentication, order processing, and data transformation, ensuring that tasks are executed in a structured and efficient manner. Moreover, reporting and analytics functionalities are essential for generating reports, summaries, and notifications, providing stakeholders with valuable insights into incident trends, resource allocation, and performance metrics. Integration with external systems is also critical, enabling seamless communication with relevant agencies, databases, and tools to enhance collaboration and information sharing in law enforcement operations.

Furthermore, user requirements play a pivotal role in shaping the system's functionalities to meet the needs and expectations of Sondu police station personnel. Users should be able to easily create and update incident reports, access relevant case information, and perform necessary tasks with minimal complexity. System requirements, on the other hand, dictate the behavior and performance of the entire system, emphasizing aspects such as data encryption for security, concurrency control for handling multiple transactions, and error handling for graceful handling of exceptions. Input requirements ensure that user inputs are accurately captured and processed, while output requirements dictate how information is presented and actions are performed to provide meaningful outputs to users. Process requirements define the workflows and interactions necessary for various tasks, while data requirements specify how data is managed, stored, and

secured within the system. By addressing these functional requirements comprehensively, the incidence management system for Sondu police station can effectively streamline operations, enhance collaboration, and improve overall efficiency in crime and incident management endeavors.

4.4.2 Non-functional requirements

Non-functional requirements (NFRs) are essential considerations in software development, focusing on how a system performs or behaves rather than its specific functionalities. They encompass various aspects such as performance, security, usability, reliability, maintainability, and scalability, all crucial for ensuring the overall quality and success of a software system. Performance requirements, for instance, ensure system efficiency and responsiveness, defining parameters like response time, throughput, scalability, and capacity. Security requirements safeguard the system and its data from unauthorized access or breaches, encompassing aspects like authentication, authorization, data encryption, auditability, and compliance. Meanwhile, usability requirements aim to enhance the user experience and interface, covering elements such as user interface design, accessibility, error handling, response time, and learnability. These NFRs are vital for guiding the development process and ensuring that the resulting system meets the desired standards of performance, security, and usability, ultimately contributing to its overall success and effectiveness in meeting user needs.

Furthermore, effective requirement gathering and management are crucial for ensuring project success, overcoming challenges such as stakeholder involvement, incomplete or inconsistent requirements, changing requirements, communication issues, and lack of domain knowledge. Prioritizing requirements and managing trade-offs are key aspects of this process, involving techniques like the Moscow technique, considering impact and dependencies, collaborating with the development team, and adopting an iterative approach. Agile and iterative methodologies are particularly beneficial in this regard, emphasizing flexibility, collaboration, and continuous improvement. User stories, backlog management, sprints, and iterations facilitate a more dynamic and adaptable approach to requirements gathering and implementation, fostering close collaboration between stakeholders, developers, and the requirements team throughout the project lifecycle. By applying these best practices and methodologies, teams can effectively manage

requirements, address challenges, and deliver successful software solutions that meet user needs and expectations.

4.5 System analysis breakdown

4.4.1 Data Flow Diagram

The data flow diagram is the graphical representation of how data flows within the system. It describes the processes and data flow of a system in a clear and concise manner our data flow of the Incidence and crime management system is as follows

Figure1: Login Flow DFD (Author, 2024)

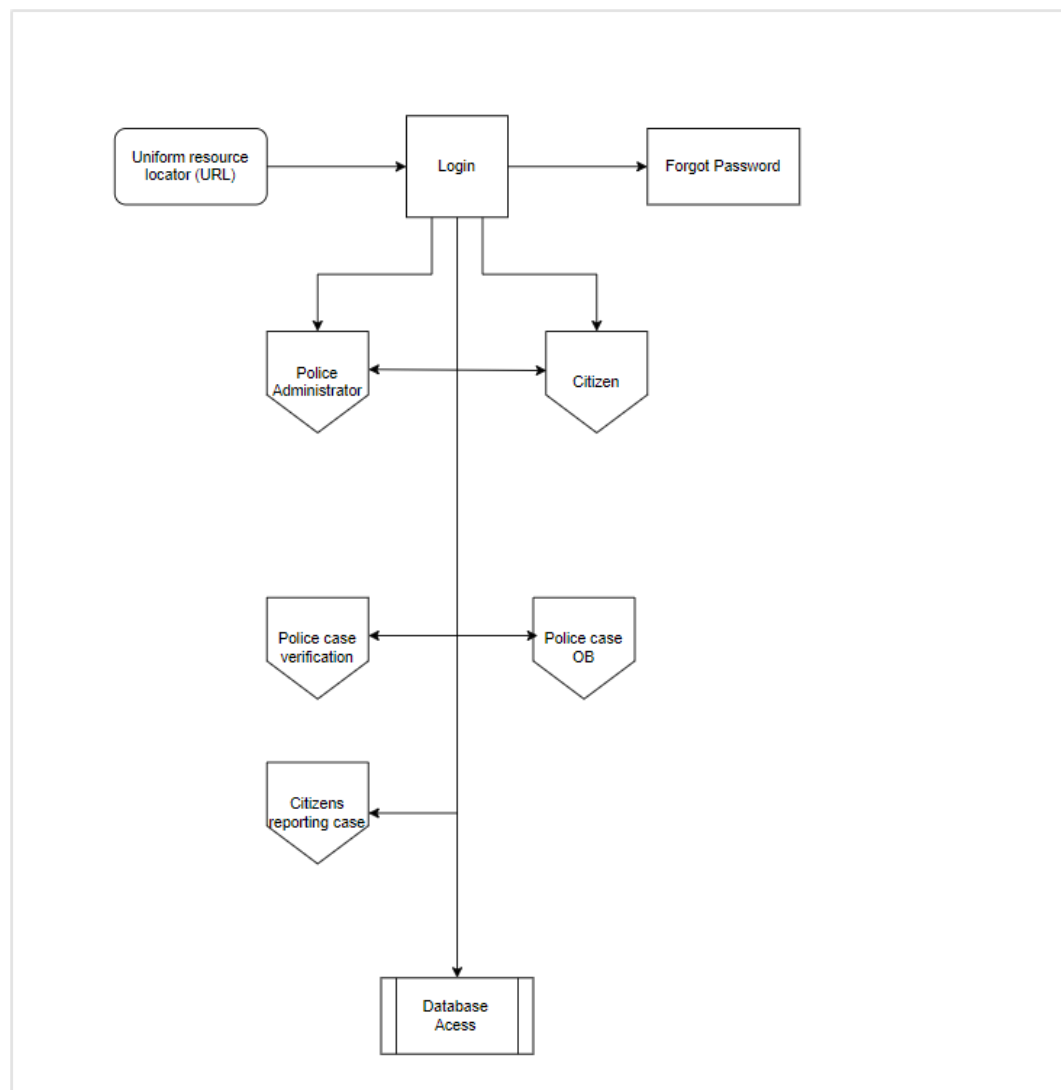


Figure 2 Admin dataflow diagram

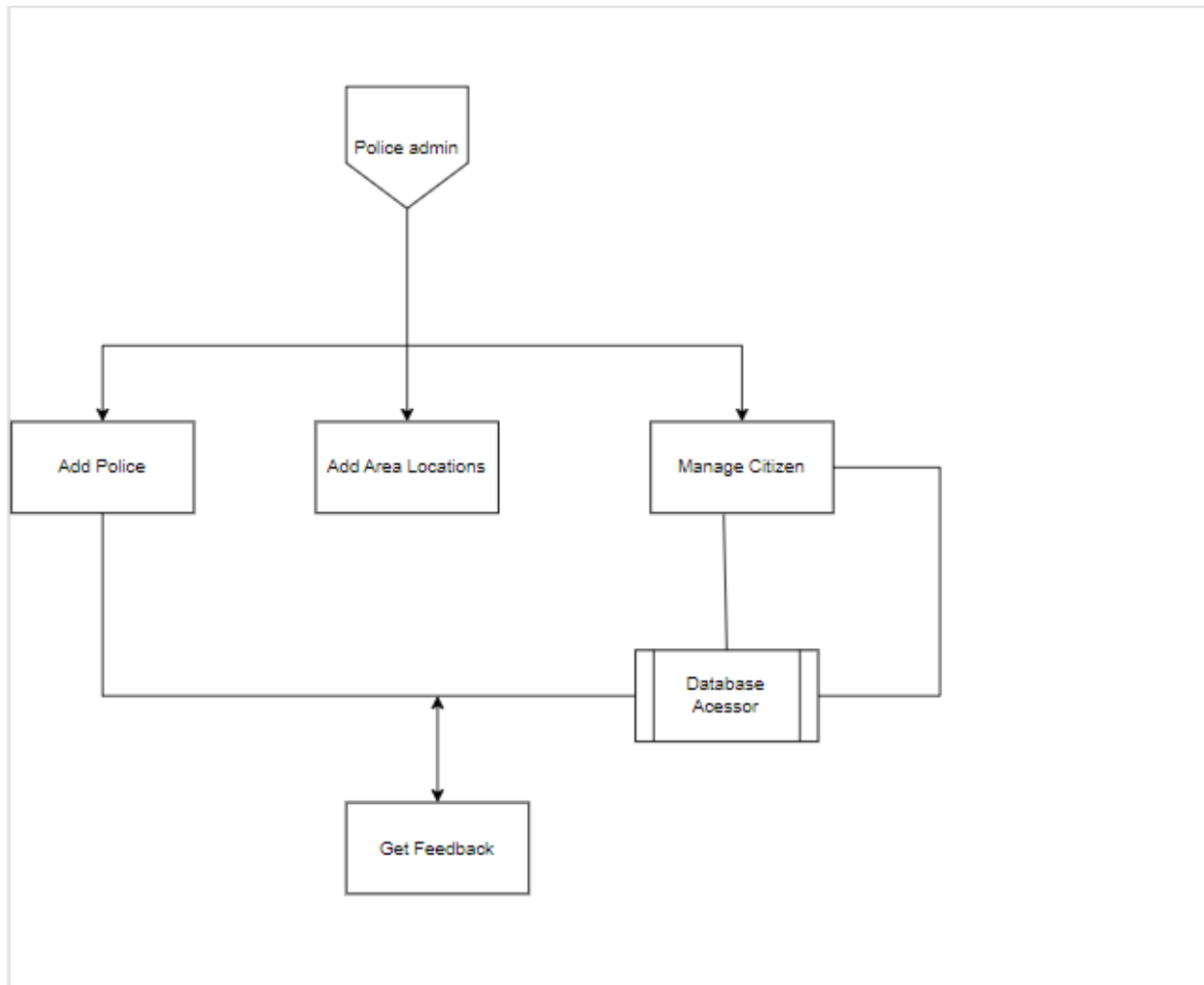
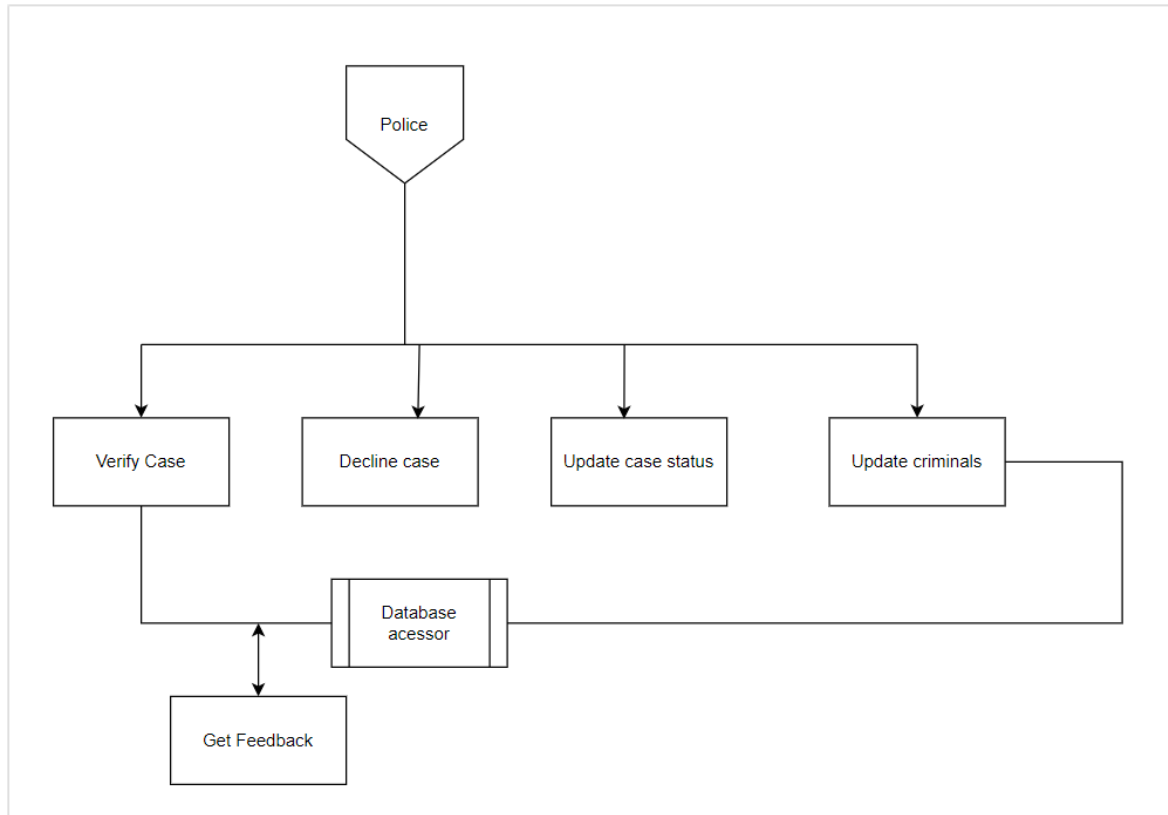


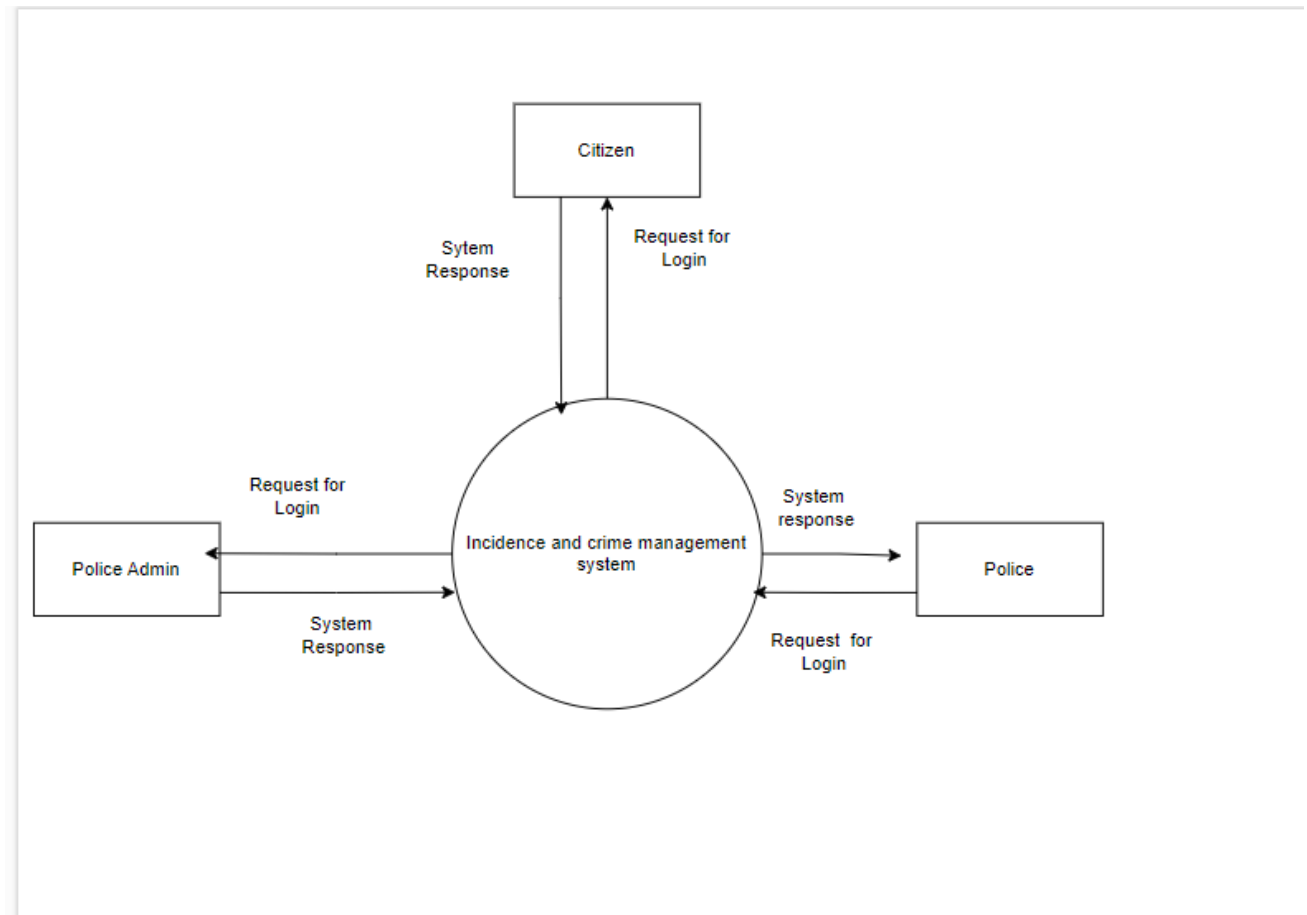
Figure 3: Police Dataflow diagram (Author, 2024)



4.4.2 Context diagram

The context diagram is a high-level representation of the system that will be able to show us the interaction between the system and the environment. For our case of the incidence and crime management system the context diagram is as follows.

Figure 4: Context diagram (Author, 2024)



4.5 System users' actors Inputs and Outputs

System actors

The system actors are inclusive of

1. **Citizen:** This is a normal user in our system and for this the user is responsible for reporting any incident/case at any time of occurrence and can be able to track the incident he or she reported
2. **The Police officer:** For this part it is the police officer is responsible for managing any incident reported at any time in such a case that a police officer can either verify or decline a case or incident and assigning an OB-Number for a specific case reported through the system
3. **Administrator:** For this the system administrator is responsible for managing the whole system from managing the citizen up to the police and be able to view data analyzed by our system.

System Input

The system input details consist of the case details, the donation details, the police details and the admin details.

System output

For the system output we will have the reports from the admin panel, the OB number with the case details and the emails

4.6 Chapter summary

The design that aims to streamline crime reporting through allowing identified submission of reported crimes into Sondu police station's database and provide real time access to crime records to officers will be detailed in this chapter. A description of the existing manual system which includes its advantages, disadvantages including the fact that it is simple though prone to vulnerabilities and inefficiencies is done. To affirm its practicability, a feasibility report has it all in place for the project encompassing all possible areas.

CHAPTER 5: SYSTEM DESIGN

5.1 Introduction

The system design of the proposed Incidence and Crime Management System for Sondu police station is the focus of this chapter. To establish functionality, address limitations, mitigate risks, and maximize opportunities for successful implementation, there is a detailed description of this system which includes its strengths and weaknesses. In addition, this chapter also provides logic flow design diagrams, database design and finally ends with summarizing what it contains as well as its importance to the next steps in our project.

5.2 Description of the proposed system its strengths and weaknesses

The proposed system is an incident and crime management web-based system that allows users or citizens within Sondu area to report crimes

5.2.1 Strengths of the proposed system

- 1 **Ease in Crime Reporting:** The system simplifies the process of reporting crimes, allowing residents to easily submit incident reports online at their comfort of their homes.
2. **Time Saving:** Automation of data entry and retrieval significantly reduces the time required for managing and accessing crime records, enhancing overall efficiency.
3. **Centralized Information:** All crime data is stored in a centralized database, ensuring that information is easily accessible, well-organized, and securely managed.

5.2.2 Weakness of the proposed system

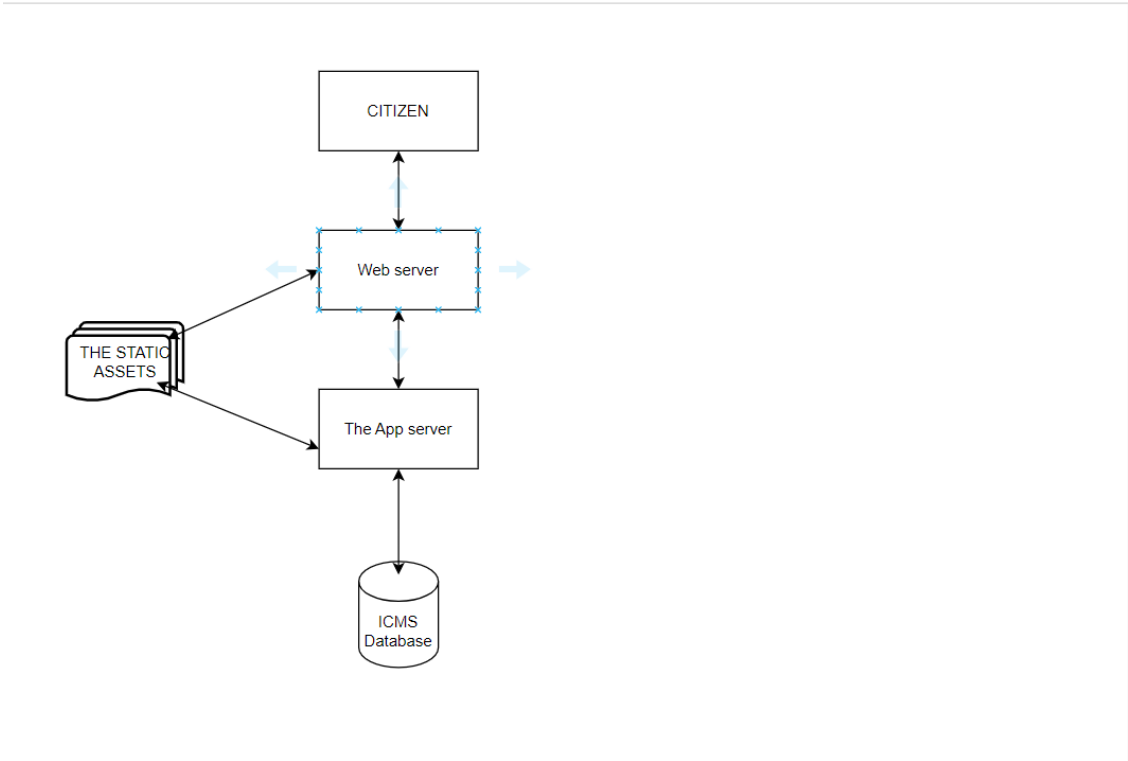
1. **User Adoption Challenges:** Illiterate or less tech-savvy users may struggle to use the system effectively, leading to potential underreporting of incidents.
2. **Dependence on Technology:** The system's reliance on stable internet may be problematic in rural areas prone to outages.
3. **Initial Cost and Training Requirements:** Implementing the system requires significant upfront investment and comprehensive training for users, which may be difficult in a resource-limited setting.

5.3 Conceptual architecture of the proposed system

Owing to the fact that this will be a web-based system, the architecture of the Incident and Crime Management System is based on the client-server model. In this case, the available computing resources are efficiently utilized

by way of distributing the data processing loads: the client machine carrying out the user-interfacing and application processing, and the server machine undertaking the data processing.

Figure 5: Web Architecture (Author, 2024)

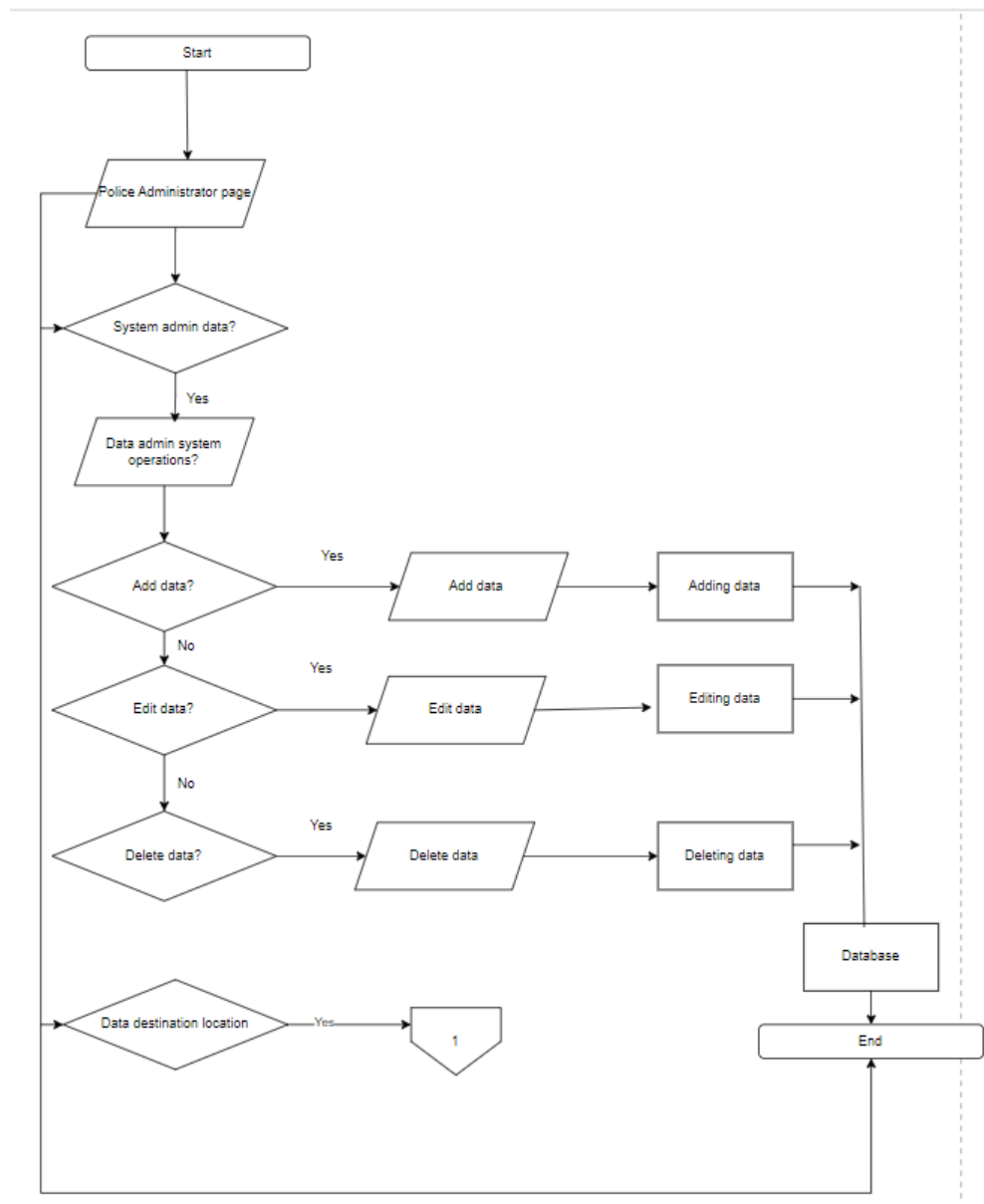


5.4 Process design logic

5.4.1 Flowchart

The flowchart diagram for the Incident and Crime Management System illustrates the step-by-step process of reporting and managing incidents. It begins with the user accessing the system to report an incident. The report is then submitted to the system, where it is logged and stored in a centralized database. Police officers can access the system to review, verify, and update incident details. The system also allows for the generation of reports and analytics, providing valuable insights into crime trends and resource allocation. Each step in the flowchart represents a key function of the system, ensuring a clear and organized workflow for managing incidents.

Figure 6: Flowchart diagram (Author, 2024)

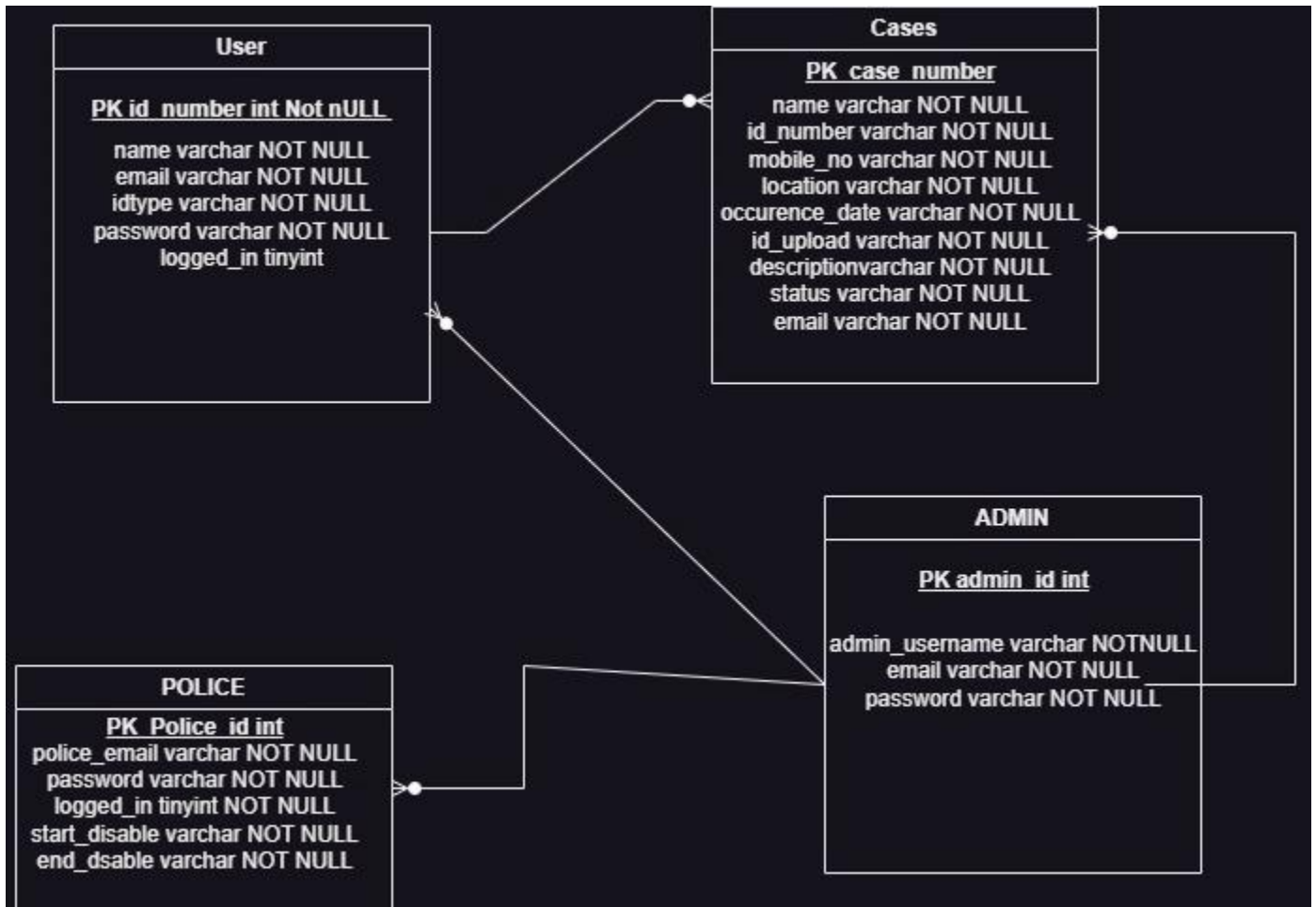


5.5: Database design

The database design for our incidence and crime management system involves creation of various tables to store users, admin and police information details it also includes the cases details as a whole and all the relationships between these information

5.5.1 ENTITY RELATIONSHIP DIAGRAM

Figure 7: Entity relationship diagram (Author, 2024)



5.5.2 Data dictionary

A data dictionary has a list of files in a dataset with number of records in each file, types of fields and has a constraint description.

Figure 8: Citizens Table (Author, 2024)

Server: 127.0.0.1 » Database: icms_database » Table: users

[Browse](#)
[Structure](#)
[SQL](#)
[Search](#)
[Insert](#)
[Export](#)
[Import](#)
[Privileges](#)
[Operations](#)
[Triggers](#)

[Table structure](#)
[Relation view](#)

	#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
<input type="checkbox"/>	1	name	text	utf8mb4_general_ci		No	None			Change Drop More
<input type="checkbox"/>	2	email	varchar(255)	utf8mb4_general_ci		No	None			Change Drop More
<input type="checkbox"/>	3	id_number	int(255)			No	None			Change Drop More
<input type="checkbox"/>	4	idtype	varchar(255)	utf8mb4_general_ci		No	None			Change Drop More
<input type="checkbox"/>	5	mobile_no	int(255)			No	None			Change Drop More
<input type="checkbox"/>	6	password	varchar(255)	utf8mb4_general_ci		No	None			Change Drop More
<input type="checkbox"/>	7	logged_in	tinyint(1)			No	None			Change Drop More
<input type="checkbox"/>	8	otp	varchar(6)	utf8mb4_general_ci		Yes	NULL			Change Drop More
<input type="checkbox"/>	9	otp_expiration	datetime			Yes	NULL			Change Drop More

☐ Check all
 With selected:
 [Browse](#)
 Change
 Drop
 Primary
 Unique
 Index
 Spatial
 Fulltext

Figure 9: Police table (Author, 2024)

Server: 127.0.0.1 » Database: icms_database » Table: police										
Browse Structure SQL Search Insert Export Import Privileges Operations Triggers										
Table structure Relation view										
	#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
<input type="checkbox"/>	1	police_id	int(255)			No	None			Change Drop More
<input type="checkbox"/>	2	police_email	varchar(255)	utf8mb4_general_ci		No	None			Change Drop More
<input type="checkbox"/>	3	password	varchar(255)	utf8mb4_general_ci		No	None			Change Drop More
<input type="checkbox"/>	4	logged_in	tinyint(1)			No	None			Change Drop More
<input type="checkbox"/>	5	start_disable	datetime			Yes	NULL			Change Drop More
<input type="checkbox"/>	6	end_disable	datetime			Yes	NULL			Change Drop More
<input type="checkbox"/>	7	name	varchar(100)	utf8mb4_general_ci		No	None			Change Drop More
<input type="checkbox"/>	8	rank	varchar(50)	utf8mb4_general_ci		No	None			Change Drop More
<input type="checkbox"/>	9	police_id_number	varchar(20)	utf8mb4_general_ci		No	None			Change Drop More
<input type="checkbox"/> Check all With selected: Browse Change Drop Primary Unique Index Spatial Fulltext										

Figure 10: Admin table (Author, 2024)

Server: 127.0.0.1 » Database: icms_database » Table: admin										
Browse Structure SQL Search Insert Export Import Privileges Operations Triggers										
Table structure Relation view										
	#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
<input type="checkbox"/>	1	admin_id	int(255)			No	None			Change Drop More
<input type="checkbox"/>	2	admin_username	varchar(255)	utf8mb4_general_ci		No	None			Change Drop More
<input type="checkbox"/>	3	email	varchar(255)	utf8mb4_general_ci		No	None			Change Drop More
<input type="checkbox"/>	4	password	varchar(255)	utf8mb4_general_ci		No	None			Change Drop More
<input type="checkbox"/> Check all With selected: Browse Change Drop Primary Unique Index Spatial Fulltext										
Print Propose table structure Move columns Normalize										
Add <input type="text" value="1"/> column(s) <input type="text" value="after password"/> <input type="button" value="Go"/>										
Indexes										

Figure 12: Cases table (Author, 2024)










































Server: 127.0.0.1 » Database: icms_database » Table: cases										
Browse Structure SQL Search Insert Export Import Privileges Operations Triggers										
Table structure Relation view										
	#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
<input type="checkbox"/>	1	case_number 	int(255)			No	None		AUTO_INCREMENT	 Change  Drop  More
<input type="checkbox"/>	2	name	varchar(255)	utf8mb4_general_ci		No	None			 Change  Drop  More
<input type="checkbox"/>	3	id_number	int(255)			No	None			 Change  Drop  More
<input type="checkbox"/>	4	mobile_no	varchar(255)	utf8mb4_general_ci		No	None			 Change  Drop  More
<input type="checkbox"/>	5	location	varchar(255)	utf8mb4_general_ci		No	None			 Change  Drop  More
<input type="checkbox"/>	6	occurence_date	date			No	None			 Change  Drop  More
<input type="checkbox"/>	7	occurence_time	time(6)			No	None			 Change  Drop  More
<input type="checkbox"/>	8	id_upload	varchar(255)	utf8mb4_general_ci		No	None			 Change  Drop  More
<input type="checkbox"/>	9	description	varchar(255)	utf8mb4_general_ci		No	None			 Change  Drop  More
<input type="checkbox"/>	10	status	varchar(255)	utf8mb4_general_ci		No	None			 Change  Drop  More
<input type="checkbox"/>	11	email	varchar(255)	utf8mb4_general_ci		No	None			 Change  Drop  More
<input type="checkbox"/> Check all With selected: Browse  Change  Drop  Primary  Unique  Index  Spatial  Fulltext										

Figure 13: Event logs table (Author, 2024)

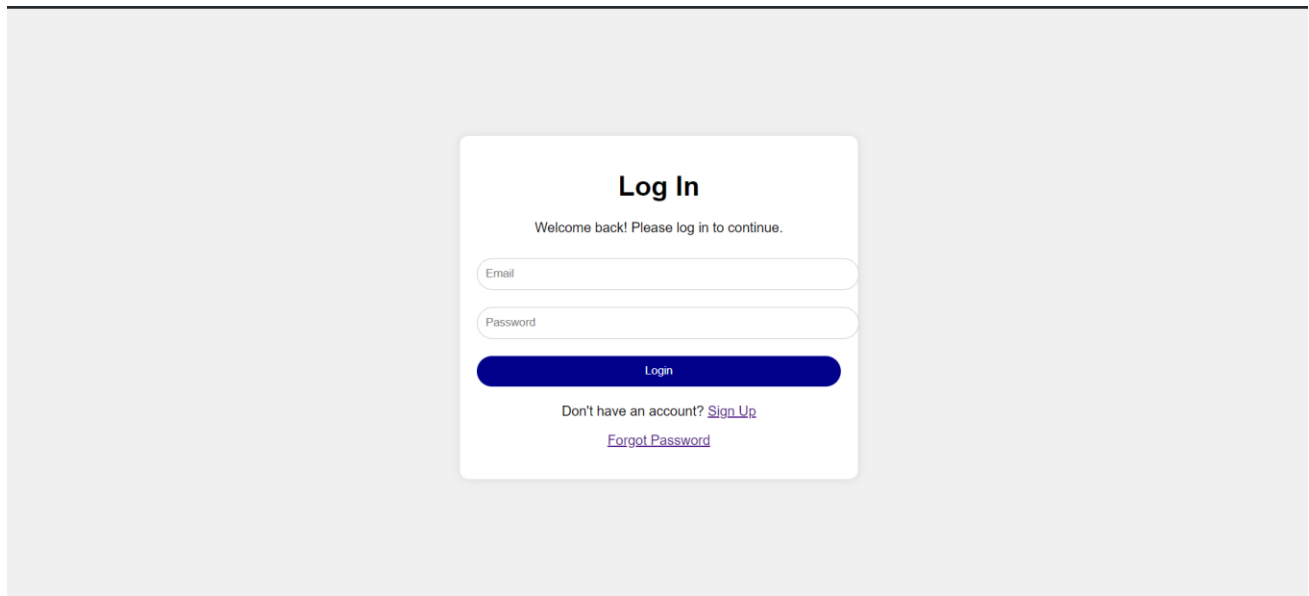
#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	id	int(11)			No	None		AUTO_INCREMENT	Change Drop More
2	timestamp	datetime			Yes	current_timestamp()			Change Drop More
3	user	varchar(255)	utf8mb4_general_ci		Yes	NULL			Change Drop More
4	event	varchar(255)	utf8mb4_general_ci		Yes	NULL			Change Drop More

Action	Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null	Comment
PRIMARY		BTREE	Yes	No	id	38	A	No	

5.6 INPUT/OUTPUT of the proposed system (Mockup screens)

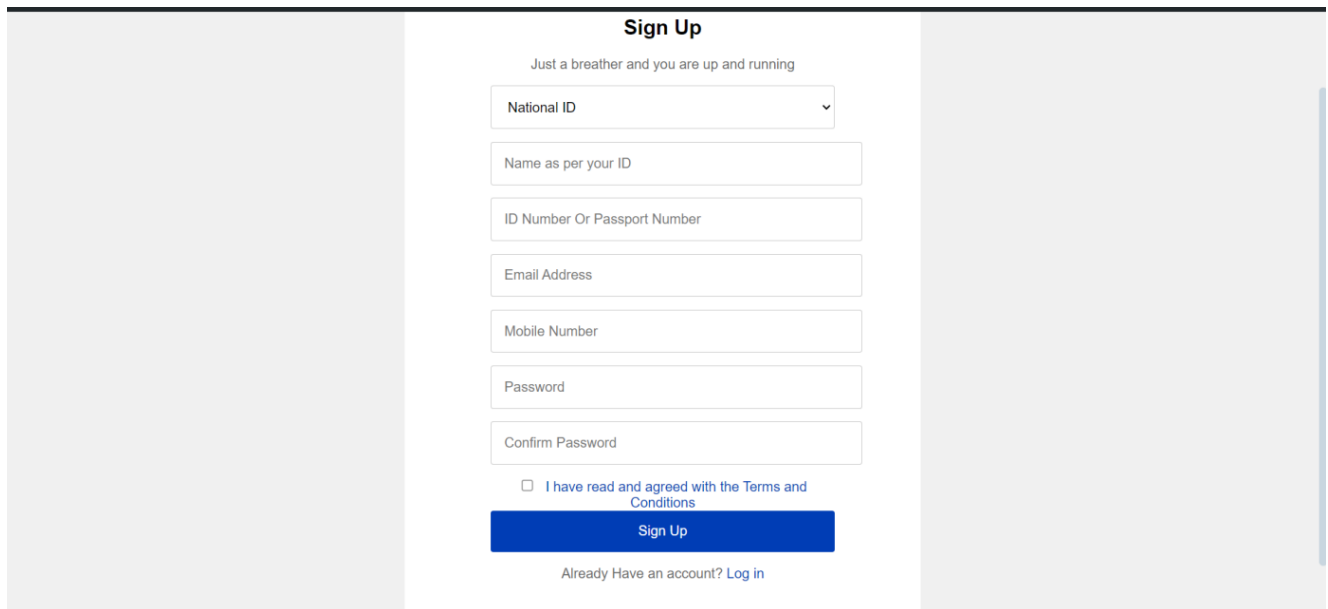
In the Incidence and Crime Management System for Sondu Police Station, web forms are essential features that enable information gathering from the user. Such forms act as the primary input interface through which citizens can report incidents, give details, or even use other services provided by this system. Be it crime reporting, incident registration, or even system functionality, web forms effectively capture data and provide a user interaction platform within the incidence of crime management operations.

Figure 14: Login page screenshot (Author, 2024)



The screenshot shows a login page with a central white card on a light gray background. The card is titled "Log In" in bold black text. Below the title is a welcome message: "Welcome back! Please log in to continue." There are two input fields: "Email" and "Password", both with rounded rectangular borders. Below these fields is a blue button with the text "Login" in white. At the bottom of the card, there is a link "Don't have an account? [Sign Up](#)" and another link "[Forgot Password](#)".

Figure 15: Signup page screenshot (Author, 2024)



The screenshot shows a signup page with a central white card on a light gray background. The card is titled "Sign Up" in bold black text. Below the title is a message: "Just a breather and you are up and running". There are several input fields: "National ID" (a dropdown menu), "Name as per your ID", "ID Number Or Passport Number", "Email Address", "Mobile Number", "Password", and "Confirm Password". Below these fields is a checkbox labeled "I have read and agreed with the Terms and Conditions". At the bottom of the card is a blue button with the text "Sign Up" in white. Below the button is a link "Already Have an account? [Log in](#)".

5.8 Chapter summary

This chapter focused on the design of the Incidence and Crime Management System for Sondu Police Station. We pointed out some of the methodologies used in systems design, among which

are descriptions of the current system, analysis of its strengths and weaknesses, requirement analysis, feasibility studies, process logic design using flowcharts, context diagrams, and Data Flow Diagrams. These activities laid a complete platform with regard to understanding the objectives of the system and structuring the system in order to meet effectively all of the user's expectations. The chapter covered in great detail all of the features, architecture, database design, and user interface of the system. The next chapter will take a close look at the Implementation of the System.

CHAPTER 6: IMPLEMENTATION (SYSTEM PROTOTYPE)

6.1 Introduction

System implementation and testing refers to how the system is to be deployed and verified in conformance with required standards. This chapter gives the details of the deployment process with corresponding screenshots, accompanied by plans for testing and evaluation.

6.2 System screenshots

Figure 16: Signup form (Author, 2024)

The screenshot displays a 'Sign Up' form centered on a light gray background. The form is titled 'Sign Up' in bold black text. Below the title is a subtitle 'Just a breather and you are up and running'. The form contains several input fields: a dropdown menu for 'National ID', a text field for 'Name as per your ID', a text field for 'ID Number Or Passport Number', a text field for 'Email Address', a text field for 'Mobile Number', a text field for 'Password', and a text field for 'Confirm Password'. Below these fields is a checkbox labeled 'I have read and agreed with the Terms and Conditions'. A blue button with the text 'Sign Up' is positioned below the checkbox. At the bottom of the form, there is a link that says 'Already Have an account? Log in'.

Figure 17: Landing Page (Author, 2024)



Figure 20: Track case (Author, 2024)

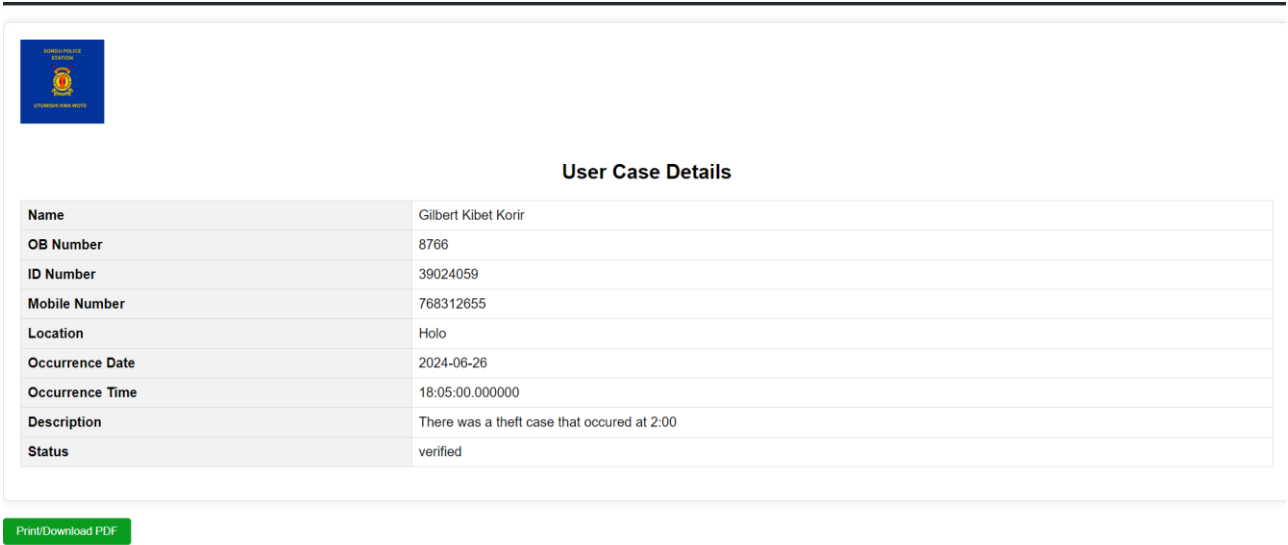


Figure 21: Admin Dashboard

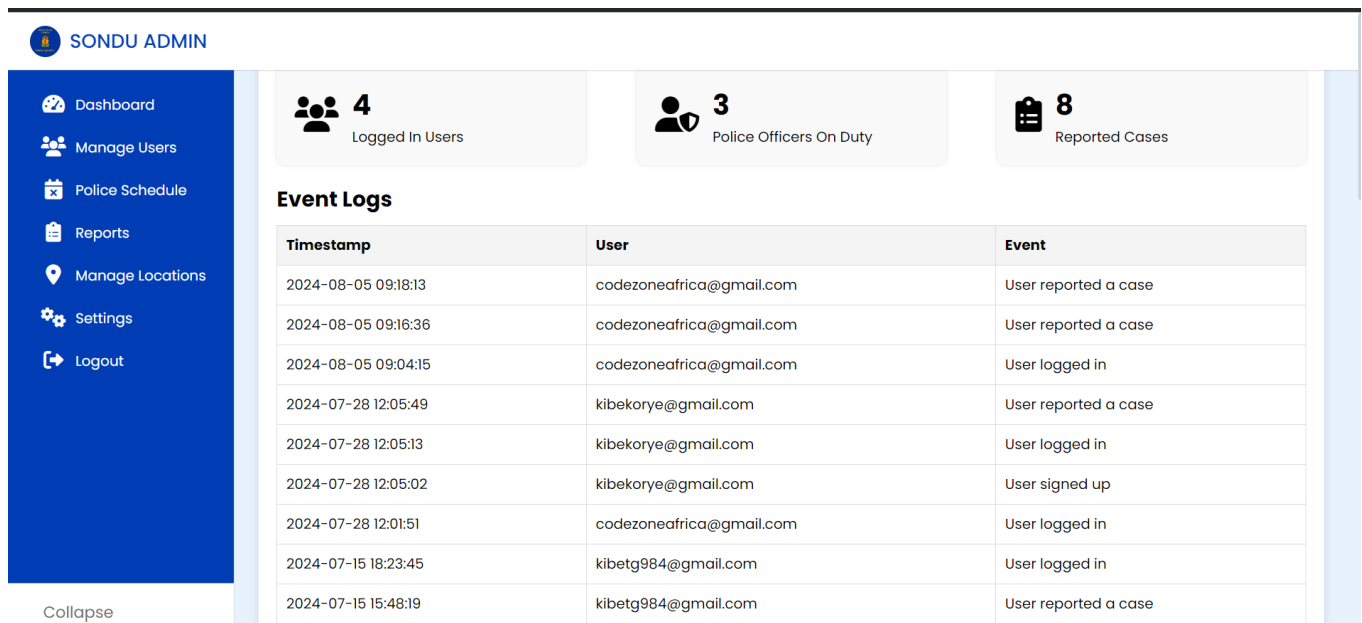
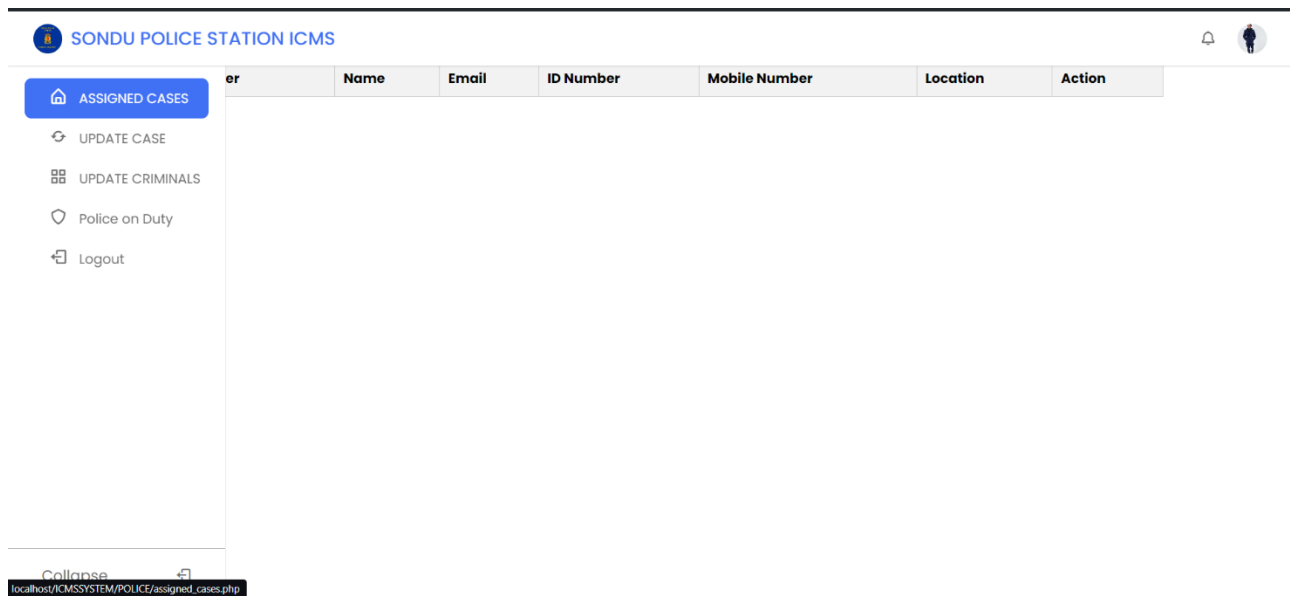


Figure 22: Police Dashboard



6.3 Testing Plan

6.3.1 Testing plan

Testing is the process of executing the program to identify any errors and ensure the system functions as required. It serves as the final verification and validation activity. During the testing phase, we aim to confirm the quality of the product, verify that it meets the user requirements as specified, and eliminate any errors from previous stages. The methods used in developing this system include:

6.3.1.1 Unit testing

Table 2 Unit testing table (Author, 2024)

What is going to be tested	Expected output with correct inputs from the user	Output from incorrect inputs By the user
Email Password	Check the user credentials against the database then redirect user either to the landing pages	Deny access and give error message staying at the log in page

Integration testing

What is being tested	Expected output	Likely outcome
Registration	Is the Registration successful or is asked to use right registration details as the form is validated	If a User registers successfully and is able to log in to the system.

6.4: Evaluation plan

Evaluation of software and a database has, as a matter of fact, been an inherent part of the software development process right from the time it came into existence. In fact, evaluation is not solely associated with code testing using practical examples but also entails checking on the development progress and ensuring that the results are what the developer or client had envisioned. This thesis puts forward the fact that evaluation is more of an inherent part of software and database development; it is a continuous practice running in all phases of development to cover user requirements comprehensively. There are broadly two approaches to test any web-based system: verification and validation.

6.4.1 Verification

This process checks whether the software has been built correctly and is free from any technical glitches. It also includes reviewing system requirements rigorously to check whether the identified issues have been addressed effectively. Verification ensures that the software is syntactically and logically correct with respect to specified functions.

6.5 Chapter summary

In this section, we present an overview of the developed live Incidence and Crime Management System for Sondu Police Station and illustrate how different users with different levels of authorization can use it. We provide a few systems module screenshots with their descriptions for the functionalities of the modules. Extensive testing and evaluation of the system were done for a period of three weeks in three phases. At each stage, only a few end-users used the product or system and brought bugs to the attention of the developer via e-mail or in hard copy. The idea behind developing this system was to gather the essential data and process it further efficiently at later stages, and the same has been duly achieved. Thus, the solution envisioned in the requirement analysis for the intended purpose of the system can be confidently asserted to have been realized.

CHAPTER 7: CONCLUSIONS FINDINGS AND RECOMMENDATIONS

7.1 Introduction

This chapter presents a conclusion. Giving a detailed account of the findings and recommendations of the research on developing an Incidence and Crime Management System for Sondu Police Station, the entire process of software development will be critically examined. Identifying the specific area of the analysis draws from it meaningful inference whether or not the system is effective and efficient. Finally, recommendations will be made to improve on future enhancements that will help the system to be more functional and address the needs of Sondu Police Station better.

7.2 Conclusion

The development of this system enhances fast processing of cases at Sondu police station and it helps in easy retrieval of data where all data stored online including case details. This will also assist police officers since paperwork will significantly reduce at the police station. Lastly such a system enhances transparency since everything is online based and reduces a lot of cases.

7.3 Challenges encountered

Some of the challenges that were encountered include

1. **Comprehensive Reporting Module:** The main issue they faced was how to create reporting module that could develop detailed and though provoking crime reports. From the system's point of view, it had to be able to support many kinds of reports ranging from daily incident logs to sophisticated trend analysis over long periods of time. This necessitated coming up with a versatile framework that could process dissimilar types of input and output data so as to make sure the reports are both precise and relevant for strategic planning and decision making. Also, it was necessary for the system to generate customizable reports which would meet different needs of users at the police station.
2. **Realistic Scenario Simulation:** Creating realistic scenarios and datasets for testing was crucial for ensuring the system's robustness and reliability. The system needed to manage various types of incidents, each with distinct data requirements and workflows. Developing a comprehensive set of test cases that accurately reflected real-world situations was challenging, as it required a deep understanding of local crime patterns and police

procedures. This aspect was essential for verifying that the system could effectively support the police station's operations and handle unexpected situations.

3. **User Interface Design:** It was quite difficult to create an interface that was both simple to use and intuitive. Due to the requirement that the system be usable by all users, even those with little technical experience, usability and design considerations have to be carefully considered. Iterative testing and user feedback were necessary to ensure that the interface remained fully functional while being easy to use. The intention was to design a system that would minimize the need for training and enable police personnel to quickly embrace it.
4. **Adaptable Incident Workflows:** A variety of incident management workflows, each specific to a certain case type, have to be supported by the system. It was difficult to design a flexible workflow engine that could handle these differences since it needed a system that could be configured to let users construct and alter workflows according to particular requirements. This required creating a solid backend that could accommodate dynamic modifications without jeopardizing the integrity or performance of the system, guaranteeing that the system could adjust to the changing needs of the police station.
5. **Juggling Academic and Project Requirements:** It was very difficult to balance the demands of accomplishing project objectives with academic requirements. The project had to produce a workable and useful system while still adhering to strict academic criteria. It took careful planning and prioritization to manage these requirements, little resources, and short timeframes. To guarantee that all goals were accomplished, effective project management was essential. This required making calculated choices about which features to include within the allocated time and financial limits.

7..4 Future Recommendations

1. **Enhance the Reporting Module:** In the future for the enhancement of the reporting module usability and flexibility one can integrate tools for data analytics which will allow extracting and analyzing the collected data on the Reporting module, finding insights and trends.

2. Applying certain machine learning techniques would enable one to detect certain trends and patterns of crime and such information can be very useful in future planning. Moreover, the integration of the option to update reports' data in real-time and work with these changes visually would be helpful and interesting for decision-makers.
3. Expand Scenario Simulations: Future development should aim at the enhancement of the number of real-world conditions and cases and of the adding of new database information and options. Getting information from local law enforcement officers on such aspects as new crimes and approaches to them may complement the system's performance in handling some cases. The feedback arise would be used to keep adjusting the scenarios in the system which would make the system to be always updated and less prone to failures.
4. Refine the User Interface: For the further improvement of usability, it is possible to apply functional interfaces that allow each user to define the appearance of the work table and the sequence of actions in accordance with his chosen position and preferences. One can also learn about the system through the incorporation of the interactive tutorials together with the context sensitive help features. Performing usability testing and incorporating testing results of the interface with the target users will need to be repeated so that the needed interface remains viewer-friendly.
5. Increase Workflow Flexibility: Enhancing the strategy of creating better tools that can facilitate even higher levels of customization of the workflow might be useful for the system in regard to the specific type and process of an incident. Introducing drag-and-drop interfaces on the design of the workflows' operation and offering templates for preferred business processes will enable the users to design the operation of the workflows without much struggle or the assistance of professional coders. Integrating the system with other system or database can also be a boost in the flexibility as well as the functionality of the system.
6. Streamline Project Management: It is suggested that one should follow a set plan of organized breakdown of tasks and schedules in a similar way as is done in project management to make the future development easier. Managing the requirements and focusing on certain tasks can be easier when developing an application with the help of the agile development methodologies.

References/Bibliography

Sample Code

```
<?php
include '../Database/db_con.php';
include 'constants/log_event.php'; // Events Happening

// Initialize error message variable
$error_message = '';

if (isset($_POST['email']) && isset($_POST['password'])) {
    $email = mysqli_real_escape_string($conn, $_POST['email']);
    $password = $_POST['password']; // Do not hash the password here

    // Fetch the user data from the database
    $check_user_query = "SELECT * FROM users WHERE email='$email'";
    $user_result = mysqli_query($conn, $check_user_query);

    if (mysqli_num_rows($user_result) == 1) {
        // User found
        $user_data = mysqli_fetch_assoc($user_result);

        // Verify the password
        if (password_verify($password, $user_data['password'])) {
            // Password is correct, log the user in
            // Update the logged_in column for the user
            $update_logged_in_query = "UPDATE users SET logged_in = 1 WHERE email = '$email'";
            mysqli_query($conn, $update_logged_in_query);

            session_start();
            $_SESSION['email'] = $email; // Store user email in session variable
            $_SESSION['name'] = $user_data['name']; // Store user name in session variable
            $_SESSION['id_number'] = $user_data['id_number']; // Store id_number in session variable

            // Log the login event
            log_event($email, 'User logged in');

            header("Location: home.php"); // Redirect to home page
            exit();
        }
    }
}
```

```

8  if (isset($_POST['email']) && isset($_POST['password'])) {
16  if (mysqli_num_rows($user_result) == 1) {
21  if (password_verify($password, $user_data['password'])) {
33  header('Location: home.php'); // Redirect to home page
36  exit();
37  } else {
38  // Password is incorrect
39  $error_message = "Invalid email or password. Please try again.";
40  }
41  } else {
42  // User not found
43  $error_message = "Invalid email or password. Please try again.";
44  }
45  }
46  ?>
47  KIBET, 2 weeks ago • MY ICMS SYSTEM
48  <!DOCTYPE html>
49  <html lang="en">
50  <head>
51  <meta charset="UTF-8">
52  <meta name="viewport" content="width=device-width, initial-scale=1.0">
53  <title>Login Page</title>
54  <link rel="stylesheet" href="css/login.css">
55  </head>
56  <body>
57  <div class="login-container">
58  <h1 class="login-header">Log In</h1>
59  <?php if (!empty($error_message)): ?>
60  <p style="color: red;"><?php echo $error_message; ?></p>
61  <?php endif; ?>
62  <p>Welcome back! Please log in to continue.</p>
63  <form action="<?php echo htmlspecialchars($_SERVER['PHP_SELF']); ?>" method="post">
64  <input type="email" name="email" placeholder="Email" required class="form-input">
65  <input type="password" name="password" placeholder="Password" required class="form-input">
66  <button type="submit" class="login-button">Login</button>
67  </form>
68  <p class="register-text">Don't have an account? <a href="signup.php">Sign Up</a></p>
69  <p class="forgot-password"><a href="forgot-password.php">Forgot Password</a></p>

```

Schedule and budget

Project stage	Period Taken					
	1 month	2 month	3rd Month	4th Month	5th Month	6th Month
Requirements gathering						
System Analysis						
Coding and debugging						
System Design						
Implementation						
Maintenance						
Documentation						

ITEM	DESCRIPTION	ESTIMATED COST(KSH)
Travel and Meetings	Attending events related to crime and technology related events	7500
Documentation	Documenting of my research	1500
Software Development	Designing building and paying for software's	6,000
Hardware	Computer equipment's	62,000
Miscellaneous	Unforeseen expenses	2,000
Total Estimated Budget		79,000

Sample questionnaires

1. How effectively does the Crime and Incidence Management system streamline case assignment and tracking for Sondu Police Station? (Scale of 1-10)

2. Rate the features available in the system for aiding in the efficient management of crime incidents at Sondu Police Station. (Scale of 1-10)
3. How would you rate the accessibility of crime data for authorized personnel at Sondu Police Station, facilitated by the system? (Scale of 1-10)
4. How robust are the security measures implemented in the Crime and Incidence Management system to safeguard sensitive information at Sondu Police Station? (Scale of 1-10)

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