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Discovering Knowledge

# E-CRIME REPORTING

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**CERTIFICATE**

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# Acronyms and Abbreviations

SSP	Senior Superintendent of Police
CPO	Inspector General of Police, Punjab.
SHO	station house officer
GUI	Graphical User Interface
PSCA	Punjab Safe Cities Authority
UML	Unified Modeling Language

# Abstract

The goal of this project is to create and construct an Android-based application for crime reporting that will be developed using Android platform. Developing a Geo location based mobile application for citizens and police officers for crime reporting, navigation and live tracking. This application will help citizens to report the crime and also helping police to reach the crime location on time and Police will also be able to see the location of the reported crime. The user's browser will ask for permission to access their location data as a result of this. If they agree, the browser will access this information using the device's greatest available capabilities. The police officers will be navigated to the crime location through the shortest path available to reach the location using map. The Patrolling officers will be under the supervision of High Authorities. The Senior officers of police department like SHO see the locations of patrolling officers and track the operation also. One of the patrolling officer can handle live chats and help the task force in their operation.



# Chapter 1

## Introduction

In today's era mobile technology can be used in many other fields and application. The quest to control crime and breakdown of law and order increases has the society grows nowadays public wants themselves to be aware of security alerts in their surrounding areas. The security is very important part of everyone's life.

The role of police in society is very important. Police is a government institution and responsible for the security of the lives and wealth of the public the Crime may be a part of outlaw activities in human life. It's quite obvious that the speed of crimes is increasing day by day it is important issue in Pakistan so we are proposing a system by creating a Mobile App for crime reporting, The name of the application is E-Crime Reporting App. the citizen will be able to generate crime alert. Our application is a self-contained product providing an efficient way for the citizens to report the crime. The aim of project is helping citizens to report the crime and helping police to reach the crime location on time.

### 1.1 Document Purpose

The purpose of this Requirement specification document is to provide a comprehensive description of product delivered by our project intended "E-crime Reporting Application" This document artifact is marked as version 1.0 and this is release 1.0 of this document artifact. It states the functions and capabilities that a software system needs to provide, as well as constraints that it must respect. This document will describe scope, definition, acronyms, abbreviations, references, target audience and its user interface (UI), hardware and software requirements and various other technical dependencies.

### 1.2 Product Scope

Product is designed in such a way that we are targeting every audience. The project is android based application. This system helps in reporting crime efficiently. The Tactical Police Reporting System would greatly assist residents in being more aware and worried about what is going on in their neighbourhoods, as well as making crime reporting easier. The system offers the most trustworthy and complaint-free process to users. The application was designed to be user-friendly so that anyone could log in and enter their password, and users could access all of their information without risk. The purpose of the

project is to provide an easily accessible online crime reporting and management system. The police department and the administrative department are two departments that work together. This approach will help the police department catch criminals by registering complaints from people via the internet. This project "Tactical Police Reporting System" is helping citizens to report the crime and helping patrolling officers to reach the crime location on time. patrolling officers will be able to see the GEO location of the reported crime. He will be navigated to the crime location through the shortest path available to reach the location using map.

### 1.3 Objectives

Following are the objectives of application to achieve.

- To design a system that help citizens to report the crime and help police force to reach the crime location on time.
- To providing an ease for the police officers to navigate to the crime regions with shortest path available.
- To provide live tracking and performance measurement of the police force by the senior officers and they can generate report along with their feedback and send to SSP and CPO.
- To provide different interfaces for petrol team, citizens and senior officers.

### 1.4 Problem Statement

Crime is a natural aspect of human life that must be regulated. There has never been a human civilization that has been completely free of deviants, and it seems unlikely that such a society would ever exist. The greater the breadth of anti-social behaviors that must be controlled by government through police power increases as a society becomes more inhabited and complicated. The incident-based system tracks a wider range of crimes and includes information on the crime scene, the victim, and the defendant. The current crime reporting system faces various challenges, including the lack of an instant means of reporting crime other than phone calls, message, or possibly face-to-face, which is always problematic when the reporter wishes to maintain confidentiality.

Public need awareness of their neighborhoods. Everyone cares for the lives of children and their beloved ones so they should be aware of the current situations in the area one big problem faced by our society is the large number of crimes happening across the cities especially street crimes. Second problem is that when a crime is reported, police manually find the reported address and reach the location which is time consuming and may lead to failure in protecting the victim. In order to report any complains associated with crime, people has to contact closest police station.

## 1.5 Proposed Solution

Today is an information technology age, and computers are used in almost every aspect of life. There are hundreds of inventory systems on the market, and some of them have the same maximum functionality as others. Because these systems have different functionalities and highly functions, they can be used by sophisticated and expert users, while others are more difficult and common to use by inexperienced users. There are the following existing systems in the market, which I carefully visit, examine, and analyses before proposing my system.

### Existing technology:

- We looked at a lot of websites about crime management systems. Visual basic and simple code are used in this system. The scope and functionality of this system is that it simply registers one complaint and its details.
- The police department currently uses manual system for management and maintenance of the recorded. In the current arrangement, all records in every field of the police station are kept on paper. It's possible that the data isn't complete or that it doesn't meet management's standards.

### Proposed system:

- The organization's operation will be well-planned and coordinated. The data will be correctly saved in data stores, which will aid in both retrieval and storage of information.
- The system should be simple to use and build in a short amount of time while staying within the user's financial restrictions. For record administration and maintenance, the police station now employs a manual approach. In the current arrangement, the victim is not able to report crime on time which is not helpful for citizen. In this police reporting system user interact directly with police department which really help in real life incident.

- The proposed technology will have a better level of accuracy. All operations would be carried out correctly, and any information received from the headquarters would be accurate.
- The suggested system will have a high level of reliability. The increased system reliability is due to the fact that information is now properly stored and accessible.
- No information would be repeated anywhere in the proposed model, whether in storage or anywhere else. This will ensure efficient storage space management and data consistency.
- No one is perfect, and we are all capable of making errors. This is why a machine that performs routine tasks is less likely than an employee to make mistakes. Quick information storage in a manual system, there are massive problems with storing a huge volume of data.
- In old days police reporting is very slow, wasting of time and routing the way of crime, most of the people does not file report because it's not helpful for them. This system proposed the way anyone who see the crime or violence who can report crime from their foot step.

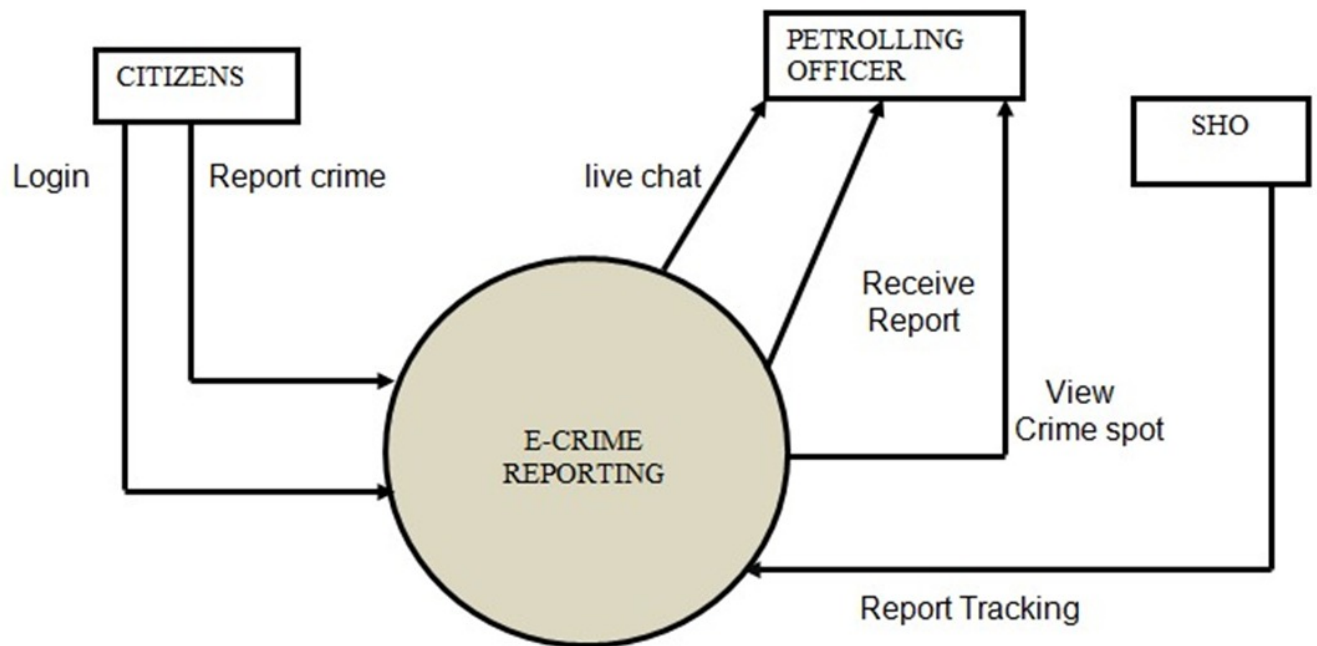
## 1.6 Software Process Model

The software development process is abstracted in a software process model. The steps and order of a process are specified by the models. Consider this a representation of the process's order of operations and the order in which they are performed out. Choosing the right software process model for your project can be difficult. If you know your requirements well, it will be easier to select a model that best matches your needs.[16]

### 1.6.1 Introduction

The incremental model splits the system's capability into smaller bits that are delivered in quick sequence one after the other. In the first increments, the most crucial functionality is implemented. The subsequent increments expand on the previous ones until everything has been updated and implemented. Incremental development is the process of creating an initial implementation, testing it with users, and then improving it with successive versions. The activities of the process are intertwined via feedback. Once the fundamental elements are complete, they are improved to include new functions in later updates, increasing the level of capability. As each new version of the software is built and released, the customer's comments will be collected and incorporated into the next edition. Each new edition of the software adds more functionality than the one before it. With the incremental methodology, stakeholders and developers may see benefits right away. If the stakeholders don't like something, it becomes public knowledge much sooner. It is efficient because coders focus only on what is important, and bugs are

repaired as they happen, but you must first define the entire system in detail.



*Figure 1 Context Diagram*

Figure 1.1: System functionality

## 1.6.2 Justification

The Incremental Model will be used for developing this Application. In this software development life cycle, the software need is broken down into several separate modules. Once the modules have been split, incremental development will be carried out in steps, covering all aspects of analysis, design, implementation, testing, verification, and maintenance. Each stage's functionality will be built on top of the preceding stage's functionality, and this process will continue until the software is complete. There will be a thorough assessment at each incremental stage, based on which the decision for the next stage will be made. In this project every increment develops the interface and every interface has analysis, design, coding, testing and maintenance. The project will be completed in 4 iteration. In each increment we will be building different interfaces of mobile App.

In this project incremental model will be used for developing the mobile application. In each iteration we will be building different interfaces. First we will build registration interface, using this interface both citizens and police officers can get themselves register into the system but police officers first have to register themselves with mac address of their mobile phone manually by the admin. The next step is citizen interface (to report crime) after the successful registration now user can report crime using the Geo location to the nearest police officer available. After this patrolling officer's interface will be built,

Patrolling officer will be able to get the notification and navigation of the reported crime in his region. It will be display hot spots of high risk crime regions. For monitoring the patrolling officers the SHO interface will be built in which Senior House Officer will be monitoring the performance of the patrolling officers and tracking their live location through the map. After that we will create the hot spot region. Now at the end we deploy application.

### 1.6.3 Steps

Below are the 4 stages of Incremental model that we carried out for our timetable generation application:

- **Requirement analysis:**

In the first phase of the incremental model, the product analysis expertise identifies the requirements. And the system functional requirements are understood by the requirement analysis team. To develop the software under the incremental model, this phase performs a crucial role.

- **Design and Development:**

The design of the system functionality and the development technique are completed successfully in this phase of the Incremental model of SDLC. The incremental model employs style and development phase when software creates new functionality.

- **Testing:**

The testing phase in the incremental model examines the performance of each current function as well as new capabilities. Various approaches are utilised to test the behaviour of each task throughout the testing process.

- **Implementation:**

The coding step of the development system is enabled by the implementation phase. It entails the final code that was created throughout the designing and development process, as well as the testing of the functionality. Following the completion of this phase, the number of working products is increased and updated all the way to the final system product.

## 1.7 Intended Market of Product

Well-defined target audiences, through increasing marketing efficiency can help an organization enhance earnings and attract new clients. This is due to the fact that the organization does not waste time and resources promoting to customers who are unlikely to be interested in its products. Small, startup, and specialty firms can compete with larger organizations if they have a clear understanding of target markets.

Intelligence and security are top priorities for law enforcement authorities around the

world. Law enforcement authorities can use intelligence to solve crimes more effectively. Security, on the other hand, guarantees that sensitive information does not fall into the wrong hands. Surveillance by law enforcement agencies aids in the gathering of large amounts of information about a crime or criminal activity before to its occurrence, which aids in the establishment of the crime's existence.

Market means an online directory, catalog or marketplace of applications that interoperate with the Services, The police reporting system is one of the most sensitive applications which are used for crime prevention. So the market place of police reporting system is police departments and law enforcement organization. Police reporting system is a crime reporting system for citizens so citizen also part of this application.

## 1.8 Intended Users of the Product

In this application we have 3 user interfaces for which a service or product is designed. Each user has different functionality and all the data stored in database. The police reporting system are crime reporting system which is use for allocating crime reports. following three users in our project as well as their functionality.

Citizens are the most fundamental user of this project. User can be able to send alert to the patrolling officer and then patrolling officer will track the crime location. Citizens are the users who login the application and register themselves. Citizens can use it as a tool to get information or acknowledgements from police. The police in turn can use it to respond to citizens with very little turnaround time. It improves overall productivity by helping citizens and police to cut short the drudgery of large amounts of paperwork. The Second most fundamental part of this application is patrolling officers. The role of patrolling officers is they can able to communicate with citizen and victim. One of the patrolling officers communicates and controls all activities and gives command to both citizen and patrolling officers. They can track the location of crime scene that's the way police plan better and execute with greater efficiency.

The third module of this project is SHO (station house officer). SHO holds the rank of inspector or sub-inspector. The law permits a station house officer to conduct the investigation of crimes. SHO can able to track patrolling officers and also generate the report of operation to the SSP and CPO of police department.

# Chapter 2

## Literature Review

The targeting application domain are the following because we see application related to this domain

- 1 Public safety App
- 2 KP women Safety App
- 3 Women Safety App
- 4 Sawabi Police Force App
- 5 Punjab Police Khidmat App
- 6 Nepal Police Reporting App
- 7 Crime Reporting App
- 8 Rawalpindi Police
- 9 New Zealand police App

we have analyzed some limitation of these Applications.

### 2.1 Existing Systems

**Public Safety App** has been Launched by the PSCA (Punjab Safe Cities Authority). PSCA will register all the users of this app as verified users and this will help PSCA in providing Quick and ensured response. By pressing the panic button you can contact the 15 services of Punjab Safe Cities Authorities instantly and receive immediate help at your precise location. This App also provide E challan status Lost and found status of vehicals. The limitation of this App is there is no live chat feature in this Application, no live tracking of patrolling officer. This app also do not show the high risk crime regions. In order to realize the vision of developing safe cities in the province, PPIC3 Centre has been developed for Punjab Police in the city of Lahore, which will be subsequently established in the larger cities of the province.

Recently, PSCA has identified 2000 locations for installing more than 10,000 cameras for surveillance through a comprehensive survey. That includes the coverage of public institutions, key infrastructure, public roads, crime hotspots, VVIP routes, entry exit points and public places.

The features of the application are E challan, statusAlert, Lost and found Vehical, Location Sharing. The limitations of the application are Live tracking of Petroling Police, Live Chat, Report Generation Generating Alert to nearest patrolling Officer[1].



**KP women Safety App** has been launched by the collaboration of Kp police and PSCA. Women Safety App is a new initiative for the safety of women which is high priority objective of KP police. This app has been launched by the KP police and powered by IT infrastructure of Punjab Safe Cities Authority. Women Safety app by PSCA to contact KP Police in case of emergency. Women and girls can use this safety app to share their current location with police station or patrolling officers, send distress signals to family and friends. In this App the user can only generate alert, Location Sharing and he can also add location review. The limitation of this app is that there is no live tracking of patrolling officer, No generation of crime report and this app also do not give the alert to nearest police officer. These given limitations are the proofs that the system should have been observed more deeply within the current features.

The features of the application are Alert, Live Chat, Location Sharing, Location Review. The limitations of the application are Live tracking of Petroling Police, Generating Alert to nearest patrolling Officer, Hotspot crime regions , Report Generation[2].

**Women Safety App** is a big concern which has been the most important topic till date. Women safety matters a lot whether at home, outside the home or working place. Few crimes against ladies particularly rape cases were terribly dread and fearful. Most of the women of various ages, till this day are being subjected to violence, domestic abuse, and rape. As ladies ought to travel late night generally, it's necessary to remain alert and safe. Although the government is taking necessary measures for their safety, still, there are free safety apps for women that can help them to stay safe. Most of the females these days carry their smartphone with them, so it is necessary to have at least one the personal safety apps installed. Such a security app for ladies will definitely facilitate in a way or the opposite. This is user-friendly application that can be accessed by anyone who has installed it in their smart phones. Our intention is to provide you with fastest and simplest way to contact your nearest help. It has been launched by the collaboration of Punjab Police and PSCA (Punjab Safe Cities Authority). Women safety application is a new initiative of Punjab police for the safety of women which is high priority. This App generate alert to police, it also provide Awareness document to the user and also provide live chat facilities. The limitation of this app is that there is no live tracking of patrolling officer, No generation of crime report and this app also do not give the alert to nearest police officer. This App also do not provide the high risk crime region.

The features of the application are Alert, Current Location, Awareness document, Feed Back, Live Chat. The limitations of the application are High risk crime regions, Live tracking of Patrolling Police, Report Generation, Generating Alert to nearest patrolling Officer[3].

**Sawabi Police Force** In this digitized world, where dependence on technology and the permeability of smart phones is on the rise, ‘Swabi Police Help Line’ app aims at bringing Police and people of District Swabi even closer. The registration process is kept minimal and simple to enable even the less tech-savvy individuals take full advantage of the app. The ‘login’ is the mobile number of the user, which is well remembered and always unique. The main dashboard is least cluttered with color coded buttons for easy, simple yet attractive interface. A collapsible ‘menu’ is also provided for smooth transaction from any section to other. ‘Report Incident’ Button Displays a form for instant reporting with option to upload multiple pictures, if any, of crimes or accidents. Through ‘Secret Info’, the user can share any kind of secret information with police from the privacy of his/her home with confidence. Furthermore, any feedback or suggestions can be shared with Police department through ‘Suggestions’ Button. Users can also avail PAL service of reporting stolen property through Police Helpline App by completing the Theft/Stolen form online. A detailed Police Directory along with contact information of Police Stations and Police Officers is integrated in the App.

The features of the application are Report incident Active cases registration , Awareness document, Feed Back, secret message. The limitations of the application are High risk crime regions. Live tracking of Petroling Police, Report Generation, Generating Alert to nearest patrolling Officer[4].

**Punjab Police Khidmat App** This application provides detailed information (fees, office locations, required documents, online booking etc.) about 14 services offered by Punjab Police to the citizens at Police Khidmat Markaz (offices) recently established across Punjab. These services includes online booking facility, application tracking, Document Varification, crime report, Women Violence report. The limitation of this App is there is no live chat feature in this Application, no live tracking of patrolling officer. This app also do not show the high risk crime regions.

The features of the application are Report incident Endorsement of a License , online booking facility, Women Violence report, The limitations of the application are High risk crime regions. Live tracking of Petroling Police, Report Generation, Generating Alert to nearest patrolling Officer[5].

**Nepal Police Reporting Application** is launch by Nepal police department. The purpose of this app is use for communication with Nepal police and assist the community in establishing a secure peaceful society. A simple and quick way to report public safety infraction and event with video evidence with ease and confidentiality, report any events or suspected behavior. Users who have registered can check on the status of reported incidents. In this application you have list of emergency number. Allow you to locate and connect to the nearest police station on map. File complain against the services

provided by Nepal police. Apply for a police clearance report through OPRC system. Stay updated with various traffic related update and public services announcement from metro traffic FM 95.5. keep in touch with the latest news and development from official Nepal police source. Get real time notification and access to Nepal police contents as soon as they're posted. All your PMIS profile details at one place. Track your location with options to save and export the recorded location and route. Check all events with the calendar available inside the app.

The features of the application are Report incident, Emergency number, News / Notice, E complaints. The limitations of the application are High risk crime regions, Live tracking of Petroling Police, Report Generation, Generating Alert to nearest patrolling Officer[6].

**Rawalpindi Police** This project is initiative of Rawalpindi Police and Traffic Police for community. Rawalpindi Police is an application designed by Rawalpindi Police for the facilitation of the citizens of Rawalpindi. In this application The Emergency 15 phone call is connected to 15 Control Room in Lahore, however the REAL TIME LOCATION of the distress caller is sent directly to the CPO Rawalpindi Control Room in Rawalpindi so that Police can reach the location without wasting time on trying to ascertain the location of the distress caller.

Rawalpindi police allow us Appointment for Traffic Licensing Office, any Khidmat Markaz, Khuli Kachehri of CPO Rawalpindi, meet any Police Officer (from Station House Officer to City Police Officer Rawalpindi) can be scheduled. Students can apply for internship through the Volunteer In Police (VIP) Youth Internship Programme. Upon successful completion of the internship students will the given certificates for the same. Incidents or suspected incidents of Child Abuse can be reported through this feature. Users can upload a photo, video or even an audio recording of the child that has been, is facing or is at risk of being abused. Children can be protected from abuse through this feature. In this application Nearest Police Station on the Map the contact details of each Police Station can be viewed. Citizens can report a missing child, person or pet and an alert will be sent to all Rawalpindi Police Citizens Connect app users to raise awareness so that the app users can also help in the search. Furthermore, major crimes can be reported through this app and users can also report incidents of Road Traffic Accidents, One Wheeling, Aerial Firing, Fireworks, Explosion, Kite Flying, Scuffle etc. Users can also upload Photos, Videos Audio Recordings of any incident or crime. Rawalpindi police is joint application of Rawalpindi police and traffic police so this application also provide the Users can schedule an appointment for Driving License Services, verify their Driving License, track the delivery of their Driving License, plan their route to their destination, view traffic congestion on the city roads, get information on various traffic violations.

Latest news of Police, Crime Traffic related issues is available on this app. All social media accounts of City Police Rawalpindi and City Traffic Police Rawalpindi can be ac-

cessed through the app. A complaint against Rawalpindi Police can be lodged to the office Inspector General of Police (IGP), Punjab province additionally any previous complaint made to the office of IGP Punjab can also be tracked through this feature. The app also gives a pathway to users to access the PM CM Punjab Portals to register any complaint against Rawalpindi Police.

The features of the application are Report incident, Nearest Police Station, Emergency 15, Appointment, Child Abuse. The limitations of the application are High risk crime regions. Live tracking of Petroling Police, Report Generation, Generating Alert to nearest patrolling Officer[7].

**Crime Reporting Application** is a mobile application for the Police officer for structured data collection at the scene of the crime. Using this application the police personal with very minimal training can capture a significantly large quantum of information at the crime scene. In this application the citizen is able to send the image and video of evidence and crime scene. Crime reporting application also use GPS for live tracking. This application is very helpful for citizen to report crime and aware the police about any accidental situation. In this application citizen also provide the witness and victim details so this will really help police department to capture criminal. Using this application police officers able to track the location of crime scene.

The features of the application are Images and videos of evidence and crime scene, GPS location, Victim, Witness details. The limitations of the application are listed below High risk crime regions. Live tracking of Petroling Police, Report Generation, Generating Alert to nearest patrolling Officer[8].

**New Zealand police application** makes it easier to access New Zealand Police's services and information. Easy access to official news, alerts and online services from the NZ Police. Get our latest news, alerts and safety advice, easily report incidents and issues to Police, and access our other online services – all from your phone. This application help you to keep informed, Stay up to date with Police news, nationally and in your district. Receive real-time emergency alerts for traffic and major national events. See media releases, Ten One articles and other news content from Police. Subscribe to push notifications for news, alerts and important safety advice. This application also provide you online services such as Easily use the 105 online form to report any non-emergency situation to Police. Get updates/add to an existing 105 report. Pay an infringement fee or ticket. Check to see if a vehicle is listed as stolen. Quickly call 105 for non-emergencies or 111 for emergencies. NZ police application find information and advice Get answers to some frequently asked questions. Explore key Police data and insights, and find out how Police is tracking against its targets. Learn about careers with NZ Police. New Zealand Police is committed to being accessible and available. That means providing a stronger

presence in the community, as well as ensuring our service and information are available to you, anywhere, any time. The NZ Police App is an important step on that journey, allowing us to share our news and alerts further and extend access to our online services. It's one of the ways we're working to make sure New Zealand is the safest country.

The features of the application are News updates and articles Generate alert, Learn about NZ police, Listed stolen vehicle, Frequent Q/A. The limitations of the application are listed below High risk crime regions, Live tracking of Patrolling Police, Report Generation, Generating Alert to nearest patrolling Officer[9].

**Police@SG** is the initiative from the Singapore Police Force, which gives members of public access to useful information on the go. Police@SG is helpful for police department to find criminal and gather data more frequently. This application help us to Read the latest crime news, police appeals for information and missing persons. If anywhere crime is happened you can easily access nearest police station. This application provide you the way to find Locate of the nearest police station from your current location. This application also help us to aware about any accident through social media account such as Facebook and twitter. You can Share content on Facebook and Twitter. This application also help you to access official page of police department. Easily access the Links to Singapore Police Force homepage, recruitment and social media sites. Submit information or respond to police appeals via our information submission portal "i-Witness". The features of the application are News and updates Nearest location of police Share content on Facebook and Twitter Women Violence report I-witness The limitations of the application are High risk crime regions. Live tracking of Patrolling Police, Report Generation, Generating Alert to nearest patrolling Officer[10].

## 2.2 Research Gap

The system and the architecture is a compatible one, so addition of new modules can be done without much difficulty. Since this module has its unique properties it can extend further to make this system a complete one.



# Chapter 3

## Requirement Specification

The Requirement Specification document defines what the software will do and how it will work. The software requirements specification is the basis for a contract between customers and contractors or suppliers that outlines how the software product should function. The software requirements specification lays out both functional and non-functional requirements, as well as a set of use cases that describe how the software should interact with the user to ensure a smooth interface. The Requirement Specification is a framework that every development team will follow; while this may not appear to be necessary for a single developer project, the goal is scalability. The Requirement Specification ensures that requirements are met and that important information is shared across several teams. The four teams include development, quality assurance, operations, and maintenance.

### 3.1 Introduction

A Requirement Specification is a document that describes the nature of a system and application. The Requirement Specification document is the manual of the project that is prepared before starting an application. This software document is primarily prepared for a project or application. It also includes yield and cost of project. Requirement Specification involves everyone with a road-map for the project. It provides high-level descriptions for the software's functional and non-functional specifications, as well as use cases that show how a person can deal with the system once it's finished.

Requirement Specification is important for developers because it decreases the amount of time and effort required of developers to obtain desirable app outcomes. It establishes the guidelines that will be followed by all production teams. It's used to convey sensitive knowledge to a variety of multiple parties. Thus, it reduces the development cost. Requirement Specification reduces the chances of further redesigns by reducing the chances of developer errors so they provide a good understanding of the software's functionalities and externalities. It also acts as a verification guide for the test methods.

This Software Requirement Documentation is the basis for your entire project. It establishes the guidelines that will be followed by all production teams. It provides the crucial information about project to end users. The basic purpose is to ensure that requirements are fulfilled. It can also help developers to make sure about project lifecycle.

cle. Writing this document can also minimize the overall development time and cost. Embedded software developers benefit greatly from using an Requirement Specification.

### 3.1.1 Document Scope

A Requirement Specification is a document that explains what the software will accomplish and how it will work. it also outlines the functionality that the product must have in order to meet the needs of stakeholders(business and users)

This project "Tactical Police Reporting System" is helping citizens to report the crime and helping patrolling officers to reach the crime location on time. patrolling officers will be able to see the location of the reported crime. He will be navigated to the crime location through the shortest path available to reach the location using map.

This system helps in reporting crime efficiently.The Tactical Police Reporting System would greatly assist residents in being more aware and worried about what is going on in their neighbourhoods, as well as making crime reporting easier. The system offers the most trustworthy and complaint-free process to users. The application was designed to be user-friendly so that anyone could log in and enter their password, and users could access all of their information without risk.

### 3.1.2 Audience

This document is intended for implementation purpose for

- Developers
- Supervisors and Coordinators, to review the document.
- Senior Design Project evaluation Committee.
- Users, who will use the system.
- System Administrator.

## 3.2 Functional Requirements

Functional Requirement (FR) is a statement that describes the service that the software must provide. It refers to a software system or a component of one. A function is nothing more than the inputs, behaviour, and outputs of a software system. A calculation, data manipulation, business procedure, user interaction, or any other unique functionality that defines what function a system is likely to execute can all be considered. Functional Requirements are also known as Functional Specification in Software Engineering.



Table 3.1: Functional Requirements

Requirement ID	Description
FR1	The user can register.
FR2	The user can login.
FR3	The user can generate Alert.
FR4	The user can live chat.
FR5	Patrolling officer can see the location of crime.
FR6	Patrolling officer can see the hotspot crime regions
FR7	SHO can track the Patrolling officer.

### 3.3 Non-Functional Requirements

System qualities such as security, reliability, performance, maintainability, scalability, and usability are defined by nonfunctional requirements (NFRs). They serve as limits or limitations on the system's design across the various backlogs. Nonfunctional requirements, often called as system attributes, are just as important as functional Epics, Capabilities, Features, and Stories. They ensure that the entire system is usable and effective. Failure to meet any one of these can result in systems that don't meet internal business, user, or market needs, or that don't meet regulatory or standards agency criteria. Noncompliance can result in serious legal consequences in various circumstances (privacy, security, safety, to name a few). Unlike functional requirements, NFRs are persistent attributes and restrictions that are often reviewed as part of the Definition of Done (DoD) for each Iteration, Program Increment (PI), or release. NFRs have an impact on all backlogs, including Team, Program, Solution, and Portfolio.

#### 3.3.1 Software Quality Attributes

- **Interoperability:** The interfaces must be completely understood in order to operate with other goods or systems in the future, whether in terms of implementation or access.
- **Completeness:** According to functional criteria, the project should be finished in each module. In the event of an error, the project should be able to work efficiently and be ready to take prompt action.
- **Portability:** The project is written in Java, which is the most widely used programming language, and it performs the website according to the hardware available.
- **Reliability:** The system must be able to carry out its functions consistently and without error. It is necessary for the system to be fault-tolerant.
- **Maintainability:** The system will be built utilising an object-oriented paradigm,

which will make it easier for the development team to maintain the system and its various applications. Use cases are specified in the specification section so that any developer can maintain this project, however they will need actual code.

### 3.3.2 Performance Requirements

System should load and respond in 5 seconds The maximum response time is currently 10 seconds and that is in case of slow internet services or traffic load on server System must be available with 24/7/365 format. Only the users with the role “site admin” can view the applicant’s verified phone number.

### 3.3.3 Safety Requirements

Information transmission in system is securely transmitted to server and all the information is encrypted while sending out from the system and saving into the system. The is ensured that no one else can access into the system because the users who logged into system have to verify first.

### 3.3.4 Other Non-Functional Requirements

The system must be interactive, and the time delays must be minimal. As a result, there are no instant delays in any system action-response. There is a delay of less than 2 seconds when opening windows forms, popping error messages, and saving settings or sessions. There are no delays when opening databases, sorting questions, and evaluating, and the operation is completed in less than 2 seconds for opening, sorting, computing, and posting greater than 95 percent of the files. Also, when connecting to the server, the delay is depending on the distance between the two systems and the setup between them, so there is a good chance that a successful connection will be made in less than 20 seconds for the sake of good communication.

- **Reliability:** Reliability is the probability and percentage of the software performing without failure for a specific number of uses or amount of time.
- **Availability** This feature defines the amount of time the system is running, the time it takes to repair a fault, and the time between lapses.

# Chapter 4

## Software Design Specification

The design of single runway simulator will defined in this document. It includes details on the intended input, output, functions and classes. At the conclusion of the text, detailed illustrations depict the interaction between the classes in order to achieve the specific criteria. Software Engineering and software quality engineering will adopt this design specification to define the design that will be utilized to implement one runaway simulator.

A software design documentation is frequently design to a architecture diagram and contain pointers to particular feature requirements for smaller design components. In practice, description is needed to bring a huge ream together around a small goal, serve as a reliable reference and explain all aspects of the program and how they will function.

### 4.1 Use-Case Diagram

The abbreviation for "Unified Modeling Language" (UML) is "Unified Modeling Language." It's a strong tool for modelling software, application architectures, system behavior, and business processes, among other things. The class diagram is an important part of any object-oriented solution. It depicts a system's classes, their attributes and operations, as well as their relationships.



Figure 4.1: Use-Case Diagram for E-Crime Reporting

## 4.2 Use-Case Descriptions

A use case is a written description of how people will use your platform to complete activities. It describes how a system reacts to a request from the perspective of a user. Each use case is described as a series of basic actions, starting with the user's goal and ending with the achievement of that goal.

### 4.2.1 UC01: Sign Up

**Actors:** Citizen,Patrolling Officer,SHO,SSP and CPO.

**type:** Primary : Citizen,Patrolling Officer,SHO,SSP and CPO.

**Brief Description:** To begin, User must first register in the system by providing basic information such as their name, phone number, email address, and password. The User will be successfully registered after inputting these details.

**Basic Flow:**

1. User open the android application.
2. User will Sign up and clicks the sign up button.
3. User can register in the system by providing their information.
4. After completing the registration process, the citizen may access the system and providing their email address and password.

**Pre-condition:**

- Android application must be installed in your system.
- User must open the android application.

**Post-condition:**

- User shall be signup and dashboard shall be displayed.

### 4.2.2 UC02: Live Chat

**Actors:** Citizen, Patrolling officier.

**type:** Primary: Citizen, Patrolling officier.

**Brief Description:** The citizen will be able to chat with patrolling officer.

**Basic Flow:**

1. Users open the android application.
2. Users can register in the system by providing their information.
3. Users can report crime.
4. Users can do live chat with patrolling officer.

**Pre-condition:**

- Android application must be installed in your system.
- User must open the android application.
- User must register in the application.

**Post-condition:**

- User shall be signup and login dashboard shall be displayed.

### 4.2.3 UC03: Get Crime Notification

**Actors:** Patrolling officier

**type:** Primary: Patrolling officier

**Brief Description:** : Patrolling officer must login to Application. When the crime is reported the Patrolling officer will get the crime notification.

**Basic Flow:**

1. Patrolling officer open the android application.
2. Patrolling officer will login in to the system.
3. When the crime is reported the Patrolling officer will get the crime notification.

**Pre-condition:**

- Android application must be installed in your system.
- Patrolling Officer must open the android application.
- Patrolling Officer must register in the application.

**Post-condition:**

- Patrolling Officer will get the crime notification.

#### 4.2.4 UC04: Report Crime

**Actors:** Citizen

**type:** Primary

**Brief Description:** Citizen wants to report the crime to the police officer.

**Basic Flow:**

1. System provides interface with a button to report crime.
2. Citizen will click the button
3. System will send crime notification to the nearest police officer available.

**Pre-condition:**

- Citizen must be registered to system and logged in to the system.

**Post-condition:**

- citizen will be notified that police officer is coming.

#### 4.2.5 UC05: Navigate to crime location

**Actors:** Patrolling officer

**type:** Primary

**Brief Description:** Patrolling officer will be navigated to the crime location.

**Basic Flow:**

1. Patrolling officer will be navigated to the crime location notification
2. Officer will click button for navigation
3. System will show the navigation of crime location through shortest path.

**Pre-condition:**

- Patrolling officer must be logged in.

**Post-condition:**

- Patrolling Officer ride will be started toward crime location.

### 4.2.6 UC06: High risk Crime Regions

**Actors:** Police Officer

**type:** Primary

**Brief Description:** Police officer will see the hotspot crime regions.

**Basic Flow:**

1. System provides hotspots for high risk crime regions
2. Police officer will see the high risk crime regions.

**Pre-condition:**

- Police officer must be registered to system and logged in to the System.

### 4.2.7 UC07: Live Tracking

**Actors:** Senior officer

**type:** Primary

**Brief Description:** Live tracking of police officers to the senior officers.

**Basic Flow:**

1. Officer will click the live tracking button.
2. System display the live location of patrolling officers.

**Pre-condition:**

- Police officer must be registered to system and logged in to the system.

**Post-condition:**

- System display live tracking successfully.

### 4.2.8 UC08: Report Generation

**Actors:** Senior officer



**type:** Primary

**Brief Description:** SHO will generate the performance report of the patrolling officers.

**Basic Flow:**

1. Officer will click the Generate Report button.
2. Officer will write the report.

**Pre-condition:**

- Police officer must be registered to system and logged in to the system.

**Post-condition:**

- Report will be generated.

#### 4.2.9 UC09: View Report

**Actors:** SSP and CPO

**type:** Primary: SSP and CPO

**Brief Description:** SSP and CPO will be able to see the performance report.

**Basic Flow:**

1. Officer will click the View Report button.
2. Officer will be able to view the report.

**Pre-condition:**

- Police officer must be registered to system and logged in to the system.

**Post-condition:**

- Report will be showed.

### 4.3 Class Daigram

A class diagram is a type of diagram in the field of software engineering that shows the classes in a system, their attributes, and the relationships between them. Class diagrams are commonly used to model the static structure of a system. They can be used to represent the domain model of a system, or to represent the architecture of a system at a high level. Class diagrams are typically created using UML (Unified Modeling Language), a standard modeling language used in software engineering.

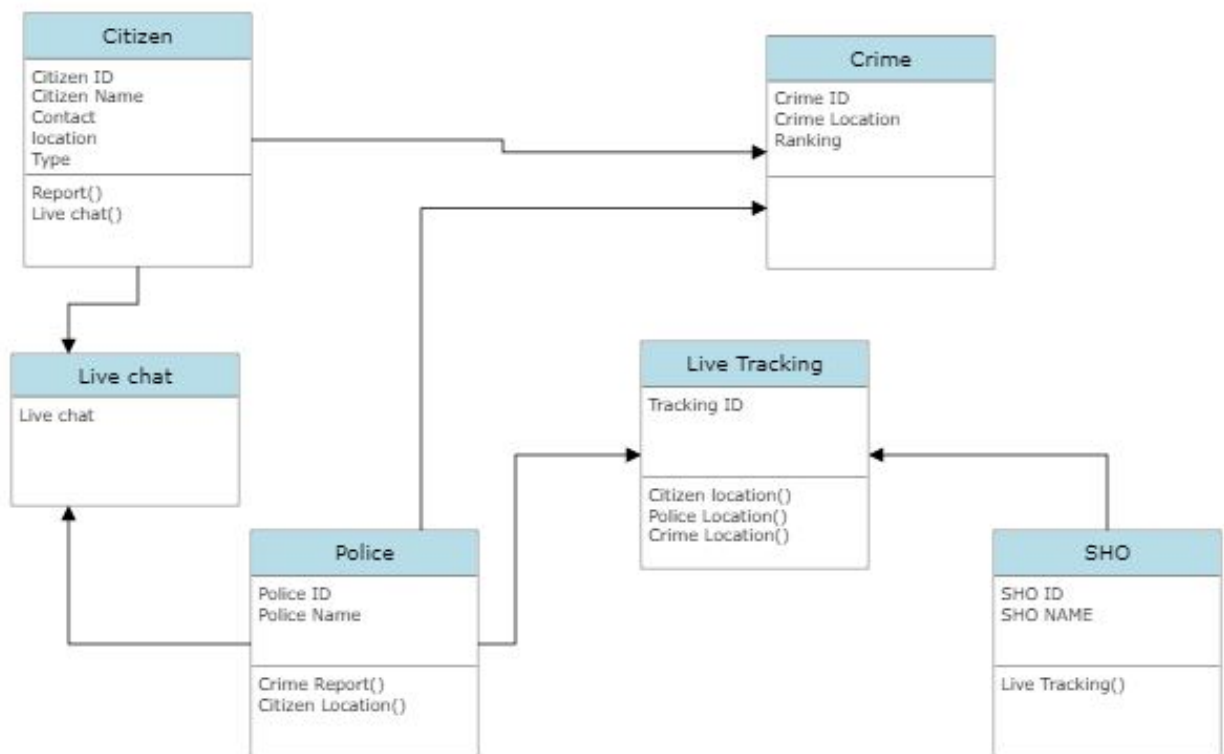


Figure 4.2: Class Diagram

### 4.4 Entity Relationship Diagram

An ER diagram is used to represent design of the database and show relation between entities and attributes, as shown in figure 4.3,

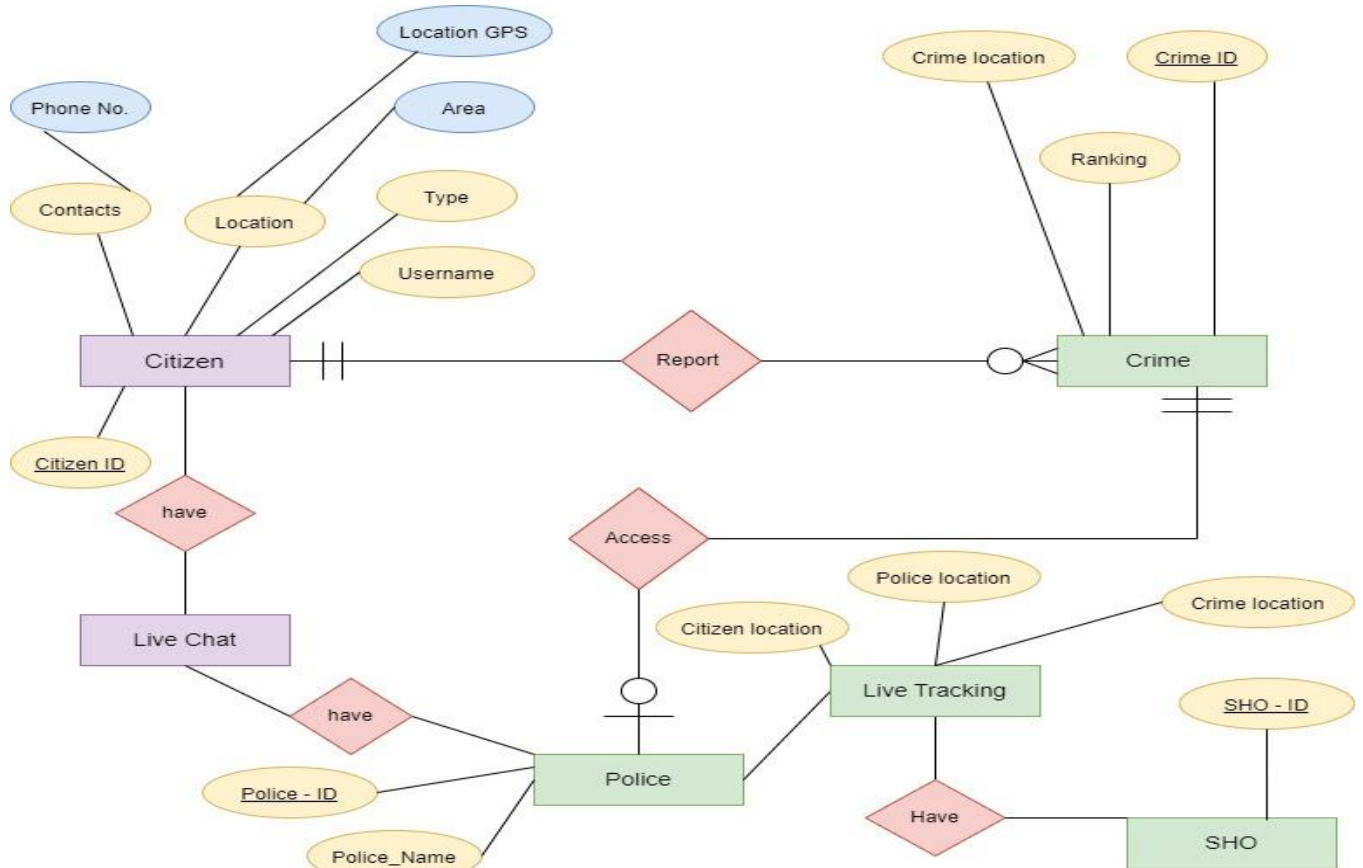


Figure 4.3: ER diagram

### 4.5 Sequence Diagram

A sequence diagram depicts item interactions in sequential order. It represents the scenario’s objects as well as the sequence of messages sent between them in order to carry out the scenario’s functionality. Because they explicitly focus on lifelines, or processes and objects that exist concurrently, and the messages transferred between them to execute a function before the lifeline expires, sequence diagrams are a common dynamic modeling method in UML. Use this article in conjunction with our UML diagramming tool to learn everything there is to know about sequence diagrams in UML.[23]

### Citizen Registration

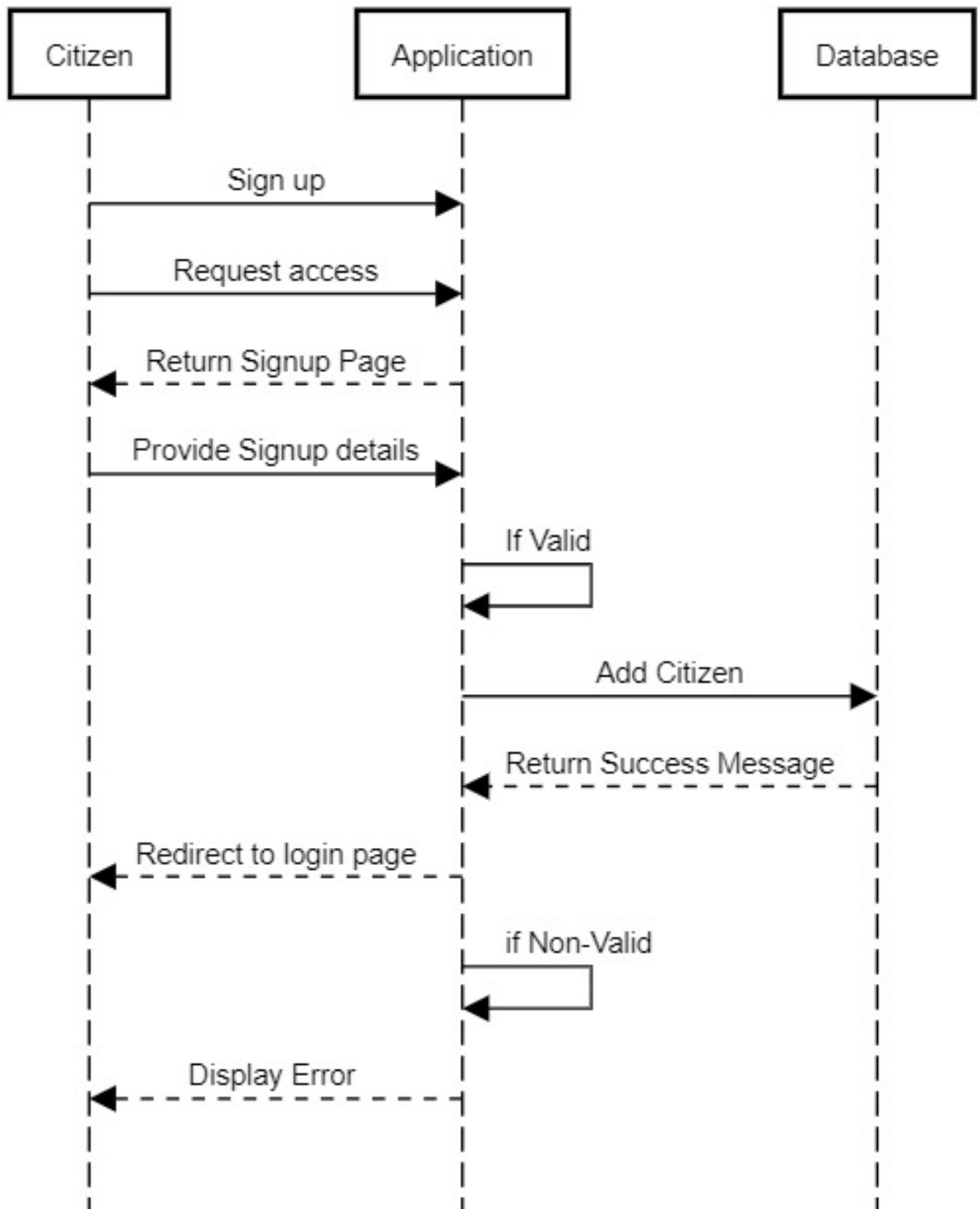


Figure 4.4: Citizen registration (Sequence Diagram)

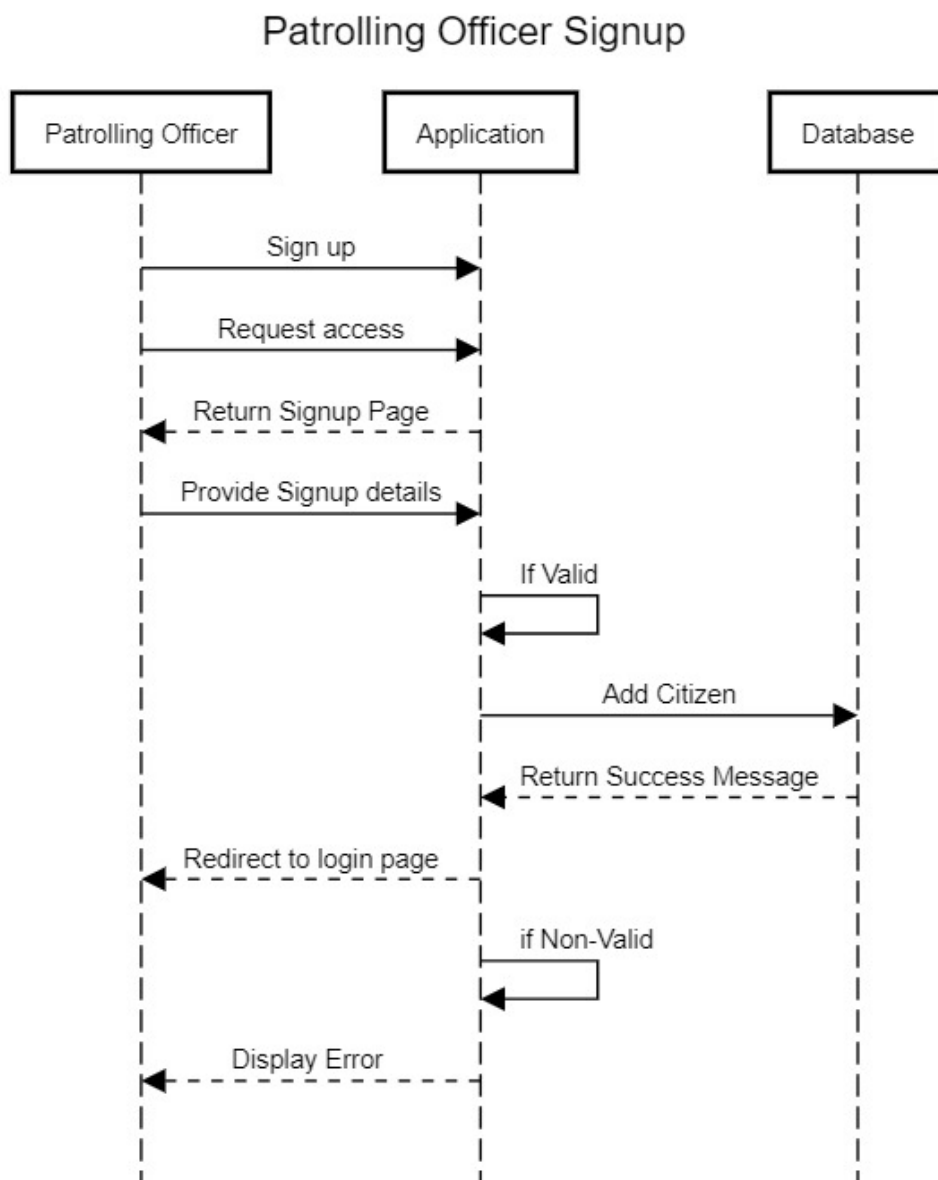


Figure 4.5: Patrolling Officer Signup (Sequence Diagram)

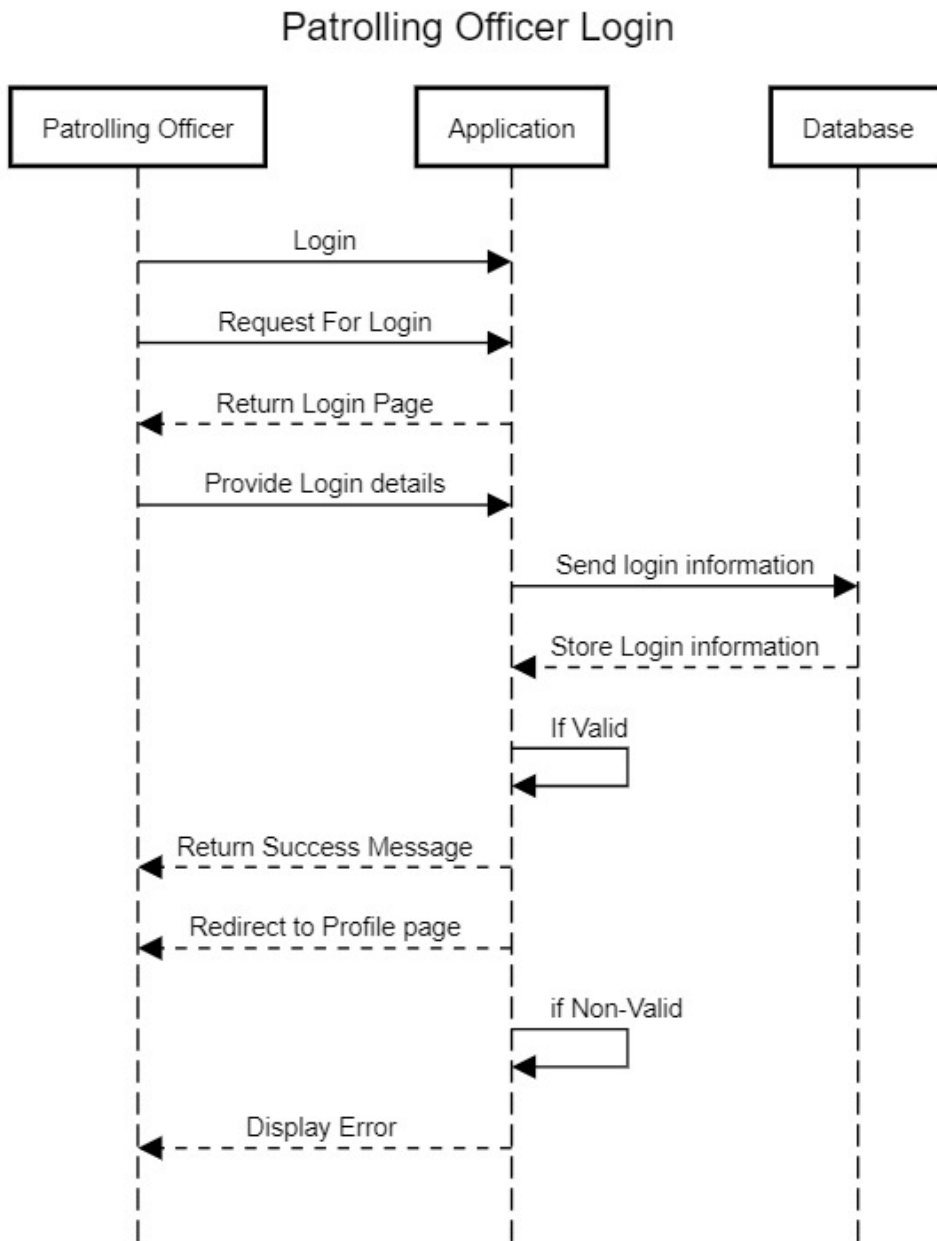


Figure 4.6: Patrolling Officer Login (Sequence Diagram)

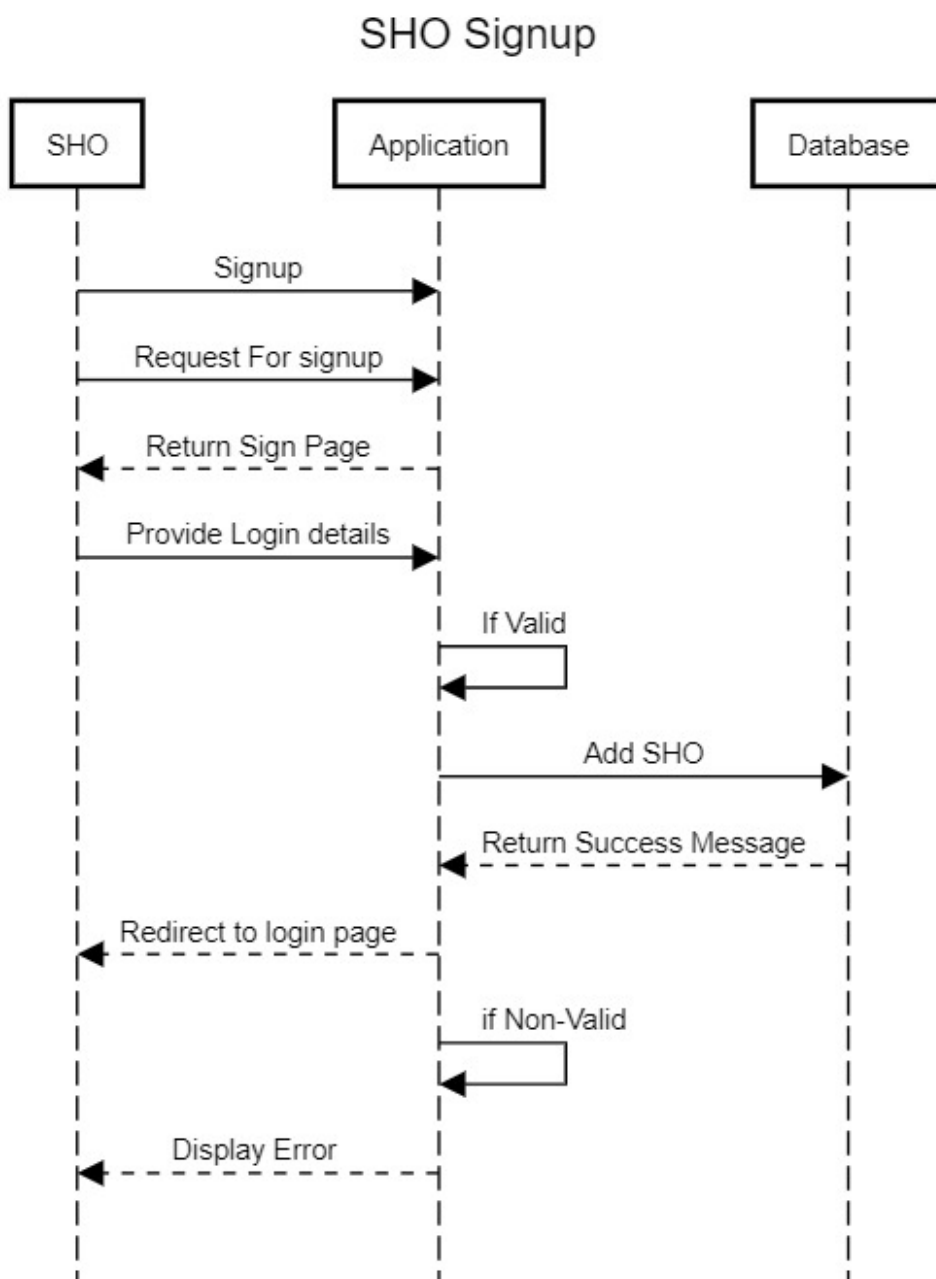


Figure 4.7: SHO Signup (Sequence Diagram)

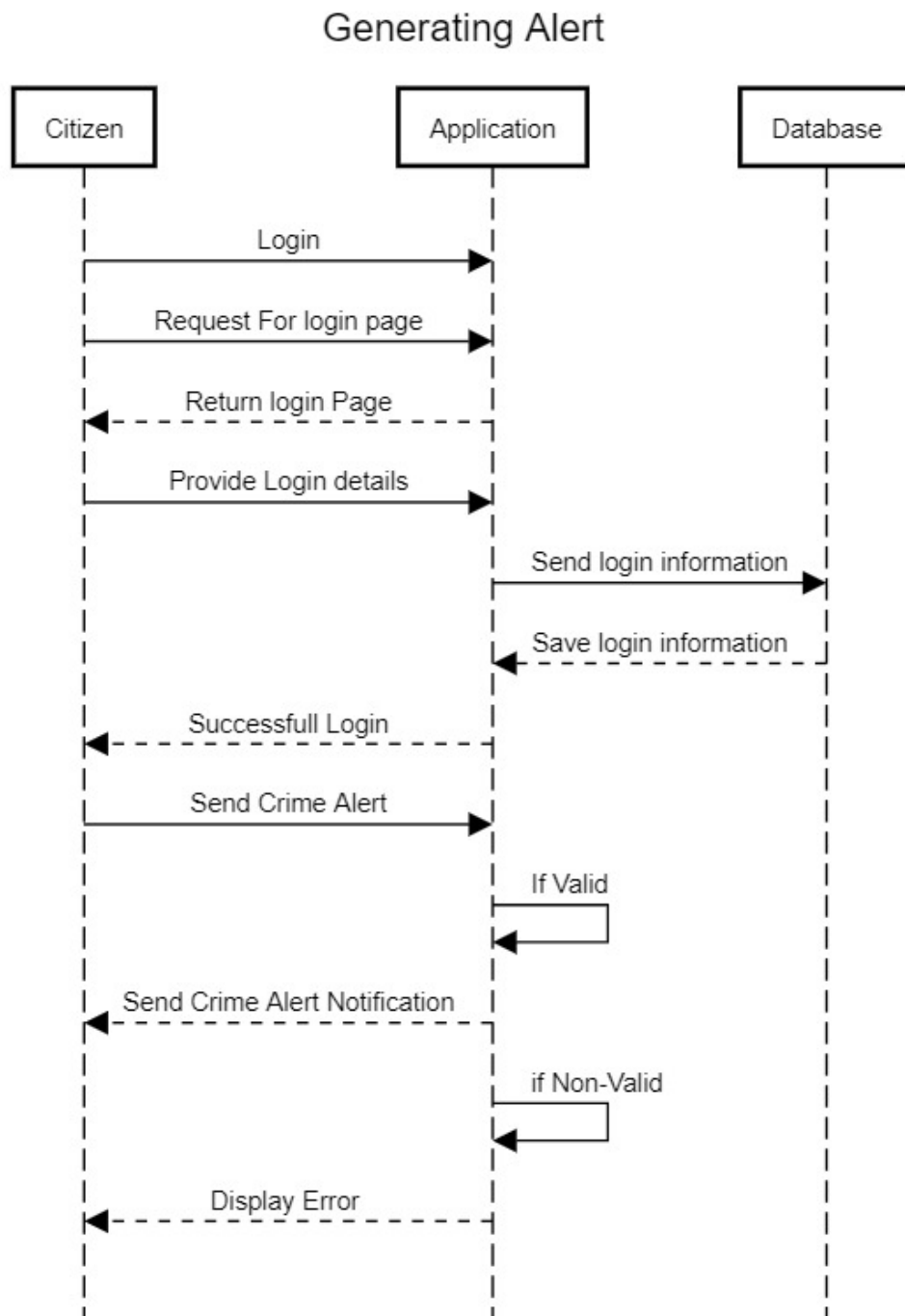


Figure 4.8: Generating Alert (Sequence Diagram)



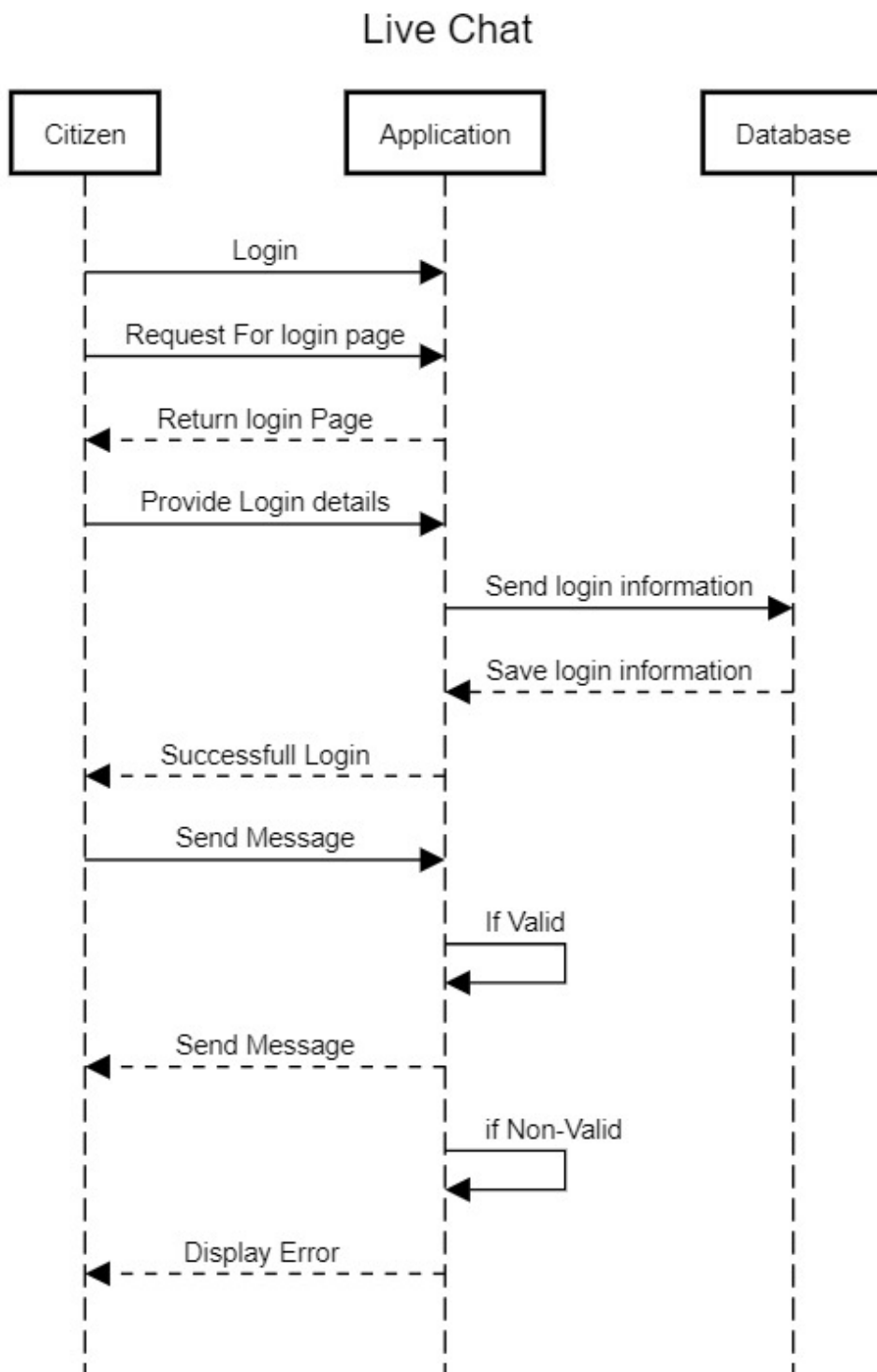


Figure 4.9: Live Chat (Sequence Diagram)

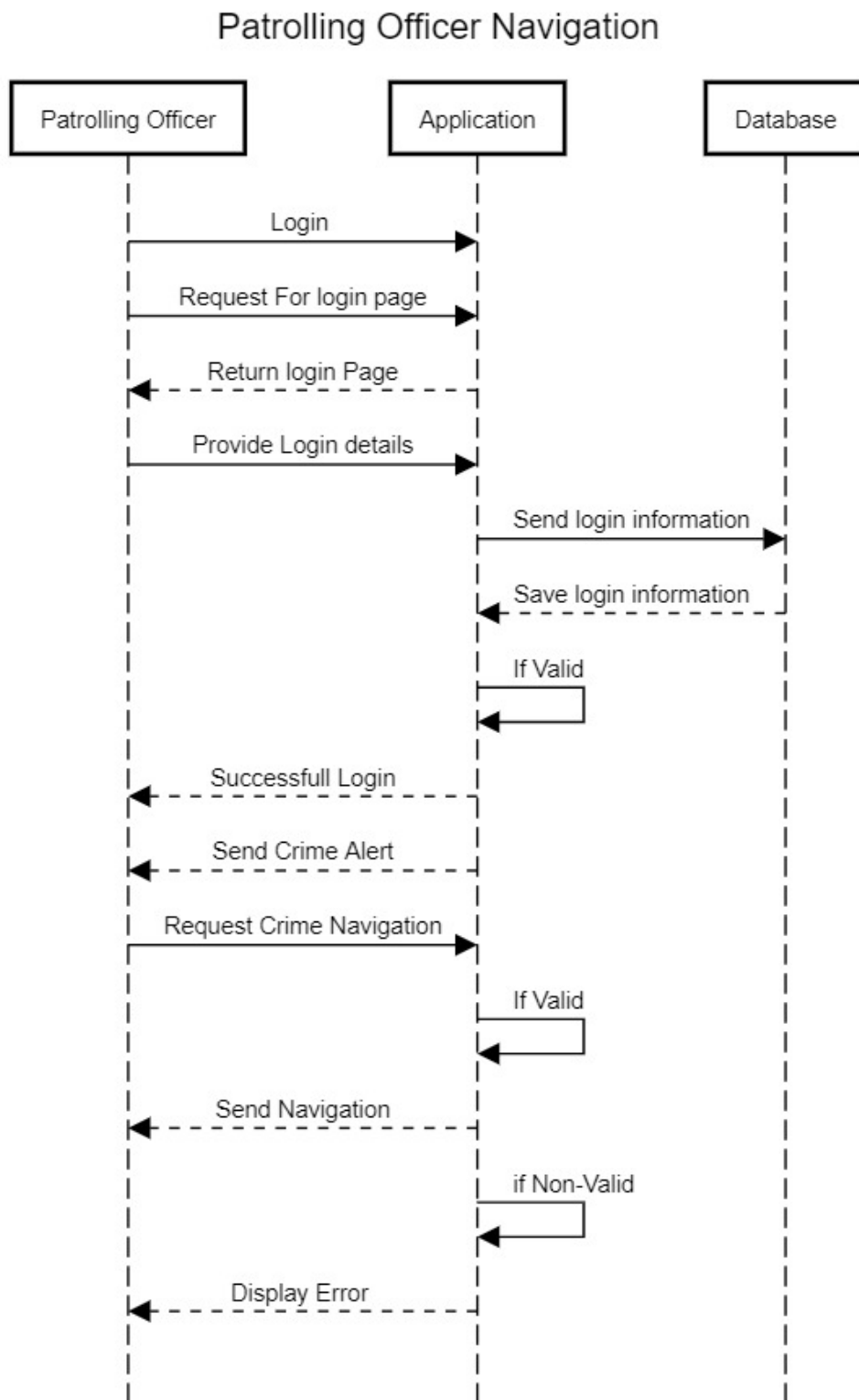


Figure 4.10: Patrolling Officer Navigation (Sequence Diagram)

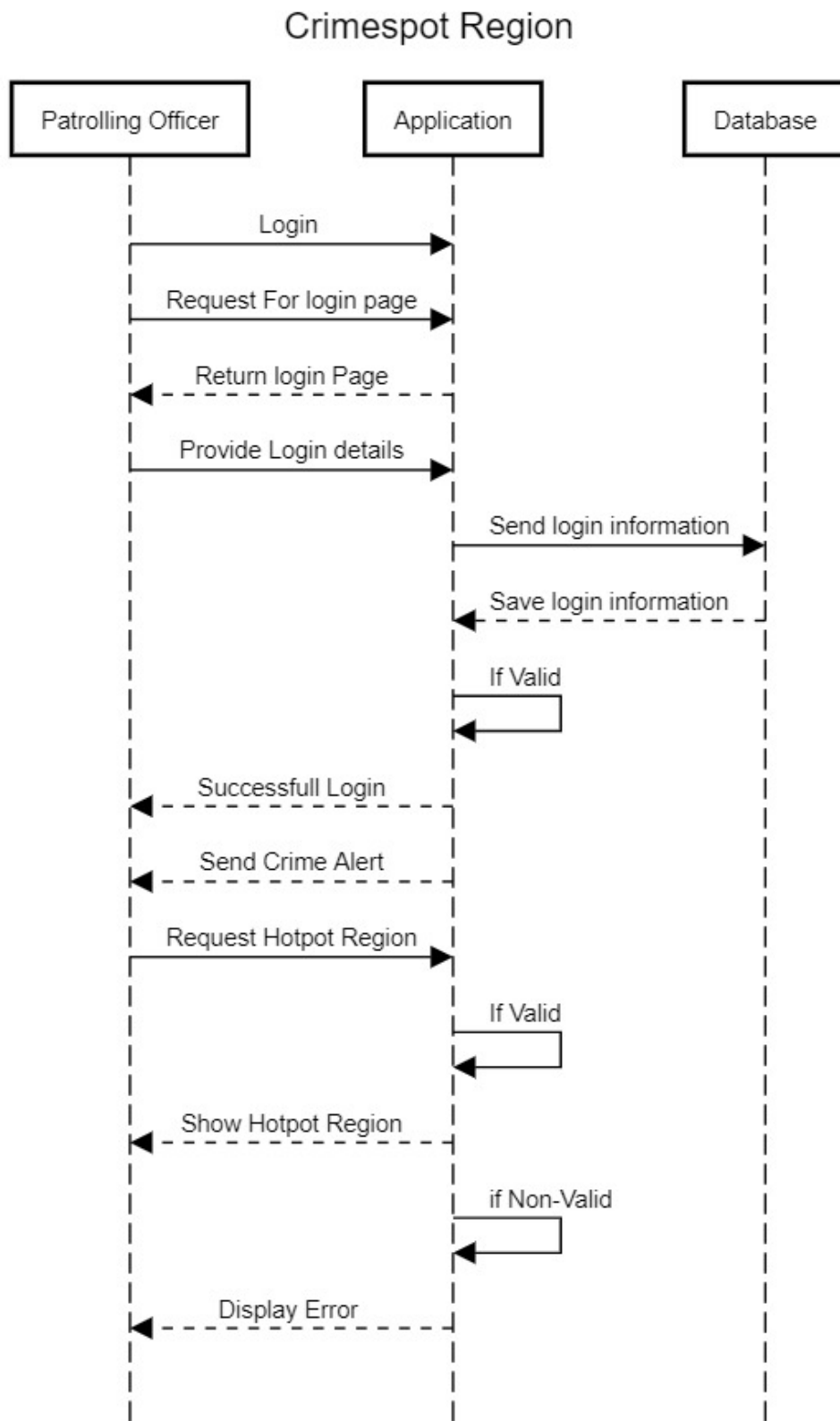


Figure 4.11: CrimeSpot regions (Sequence Diagram)

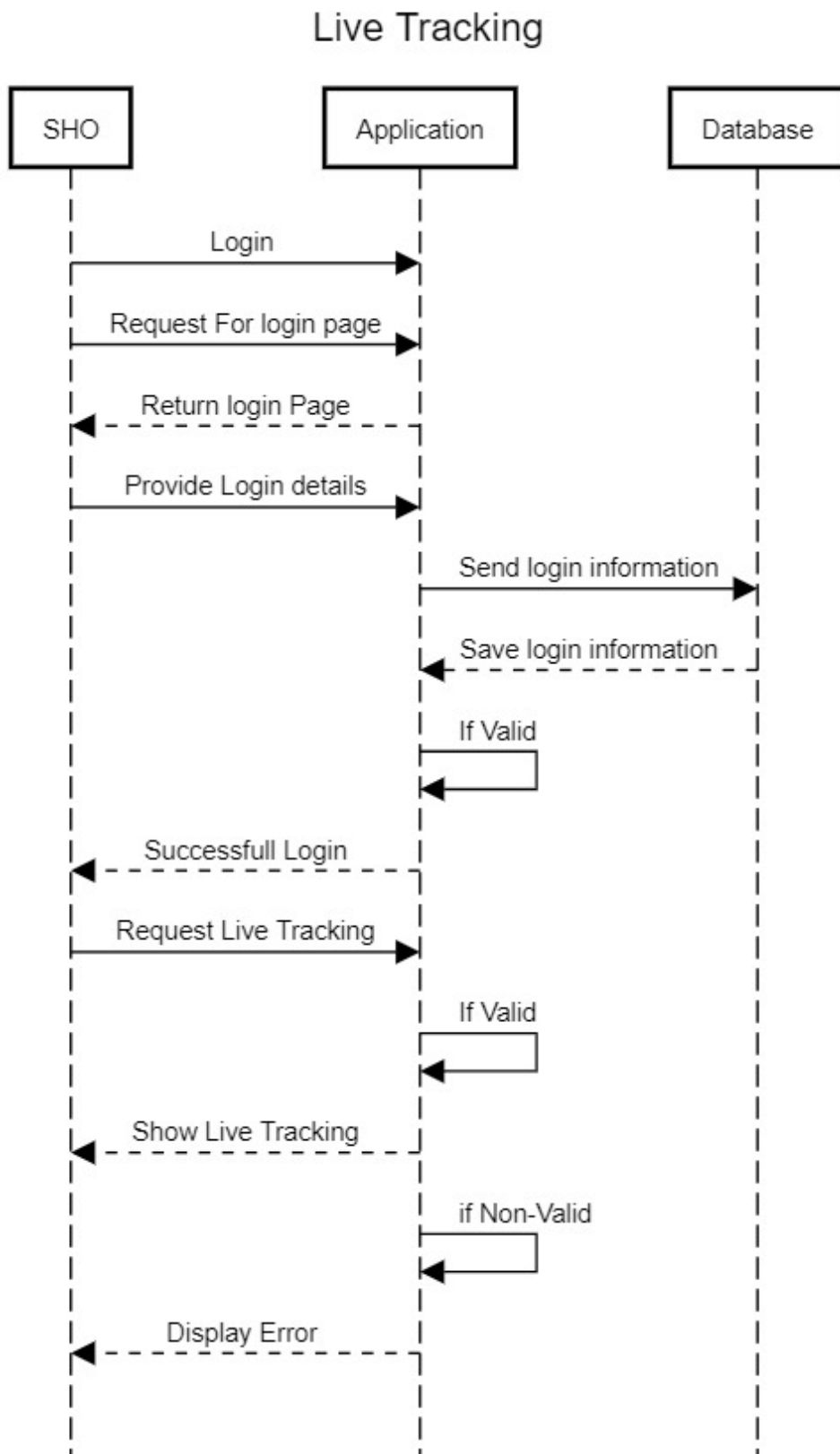


Figure 4.12: Live Tracking and Generating report (Sequence Diagram)

## 4.6 Activity Diagram

Stakeholders have a lot of concerns to deal with, so it's crucial to communicate concisely and clearly. Activity diagrams assist in bringing together individuals from the business and development sides of a company to comprehend the same process and behaviour. Making an activity diagram requires the usage of a certain set of symbols, such as those used for beginning, concluding, merging, or receiving phases in the flow, which we'll go into more detail about in this activity diagram tutorial.[24]

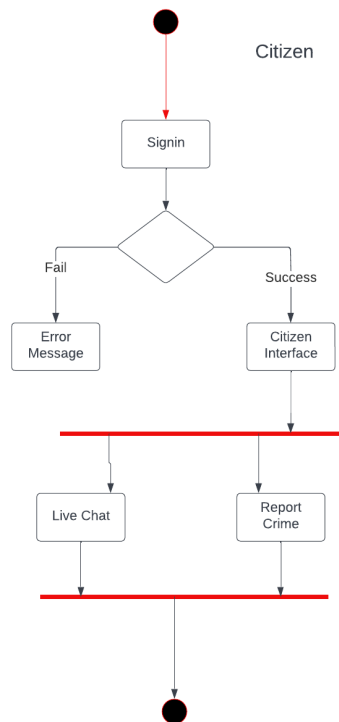


Figure 4.13: Activity Diagram of Citizen work flow

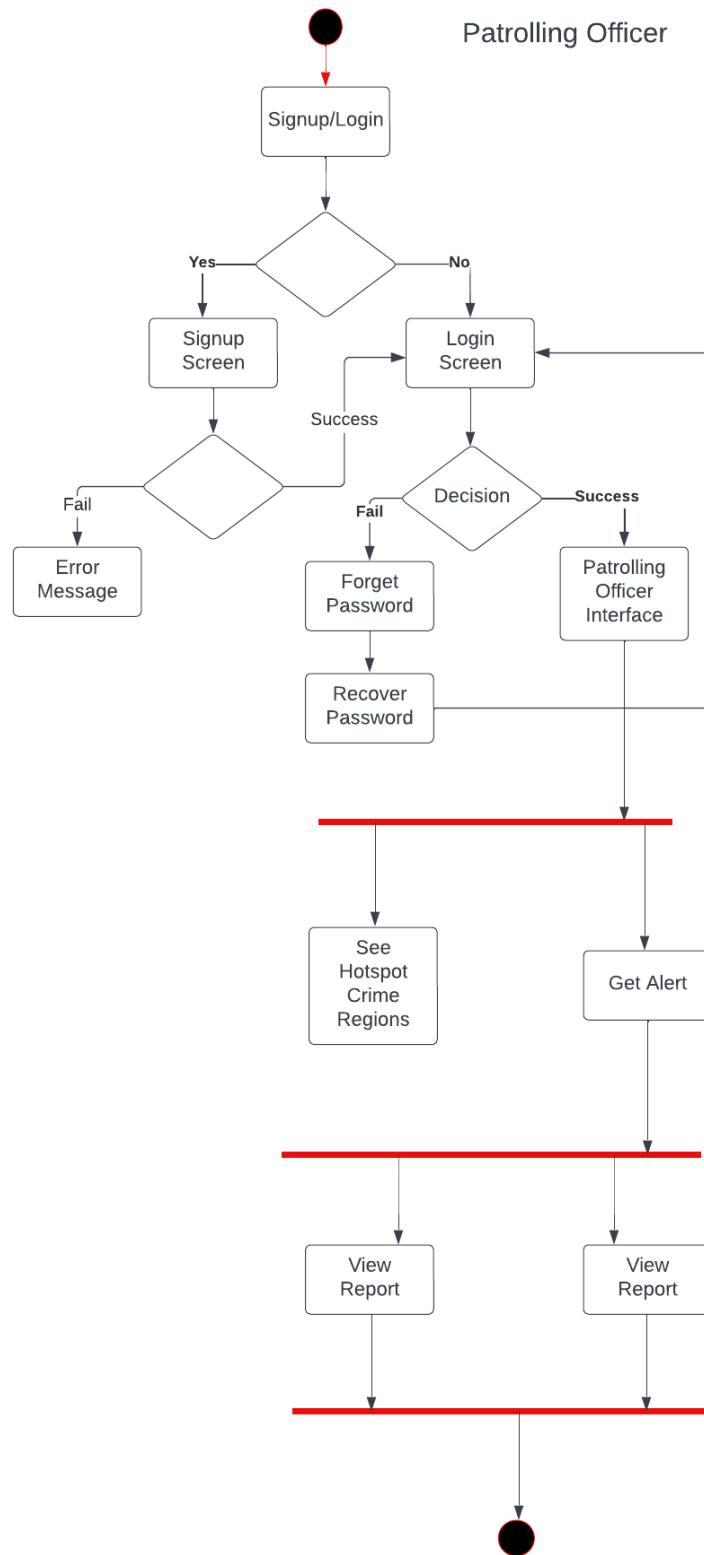


Figure 4.14: Activity Diagram of Patrolling Officer work flow

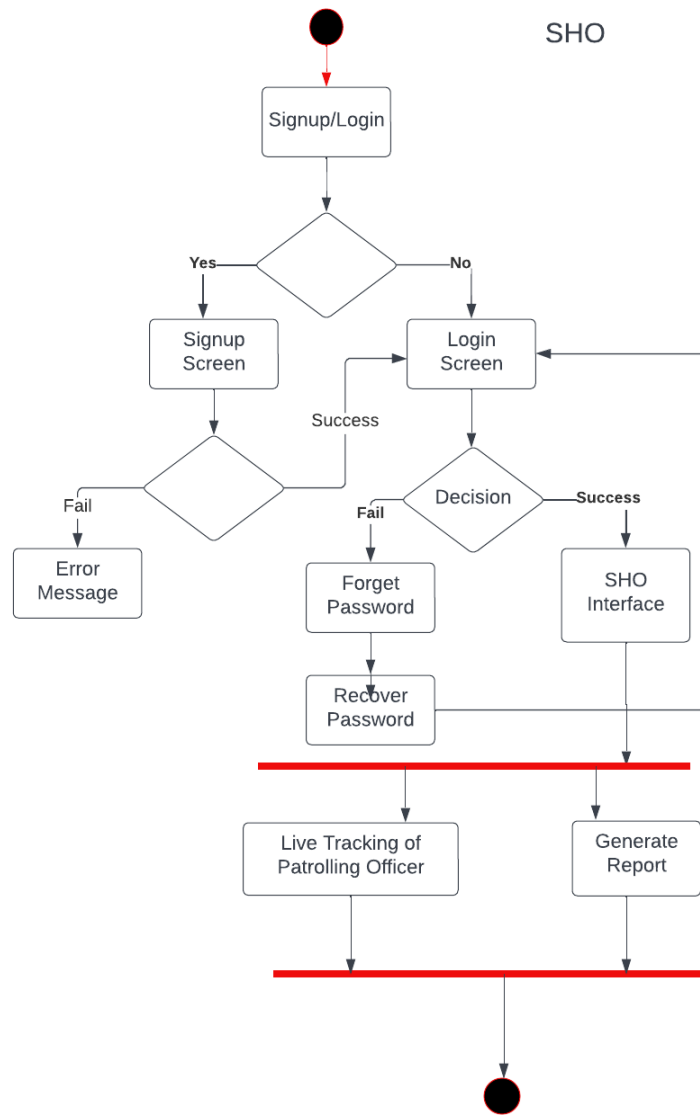


Figure 4.15: Activity Diagram of SHO work flow





## 5.2 Architecture and Component Integration

In this section we will explain integration between system components:

- Integrate required dependencies including Firebase dependency to integrate your project with Firebase.
- Create Account on Firebase.
- Create your Project and attach your project ID on Firebase.
- Download the jason file and import it in your project.
- Make sure have up-to-date SDK version for successful integration.

## 5.3 Tools And Technologies

- Laptop (4GB Ram or above).
- Android Studio (Version 2021.3.1)
- Windows 10 OS
- Firebase Account for database.
- Andriod

# Chapter 6

## System Testing and Evaluation

We tested and evaluated our project. Before submitting our project, it should be tested and passed through critical assessment, as it tells us our mistakes, errors, or deficiencies, which we can improve. To evaluate our application that it fulfills the requirements we wanted, we conducted system testing. System testing is the testing of a complete and fully integrated product. We will apply the different tests on our application. Therefore, we have applied the following tests to our application.

### 6.1 Unit Testing

In the unit testing section, we repeatedly checked our application and ensured that there are no errors and bugs in the code. We checked every function used in the application and the good thing was it didn't require any correctness. So, the application responded well and the unit test went perfectly.

### 6.2 GUI Testing

In the GUI testing section, we checked the visual design, functionality, color scheme, buttons, the message displayed, and alignments. GUI testing is urgent to the fruitful arrival of the product as it approves the client experience. GUI testing assists with conveying excellent and user-friendly applications. Eventually, you accomplish a more elevated level of client commitment and fulfillment.

So, in our case, our application works perfectly fine. We have properly designed and have a purpose for our pages, buttons, color scheme, perfect sizes, the message displayed. The text we have used is readable. Buttons are properly sized. The color scheme is perfect. The images 6.3, ??, 6.5 and 6.6 show the GUI and working of our applications.



## E-Crime Reporting

Figure 6.1: Splash screen

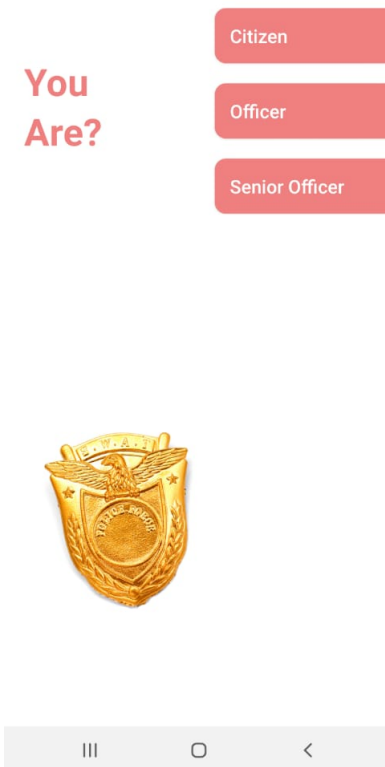


Figure 6.2: Home

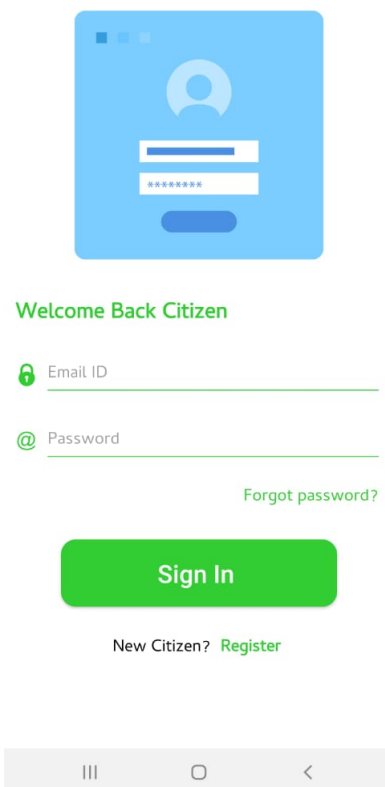


Figure 6.3: Login Page

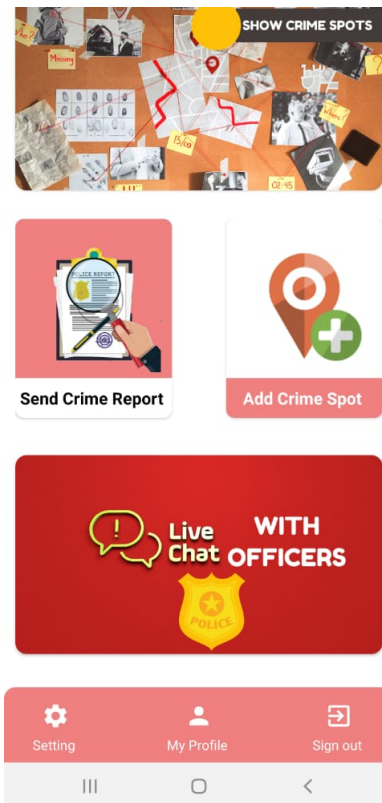


Figure 6.4: Citizen Menu

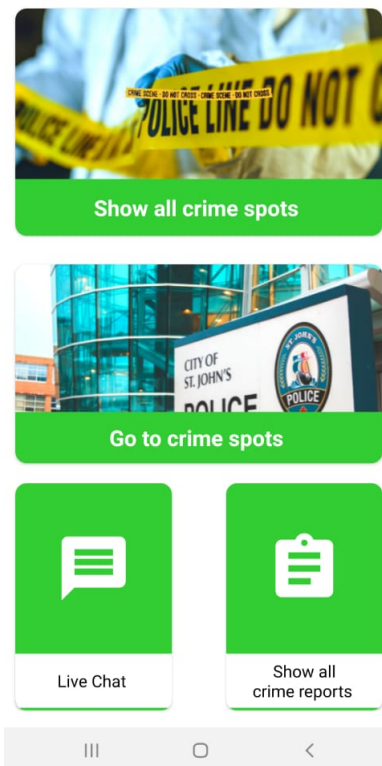


Figure 6.5: Senior Officer Menu

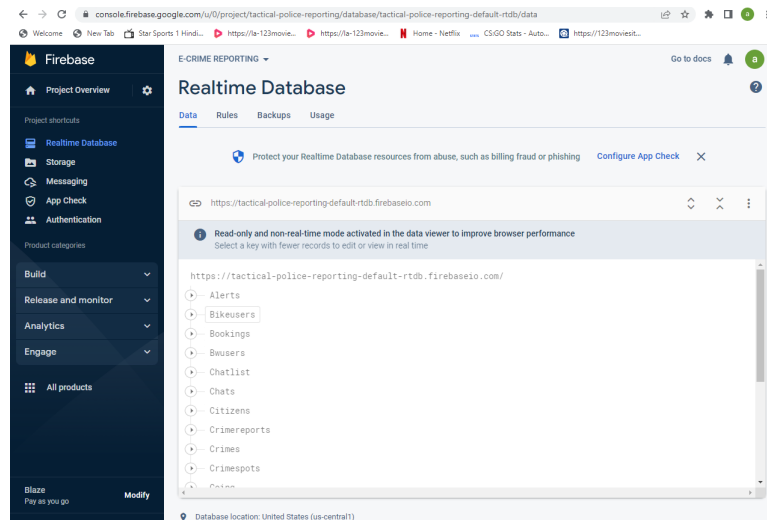


Figure 6.6: Firebase

## 6.3 Usability Testing

Usability Testing primarily focuses on the user's simplicity to utilize the application, adaptability in taking care of controls, and the capacity of the framework to meet its destinations. The main objective is to recognize any ease-of-use issues, gather subjective and quantitative information, and decide the member's fulfillment with the item.

Our application fulfills the requirements, and it passes through following usability test.

### 6.3.1 User-friendly

Our application is user-friendly. It is compatible with its user's knowledge, skills, concentration span, and other aptitudes. The user does not have to gain any special training to understand the system.

### 6.3.2 Easy to understand

Our application is easy to understand we have used appropriate graphics to represent the functionality of buttons and pages making it easy for user to understand and explore our application.

### 6.3.3 Easy to Use

Our Application is easy to use because we have made it so that user can easily understand what to do and how to do.

### **6.3.4 User experience**

The application is made so that user is comfortable and does not feel over dozed with information.

### **6.3.5 Fulfills users need**

The application fulfils user needs which is a simple way to report or alert police officers.

## **6.4 Software Performance Testing**

Software Performance test is used to examine the performance of the project under various workloads. It us used to measure speed, resource usage, scalability and stability of the application. Our application is fast and responses quickly so that user does not have to wait for a long time, we made our database in Firebase firestore which is way faster and responsive than realtime database

## **6.5 Compatibility Testing**

It is used to check whether the application is compatible with the devices or not. It enhances user experience as it shows that application working properly. We have done this test and our application can run on minimum 5.5 Android operating system and 6 IOS operating system.

## **6.6 Exception Handling**

Exceptions in the execution of the process are anomalous and always unexpected, if exception handling is not done properly it may cause the application to crash and terminate abruptly it creates user dissatisfaction.

To prevent Exception we have placed checkers and alerts on all the places that require user interaction to prevent the exception and it has been successful and our application working fine.

## **6.7 Load Testing**

This type of test is used to check how the system is responding under different types of loads, it is a type of performance checking test. It checks how the system respond when there are multiple number of virtual users interacting with system and how the system respond to them.

Our application works just fine under the load of multiple users and it does not lag or hangs the screen and works smoothly without any errors.

## 6.8 Security Testing

Security testing is done to identify the threats in the application and measure its potential vulnerabilities, so the threats can be solved, and the application does not stop functioning

Application doesn't have any threats. No unauthorized person can log in to the system and view or change user details or any other data present in the database.

## 6.9 Test Cases

The test checked done to verify that application is working fine.



### 6.9.1 Test Case 1

Sign Up Check

ID	Test Case 1
Description	Analyze and check results by Signing up.
Steps	The user creates an account by providing his/her credentials.
Pre-conditions	The user must be a new to system
Assumptions	Users should have a good processor and a minimum 4GB RAM to run the application
Expectations	The application load time should be less.
TStatus	Pass

Table 6.1: Testing Sign in

### 6.9.2 Test Case 2

Sign In check

ID	Test Case 2
Description	Testing and checking whether the user is successfully logged in or not.
SSteps	The user logs in by providing an email address and password.
Pre-conditions	The user must have already an account.
Assumptions	Users should have a good processor and a minimum 4GB RAM to run the application
Expectations	The application load time should be less.
Status	Pass

Table 6.2: Testing Sign Up

### 6.9.3 Test Case 3

Report crime section

ID	Test case 3
Description	Testing whether the user is able to report
Steps	The user should go to report section and then select report
Pre-conditions	The user must be already sign in
Assumptions	Users should have a good processor and a minimum 4GB RAM to run the application
Expectations	The application load time should be less.
Status	Pass

Table 6.3: Testing reporting from user

### 6.9.4 Test Case 4

Login from otp

ID	Test case 4
Description	Testing whether the user is able to login from otp
Steps	The user should go otp section in login menu.then select otp n and then enter any franchise number
Pre-conditions, The user must be new to the system	
Assumptions	Users should have a good processor and a minimum 4GB RAM to run the application
Expectations	The application shows data without any delay.
Status	Pass

Table 6.4: Testing user login process

### 6.9.5 Test Case 5

Report in Islamabad

ID	Test case 5
Description	Testing whether the user is able to report anywhere in Islamabad
Steps	The user should go to the report section section r
Pre-conditions	The user must have already on GPS
Assumptions	Users should have a good processor and a minimum 4GB RAM to run the application
Expectations	User gets the result without any delay.
Status	Pass

Table 6.5: Report and sharing location

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