Industry Internship Report
on
Open-source Intelligence Data Mining System

Submitted for the Partial Fulfillment of the Requirements for the degree of

Bachelor of Technology

in

Computer Science and Engineering

by

Emmadi Sumith Kumar
Roll No.: UI20CS21

Under the guidance of

Dr Pradeep Kumar Roy

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
April, 2024
INDIAN INSTITUTE OF INFORMATION TECHNOLOGY SURAT-394190

Indian Institute of Information Technology Surat

Computer Science and Engineering Department

CERTIFICATE

This is to certify that candidate **Emmadi Sumith Kumar** bearing Roll No: **UI20CS21** of B.TECH. IV, 8th Semester has successfully carried out the work on "**Open-source Intelligence Data Mining System**" for the partial fulfillment of the degree of Bachelor of Technology (B.Tech.) in **April, 2024**.

Faculty Supervisor: *Dr. Pradeep Kumar Roy* Sign:.....................

1. Examiner 1: *Dr. Pradeep Kumar Roy* Sign:.....................
2. Examiner 2: *Dr. Vipul Kumar kania* Sign:.....................
3. Examiner 3: *Ms. Jiby* T C Sign:.....................

(Seal of the Institute)

DECLARATION

This is to certify that
(i) This report comprises my original work towards the degree of Bachelor of Technology in Computer Science and Engineering at Indian Institute of Information Technology (IIIT) Surat and has not been submitted elsewhere for a degree,
(ii) Due acknowledgement has been made in the text to all other material used.

Signature of Student
(Emmadi Sumith Kumar)

ACKNOWLEDGEMENTS

I would like to express my heartfelt gratitude to all those who have helped me during my internship at **C-Trace Soft Solutions Private Limited** Company.

First and foremost, I would like to thank Prof. **J. S. Bhat**, Director, IIIT Surat for giving me this opportunity. I would also like to thank my college supervisor, **Dr. Pradeep Kumar Roy**, for their constant support and encouragement during the internship. Their insightful comments helped me to improve my work and gave me the confidence to take on new challenges. I am deeply grateful to my company mentor, **Mr. Venkata Rami Reddy Kasu**, who provided me with guidance, support, and valuable feedback throughout my internship. Their expertise, patience, and kindness made a significant difference in my learning and professional growth.

I am grateful to the IIIT Surat and Training and Placement Cell of my college for providing me with the opportunity to pursue this internship.I feel privileged to have had the opportunity to work with such supportive and knowledgeable individuals, and I am grateful for their contribution to my professional development.

ABSTRACT

This **Open-source Intelligence Data Mining System** is software is used to assist law enforcement agencies, such as police departments, in crime investigations by generating a report based on call data records (CDRs) and tower dump data. The software is designed to provide a rapid and efficient report, enabling investigators to identify suspects.

The primary objective of this software is to provide various information about individuals, including vehicle details, location data, IMEI numbers, phone numbers, PAN numbers, MNP details, IP information, etc. The software generates a PDF report containing all relevant information about the person.

The software is designed to be scalable, allowing for future enhancements and additions to accommodate evolving data collection requirements. Its success is dependent on technical infrastructure, legal compliance, user adoption, interoperability, and training and support for successful implementation.

The software is exclusively used by police department and authorized users for crime investigation purposes. It is designed to be secure and reliable, with data validation and verification processes to ensure the accuracy and reliability of collected information. The software serves as a valuable tool for law enforcement agencies, providing them with the necessary information to conduct successful criminal investigations.

The proposed software is already in use by several law enforcement agencies, This software has some pending features under development. It is continuously updated to meet the evolving needs of law enforcement agencies and to enhance its functionality and usefulness.

Contents

List of Principal Symbols and Acronyms

VS	**V**isual **S**tudio
OSINT	**O**pen **S**ource **I**ntelligence
RC	**R**egistration **C**ertificate
CRC	**C**hasis to **R**egistration **C**ertificate
SMS	**S**hort **M**essage **S**ervice
PAN	**P**ermanent **A**ccount **N**umber
IP	**I**nternet **P**rotocol
GPS	**G**lobal **P**ositioning **S**ystem
IPL	**I**nternet **P**rotocol **L**ogger
VN	**V**irtual **N**umber
IMEI	**I**nternational **M**obile **E**quipment **I**dentity
PNR	**P**assenger **N**ame **R**ecord
IFSC	**I**ndian **F**inancial **S**ystem **C**ode
UPI	**U**nified **P**ayments **I**nterface
CC	**C**ourt **C**ase
BTS	**B**ase **T**ransceiver **S**tation
MNP	**M**obile **N**umber **P**ortability
AES	**A**dvanced **E**ncryption **S**tandard
VCS	**V**ersion **C**ontrol **S**ystem
DBMS	**D**atabase **M**anagement **S**ystem
IDE	**I**ntegrated **D**evelopment **E**nvironment
CI/CD	**C**ontinous **I**ntegration and **C**ontinous **D**eployment

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OBJECTIVES/GUIDELINES/AGREEMENT: INTERNSHIP SYNOPSIS

(THIS WILL BE PREPARED IN CONSULTATION WITH SUPERVISOR)

An internship is a unique learning experience that integrates studies with practical work. This agreement is written by the student in consultation with the faculty Mentor and Industrial supervisor. It shall serve to clarify the educational purpose of the internship and to ensure an understanding of the total learning experience among the principal parties involved.

Part I: Contact Information

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Campus Address: IIIT Surat , Kholvad Campus , Kamrej, Surat

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Industrial Supervisor

Name: Kasu Venkata Rami Reddy Title: Senior Developer

Company/Organization: C-TRACE SOFT SOLUTIONS PVT. LTD.

Internship Address: #402, Mallik Chambers, Hyderguda, Himayath Nagar, Hyderabad

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Faculty Mentor

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Campus Address: IIIT Surat , Kholvad Campus , Kamrej, Surat

Academic Credit Information

Internship Title: Full Stack Developer Intern Department: CSE

Course #: CS801 Credits: 24

Grading Option: Credit/Non-Credit

Beginning Date: 8 - JAN - 2024 Ending Date: 30 - JUNE - 2024

Hours per Week: 40 Internship is: [✓ Paid] Unpaid

Part II: Internship Objectives/Learning Activities

Internship Objectives: What do you intend to learn, acquire and clarify through this internship? Try to use concrete, measurable terms in listing your learning objectives under each of the following categories:

- Knowledge and Understanding

  During my internship, I aim to master my knowledge on server-side scripting languages , particularly focusing on technologies like Node.js and python. I also plan to gain a deep understanding of the React Native framework for cross-platform mobile app development. Additionally, I intend to explore and implement native modules in Kotlin to boost the functionality and performance of the application.
- Skills

  During my internship, I aim to develop skills in backend development, API design, MongoDB database management, and node-addon-apis, python c++ extentions. I'm eager to understand and work with React Native for Android app development. Additionally, I plan to design native modules using Kotlin. My goal is to contribute effectively to the Internship project and gain practical experience in these areas.

Part III: The Internship

Job Description: Describe in as much detail as possible your role and responsibilities while on your internship. List duties, projects to be completed, deadlines, etc. How can you contribute to the organisation/site of internship. It must contain the assurance of carrying real/live project during the internship.

As a Full Stack Developer Intern, my primary role involves designing and implementing APIs in Node.js and Python for our Open Source Intelligence (OSINT) Report system. Specifically, I focus on creating social media APIs to extract user information based on phone numbers, emails, and usernames. These APIs are critical tools used by law enforcement, integrated into WhatsApp bots for efficient data access.

Additionally, I am responsible for developing an Android application using React Native, integrating APIs with some extra APIs, and adding features to enhance user experience and security. This internship offers hands-on experience with live projects, contributing directly to our organisation's goal of providing advanced OSINT tools to law enforcement for effective information gathering and analysis.

Part IV: Agreement

This contract may be terminated or amended by student, faculty coordinator or work supervisor at any time upon written notice, which is received and agreed to by the other two parties.

Student: Sreemith Date: 31/01/2024

Industry Supervisor: K.V. Rai Reddy Date: 01/02/2024

Faculty Supervisor:________________________ Date: ____________

Chapter 1

Introduction

The Open-source Intelligence Data Mining System (OSINT), as depicted in Figure 1.1, is an advanced software specifically designed to assist law enforcement agencies, such as the police department, in crime investigations by effectively analyzing call data records (CDRs) and tower dump data. It offers a comprehensive range of features crucial for conducting successful criminal investigations.

The primary objective of this application is to provide law enforcement agencies with a rapid and efficient means of analyzing call data records (CDRs) and tower dump data. C-Trace OSINT software acts as a force multiplier, empowering investigators to make informed decisions and progress their investigations more effectively.

1.1 What is OSINT Data Mining System ?

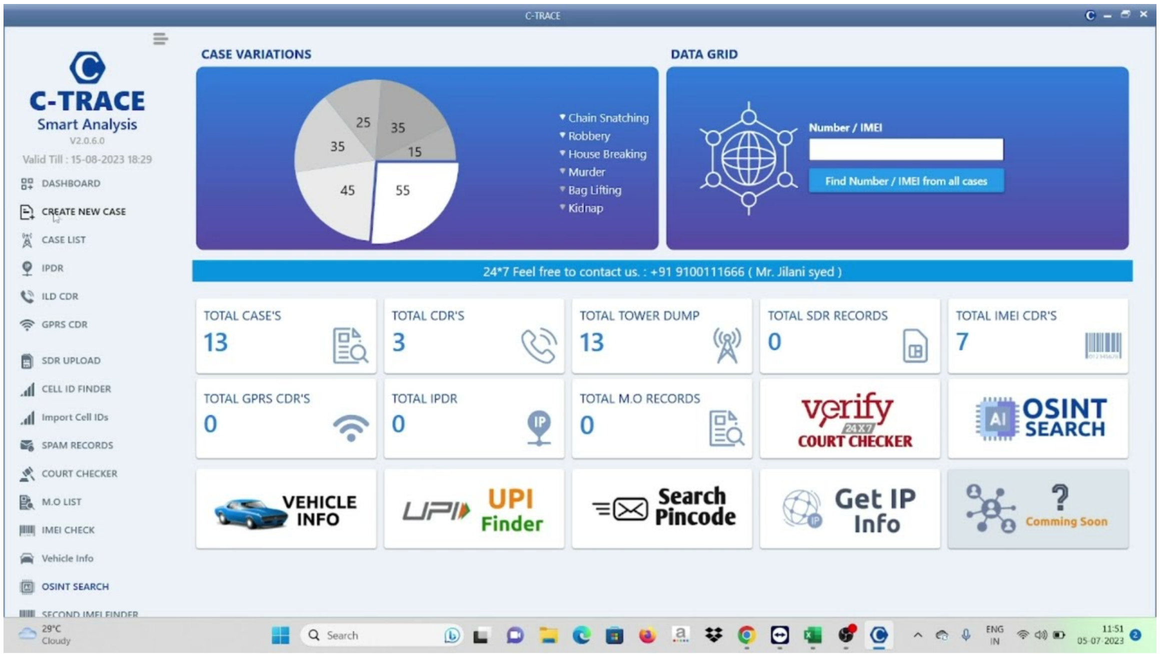
The developed application is specifically designed for use by police departments only in solving crime cases by analyzing call data records (CDRs) and tower dump data. This software provides a detailed report on individuals using their phone number, IMEI number, PAN number, etc. It can extract tower data to identify all phone users within a specific tower, using azimuth ID. The report includes information such as the person's vehicle details, location data, IMEI numbers, phone numbers, PAN numbers, MNP details, IP information, and more. The software generates a PDF report that encompasses all relevant information about the individual.

1.2 Features of OSINT Software

The developed software provides a range of powerful search functionalities based query. Below are some of the key features offered:

i. **Vehicle information** : RC MH02ZX1234

ii. **IP Lookup** : IP 192.168.01.01



24*7 Feel free to contact us. : +91 9100111666 (Mr. Jilani syed)

TOTAL CASE'S 13

TOTAL CDR'S 3

TOTAL TOWER DUMP 13

TOTAL SDR RECORDS 0

TOTAL IMEI CDR'S 7

TOTAL GPRS CDR'S 0

TOTAL IPDR 0

TOTAL M.O RECORDS 0

Figure 1.1: C-Trace OSINT Software

iii. **Pin code search** : PIN 524455

iv. **IMEI Search** : IMEI 45671234765823
You can Get Device Model details

v. **PNR Search** : PNR 456789101
Check your train ticket status. Access passenger, seat, boarding, and destination info.

vi. **IFSC Search** : (e.g., "IFSC SBIN0062517" or "IFSC SBI ATTAPUR")
Find bank details and IFSC codes for banks and cities.

vii. **UPI Search** : UPI 8465802838
Now, you can effortlessly retrieve UPI ID details by simply sending a UPI Mobile number. For instance, send UPI 8465802838

viii. **Court Case Search** : CC Name
Now you can effortlessly track court cases of old offenders and suspects with our new Court Case Search feature. Simply send "CC Name" followed by the name of the individual, just like this: CC Prakash.

ix. **OSINT Search** : OSINT 9848012345
You can access names linked to phone numbers, UPI IDs, photos, social media accounts, and more.

x. **Phone Number to Gas Connection search** : GAS 9848012345

xi. **Cell ID Search** : BTS 4044349032727
You can tower ID address and azimuth direction in Google Maps

xii. **MNP Lookup** : Network 9848012345
You can get mobile number portability details and Operator details

xiii. **IMEI Last digit finder** : FULL IMEI 45231671101234
You can identify the last digit of an IMEI number.

1.3 Plugins Integrated with C-Trace OSINT Software

This software is integrated with additional tools such as Verify 24x7 Court Checker, OSINT Search, and Vehicle Information. These plugins enhance the software's capabilities and provide additional functionalities to law enforcement agencies.

1.3.1 Verify 24x7 Court checker

The Verify 24x7 Court checker is a third party tool that has large collection of court cases in India containing millions of records and updated on a daily basis. Given a name and address, our smart, proprietary algorithms retrieve matching cases in a few seconds.

This plugin allows users to verify the court case status of an individual by entering their name. This feature provides information on the individual's court cases, including the case number, court name, and case status. By utilizing this feature, law enforcement agencies can quickly verify the court status of suspects and offenders, aiding in their investigations and intelligence gathering.

1.3.2 OSINT Search

OSINT Search is a feature that allows users to gather publicly available information about individuals, including personal and public details, to aid in investigations. By utilizing OSINT (Open-Source Intelligence) techniques, this feature helps retrieve relevant information about the suspect, such as their personal background, social media activity, online presence, and other publicly accessible data. This comprehensive search capability assists law enforcement agencies and investigators in building a more complete profile of the culprit, aiding in the investigation process.

1.3.3 Vehicle Information

Vehicle Information is a feature that allows users to obtain details about a specific vehicle using its registration number. By inputting the vehicle number into the system, investigators can retrieve information such as the make, model, year of manufacture, color, and ownership details of the vehicle associated with that registration number. This feature is valuable in investigations as it helps identify and track vehicles linked to criminal activities, providing important leads for law enforcement agencies and helping them in their pursuit of the culprits.

The rest of the Report is organized as follows:

- **Chapter 2:** Tools and Technologies
- **Chapter 3:** Proposed Systems
- **Chapter 4:** Design
- **Chapter 5:** Implementation
- **Chapter 6:** Testing and Experimental Results
- **Chapter 7:** Conclusion and Future Scope

Chapter 2

Tools and Technologies

Open-source Intelligence Data Mining System encompasses a wide range of tools and technologies that facilitate the creation, deployment, and maintenance of applications. From integrated development environments (IDEs) for coding to version control systems (VCS) for collaboration, programming languages, frameworks, database management systems (DBMS), cloud platforms, testing tools, API development tools, code editors, project management platforms, security tools, and monitoring/logging solutions.

2.1 Tools

The following Tools are used for the development of the Application. These tools are used for Development, Debugging and Testing of the Application.

i. **Visual Studio Code**: Visual Studio Code is used to design the OSINT Software, Backend of the Application and Android App Development. Visual Studio Code is a lightweight Code Editor for the development of the different kinds of Applications and Softwares. It is developed by Microsoft Inc. for developers developing for Windows, Linux, MacOS and Android. [3]

ii. **Flipper**: The Flipper is used for debugging the Android Application. It provides different debugging plugins such as logcat, Image Compressing, Shared Preferences, Network logs and SQLite Database visualization. The Flipper is developed by Facebook. [10]

iii. **React Native Debugger**: React Native debugger is used for debugging components rendering on different screens and their structure, alignment and styling. [6]

iv. **HTTPie**: HTTPie is used for testing of the APIs of CallOne Application. [25]

v. **Android Studio**: Android Studio is used for creating Native React Modules in Kotlin. Android Studio is Official Integrated Development Environment for developing Android Applications. [32]

vi. **Android Emulator**: The Android Emulator simulates Android devices on computer to test application on a variety of devices and Android API levels without needing to have each physical device. [32]

vii. **Git**: Git is a free and open source distributed version control system designed to handle everything from small to very large projects with speed and efficiency. [30]

viii. **Chromium Browser**: Chromium is an open-source browser project that aims to build a safer, faster, and more stable way for all users to experience the web. [33]

ix. **DBeaver**: DBeaver is cross-platform database tool for developers, database administrators, analysts, and everyone working with data. It supports all popular SQL databases like MySQL, MariaDB, PostgreSQL, SQLite, Apache Family, and more. [34]

x. **Nginx**: NGINX accelerates content and application delivery, improves security, and facilitates availability and scalability for the busiest websites. [22]

xi. **Puppeteer**: Puppeteer is a Node.js library which provides a high-level API to control Chrome/Chromium over the DevTools Protocol. [26]

2.2 Technologies

The following Technologies are used for the development of the Application.

i. **React Native**: React Native is JavaScript based Native Application Development Framework. It allows to build natively-rendered mobile Applications for Android and iOS. [4]

ii. **Kotlin**: Kotlin is a programming language used for development of Android Applications. [7]

iii. **TypeScript**: TypeScript adds additional syntax to JavaScript to support a tighter integration with code editor. It Catch errors early in code editor. [23]

iv. **Express.js**: Express is a minimal and flexible Node.js web application framework that provides a robust set of features for web and mobile applications. [18]

v. **Node.js**: Node.js is a free, open-source, cross-platform JavaScript runtime environment that lets developers create servers, web apps, command line tools and scripts. It is built on Chrome's Javascript V8 engine. [19]

vi. **Crypto-js**: Crypto-js is javaScript implementations of standard and secure cryptographic algorithms. CryptoJS is a growing collection of standard and secure cryptographic algorithms implemented in JavaScript using best practices and patterns. [35]

vii. **PostgreSQL**: PostgreSQL is a powerful open-source relational database management system known for its reliability, robustness, and extensibility. It offers a wide range of advanced features, including support for complex queries, indexing, and transactions. [9]

viii. **React Native Firebase**: React Native Firebase is the officially recommended collection of packages that brings React Native support for all Firebase services on both Android and iOS apps. [5]

ix. **JSON Web Tokens (JWT)**: JSON Web Tokens are an open, industry standard RFC 7519 method for representing claims securely between two parties. [11]

x. **PDFKit**: PDFKit is a PDF document generation library for Node and the browser that makes creating complex, multi-page, printable documents easy. [29]

xi. **Baileys (WhatsApp Client)**: Baileys is a Whatsapp client to communicate with web sockets. [27]

Chapter 3

Proposed System

This chapter provides a detailed overview of the **Open-source Intelligence Data Mining System**. It outlines the project's main aim of collecting information for law enforcement purposes, along with the objectives, assumptions, dependencies, and system requirements essential for its implementation.

3.1 Objectives

The primary objective of this application is to provide law enforcement agencies with a rapid and efficient means of analyzing call data records (CDRs) and tower dump data. C-Trace OSINT software acts as a force multiplier, empowering investigators to make informed decisions and progress their investigations more effectively. Specifically, the objectives are as follows:

i. To collect various types of information from individuals, including:

   - Vehicle details
   - Location data
   - IMEI numbers
   - Phone numbers
   - PAN numbers
   - MNP details
   - IP information
   - Court cases
   - PNR information and more

ii. To develop a caller ID app named ”Call One” that collects users' contacts, call logs, emails, and location information.

iii. To store the collected data securely in a PostgreSQL database for law enforcement agencies to access.

3.2 Assumptions

The successful implementation of the **Open-source Intelligence Data Mining System** is based on the following assumptions:

i. **Availability of Necessary APIs**: The app assumes access to APIs or scraping techniques to collect data from various sources.

ii. **User Consent**: Users are assumed to provide consent for the collection of their data as per legal and ethical standards, with provisions for law enforcement access.

iii. **Data Security Measures**: Adequate security measures will be implemented to protect the collected data, especially sensitive information, from unauthorized access or breaches.

iv. **Continuous Monitoring**: Implementing continuous monitoring mechanisms to detect and respond to any unauthorized access attempts or security breaches promptly.

3.3 Dependencies

The proposed system is dependent on the following factors for its successful implementation:

i. **Technical Infrastructure**: Availability of necessary hardware, software, and network infrastructure to support app functionality.

ii. **Legal Compliance**: Adherence to legal regulations and privacy policies governing data collection and usage, including provisions for law enforcement access.

iii. **User Adoption**: User acceptance and adoption of the ”Call One” app, with awareness of its law enforcement data collection purpose.

3.4 Requirements

The requirements for implementing the Open-source Intelligence Data Mining System include:

3.4.1 Software Requirements

i. **.Net Framework**: .NET Framework on Windows, Generally need a compatible Windows OS (like Windows 7, 8, 8.1, or 10) and the specific version of .NET Framework required by the app installed on system.

ii. **Chromium Browser**: Chromium Browser is used to scrap data from websites using Puppeteer.

iii. **Node.js**: A compatible node.js version 18 or above is required to installed on the system.

iv. **kotlin**: kotlin is need to be installed on the system to design android app.

v. **Data Collection Modules**: Modules for collecting contacts, call logs, emails, and location information.

vi. **Database Management System**: A robust database management system for secure data storage and retrieval. PostgreSQL is used to store user information on database.

vii. **Security Features**: Encryption mechanisms, access controls, and authentication protocols to ensure data security. used AES encryption technique to encrypt the information.

3.4.2 Hardware Requirements

i. **Compatible System**: Windows Machine (like Windows 7, 8, 8.1, or 10) and the specific version of .NET Framework required by the app installed on system.

ii. **Linux Machine**: AWS Ubuntu Linux Machine is used to run backend on it.

iii. **Compatible Devices**: The Call One app should be compatible with a range of devices, including smartphones and tablets.

Chapter 4

Design

This chapter elaborates on the system design and architecture for the Open-source Intelligence Data Mining System application.

4.1 Project Overview

The Open-source Intelligence Data Mining System project aims to develop a robust system for collecting people's information for law enforcement purposes.The "Call One" app is a part of Open-source data mining system. The system design and architecture play a crucial role in ensuring the app's functionality, scalability, security, and ease of use.

4.2 System Design

The Design of the System is depicted in Figure 4.1. This App Flow is designed to provide a seamless user experience while ensuring data collection, storage, and analysis for law enforcement purposes.The system design of the "Call One" app encompasses several key components:

i. **Application Loads:** The app uses a metro server to compile the React Native project into a JavaScript bundle. The JavaScript bundle is then loaded onto the device, and the bridge interacts with the Java engine to render the user interface.

ii. **Application Initialization:** The app initializes the user interface, database, and native modules to handle user interactions, data storage, and device functionalities. Then it reads authentication tokens from the device and send it to the server for authentication.

iii. **User Authentication:** Server authenticate the user by validationg JSON Web tokens. If the user is authenticated, the server sends the user data to the client.

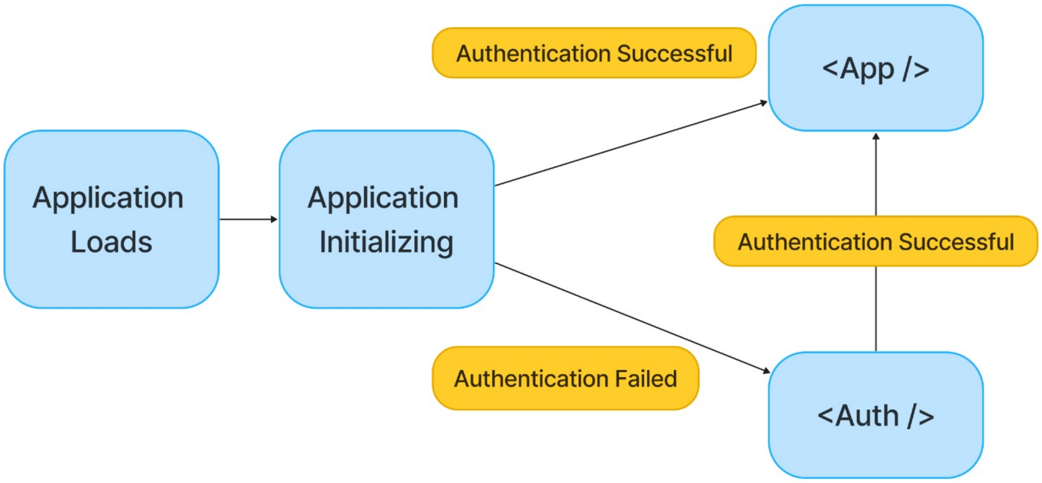


Figure 4.1: App Flow

iv. **Data Collection Modules:** Modules are designed to collect users' contacts, call logs, emails, and location information from various sources securely. Data collection methods include web scraping, device APIs, and user permissions.

v. **Data Encryption:** The app encrypts sensitive data using the Advanced Encryption Standard (AES) algorithm before transmitting it to the server. This ensures data security and privacy during data transmission.

vi. **Data Transmission:** The app sends encrypted data to the server using secure communication protocols such as HTTPS. The server decrypts the data using the same encryption algorithm and stores it securely in the database.

vii. **Sucessful Authentication:** If the user is authenticated, the server sends the user data to the client. The client then loads the App.

viii. **Failed Authentication:** If the user is not authenticated, the server sends an error message to the client, and the client displays an error message to the user. The user will be redirected to the login screen.

4.3 Architecture

The architecture of the "Call One" app follows a client-server architecture depicted in Figure 4.2. The client-side architecture is based on React Native, a popular framework for building cross-platform mobile applications. The server-side architecture comprises backend servers running on NginX, Express.js, and Node.js, along with a PostgreSQL database for data storage. The system design includes the following components and functionalities

4.3.1 Client Side

i. **React:** React Framework to create user interfaces. React Native uses react model to create user interfaces.

ii. **Metro:** Metro server is used to create a server that compile react native project to a JS Bundle to handle user interface.

iii. **JS Bundle:** Metro server generates the JS Bundle and Bridge can interact with Java Engine

iv. **Bridge**: Android apps are runs on java engine and bridge is used for communication between javascript bundle and java engine using JSON.

v. **Database:** SQLite and React Native Firebase is used to cache user data in the app for future usage.

vi. **Native Modules:** React cannot handle every functionalities. Native Modules are used to design a function in native code such as Java or Kotlin, Now javascript use bridge to call that function.

vii. **Native UI:** Native UI ares implemented that are interlined to various functionalities of native modules.

viii. **Encryption :** React Native Crypto-js is used to encrypt the information transmitted to the server. Advanced Encryption Standard (AES) is used for Encryption.

ix. **Decryption :** React Native Crypto-js is used to decrypt the information transmitted from the server. Advanced Encryption Standard (AES) is used for Decryption.

4.3.2 Server Side

i. **Backend Servers:** NginX is used to run backend server. Backend servers handle data processing, storage, and communication with external APIs and databases. They manage user requests, data synchronization, and law enforcement access.

ii. **Express.js:** Express.js is used to create a server that handles user requests and responses. It provides routing, middleware, and API endpoints for client-server communication.

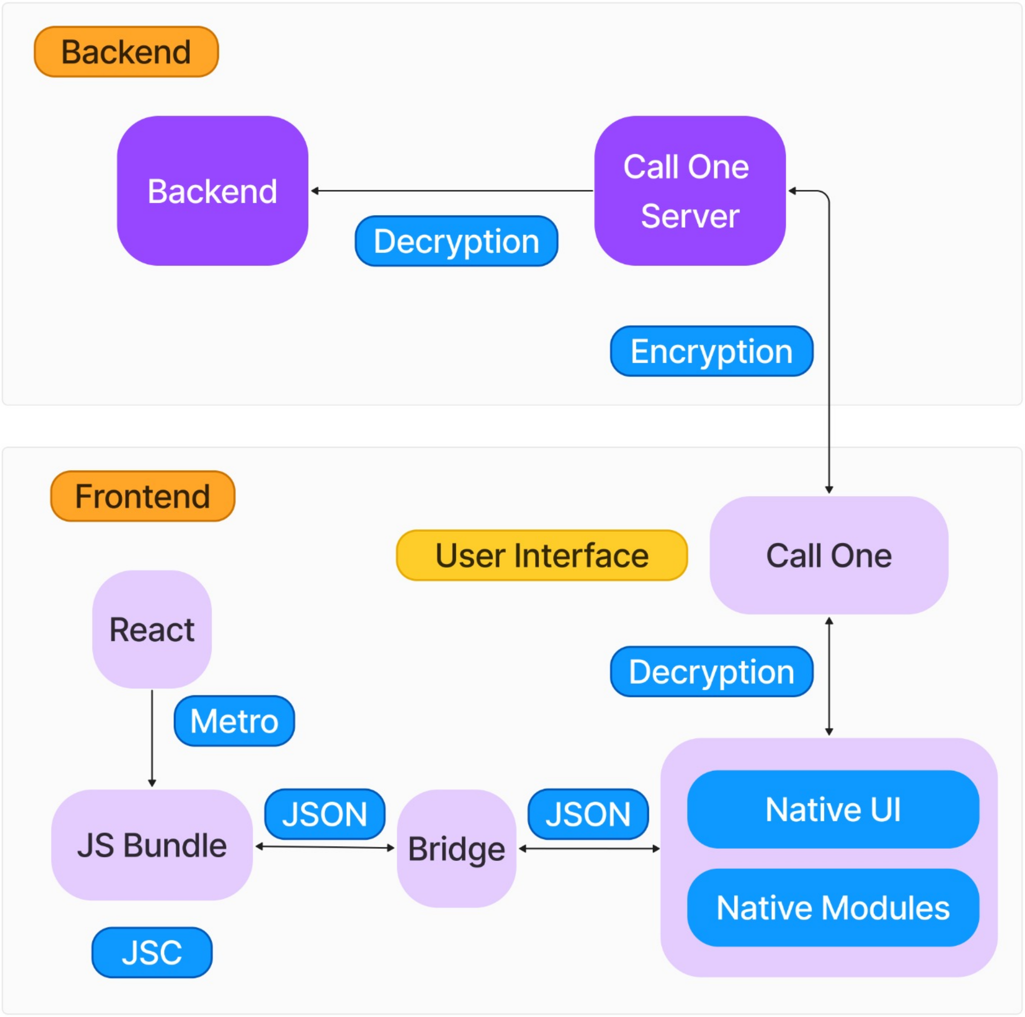


Figure 4.2: Android App Architecture

iii. **Node.js:** Node.js is used to run the server-side code. It provides a runtime environment for JavaScript code execution on the server.

iv. **Crypto-js:** Crypto-js is used to encrypt and decrypt sensitive data transmitted between the client and server. It ensures data security and privacy during data transmission.

v. **Backend Encryption:** Backend servers use encryption mechanisms to secure data at rest and in transit. This includes SSL/TLS encryption, data encryption algorithms, and secure key management practices.

vi. **Backend Decryption:** Backend servers use decryption mechanisms to process encrypted data received from clients. This includes decrypting user data for analysis, storage, and law enforcement access.

vii. **Database management:** PostgeSQL is used to store user data securely. It provides data integrity, scalability, and compliance with legal and privacy standards.

Chapter 5

Implementation

The implementation phase of the project has followed a systematic approach, incorporating all the steps and methods mentioned in the previous chapters. This phase has utilized the mentioned tools and technologies to achieve the project's objectives effectively and efficiently.

5.1 OSINT Data Mining Software

i. **Frontend:** The frond end is design using .NET framework. The .NET Framework is a proprietary software framework developed by Microsoft that runs primarily on Microsoft Windows. It was the predominant implementation of the Common Language Infrastructure until being superseded by the cross-platform .NET project.

ii. **Bacnkend:** Backend server is design in Express.js. various technologies are integrated in the express.js app.

   1. **Court Checker** : The Verify 24x7 Court checker is a third party tool that has large collection of court cases in India containing millions of records and updated on a daily basis. Given a name and address, our smart, proprietary algorithms retrieve matching cases in a few seconds.
   2. **OSINT Search**: OSINT search is a feature that allows users to gather publicly available information about individuals, including personal and public details, to aid in investigations. By utilizing OSINT (Open-Source Intelligence) techniques, this feature helps retrieve relevant information about the suspect, such as their personal background, social media activity, online presence, and other publicly accessible data. This comprehensive search capability assists law enforcement agencies and investigators in building a more complete profile of the culprit, aiding in the investigation process.

3. **Vehicle Information:** Vehicle Information is a feature that allows users to obtain details about a specific vehicle using its registration number. By inputting the vehicle number into the system, investigators can retrieve information such as the make, model, year of manufacture, color, and ownership details of the vehicle associated with that registration number. This feature is valuable in investigations as it helps identify and track vehicles linked to criminal activities, providing important leads for law enforcement agencies and helping them in their pursuit of the culprits.

5.2 Call One App

i. **Frontend:** The frond end is design using React Native. The UI design focuses on providing an intuitive and user-friendly experience for app users. It includes screens for data collection, settings, notifications, and law enforcement functionalities.

ii. **Bacnkend:** Backend server is design in Express.js. various technologies are integrated in the express.js app.

1. **Express.js** Express is a minimal and flexible Node.js web application framework that provides a robust set of features for web and mobile applications. APIs.
2. **PostgreSQL** : PostgreSQL is used to store user details such as user contacts, call logs, devices information. PostgreSQL is an object-relational database management system (ORDMBS), which means that it has relational capabilities and an object-oriented design
3. **Crypto-js**: Used AES Encryption method to encrypt user information that is transmitted over the server. Advanced Encryption Standard (AES) is an algorithm that uses the same key to encrypt and decrypt protected data.

Chapter 6

Testing and Experimental Results

Product development has been completed for the project, and as a result, all functionalities have been thoroughly tested. This chapter presents a comprehensive overview of the features tested, providing screenshots and photographs of hardware to illustrate the outcome of the built systems.

6.1 Testing Methodology

The testing phase involved various methodologies to ensure the functionality, performance, and reliability of Open-source Intelligence Data Mining System and "Call One" caller ID android app. The following testing methods were employed:

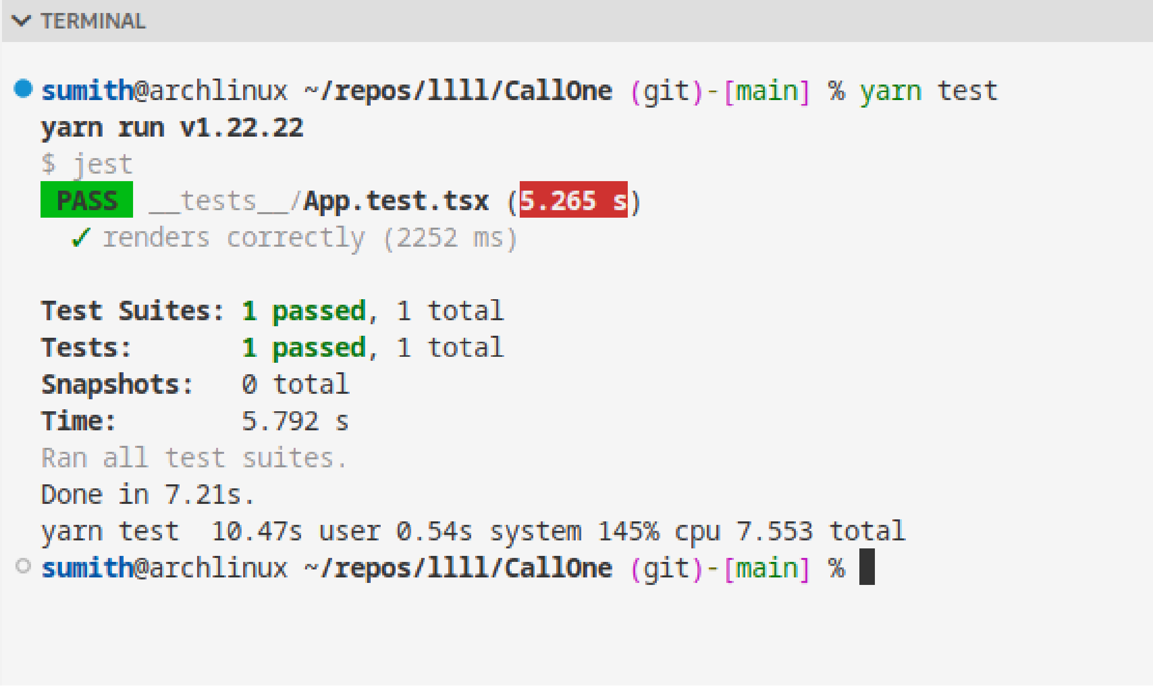
i. **Unit Testing:** Testing individual modules and components to verify their correctness and functionality. Jest an nodejs module is used to test the components of the the android app and call one app's backend. The example test results is depicted in figure 6.1 .

ii. **Testing and Debugging**: Used flipper to test the state of the application in different phase and checking shared preferences as shown in the figure 6.2 and 6.3.

iii. **Performance Testing:** Assessing the app's performance under various load conditions. Used FlatList to render contacts and call logs to implove the performance. As showing in the Figure 6.4 the performance score is 91 and on average it is rendering 57 frames per second.

6.2 Experimental Results

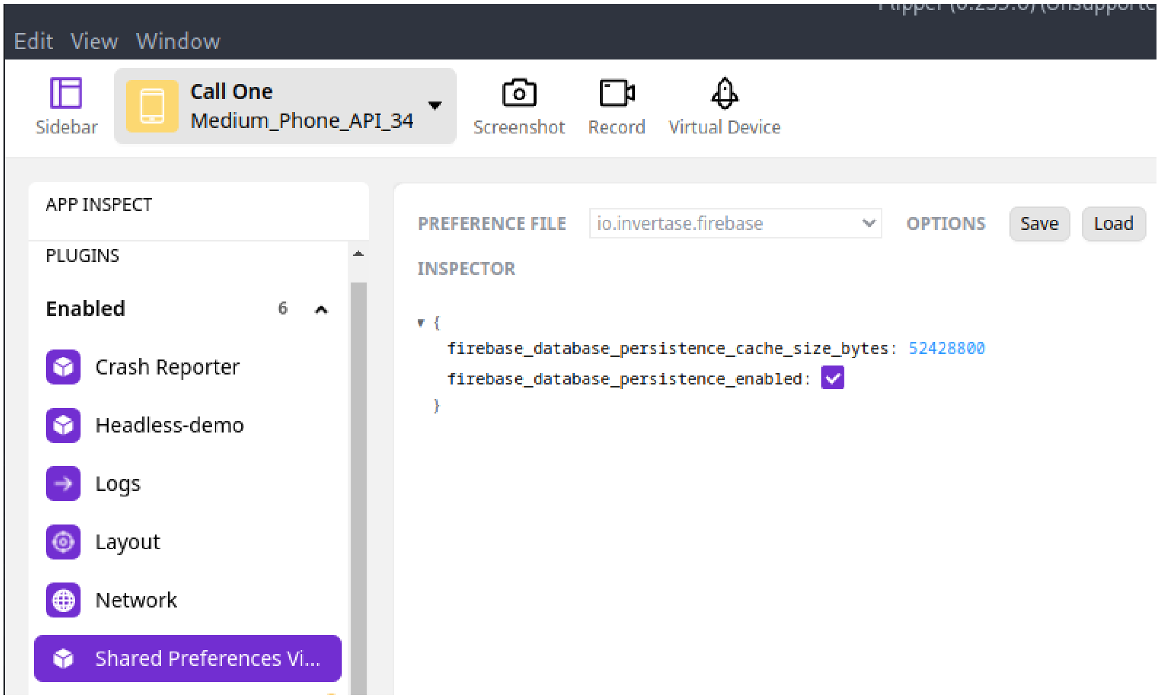
The experimental results of the testing phase demonstrated the following outcomes:



```
● sumith@archlinux ~/repos/1111/CallOne (git)-[main] % yarn test
  yarn run v1.22.22
  $ jest
  PASS  __tests__/App.test.tsx (5.265 s)
    ✓ renders correctly (2252 ms)

  Test Suites: 1 passed, 1 total
  Tests:       1 passed, 1 total
  Snapshots:   0 total
  Time:        5.792 s
  Ran all test suites.
  Done in 7.21s.
  yarn test  10.47s user 0.54s system 145% cpu 7.553 total
○ sumith@archlinux ~/repos/1111/CallOne (git)-[main] %
```

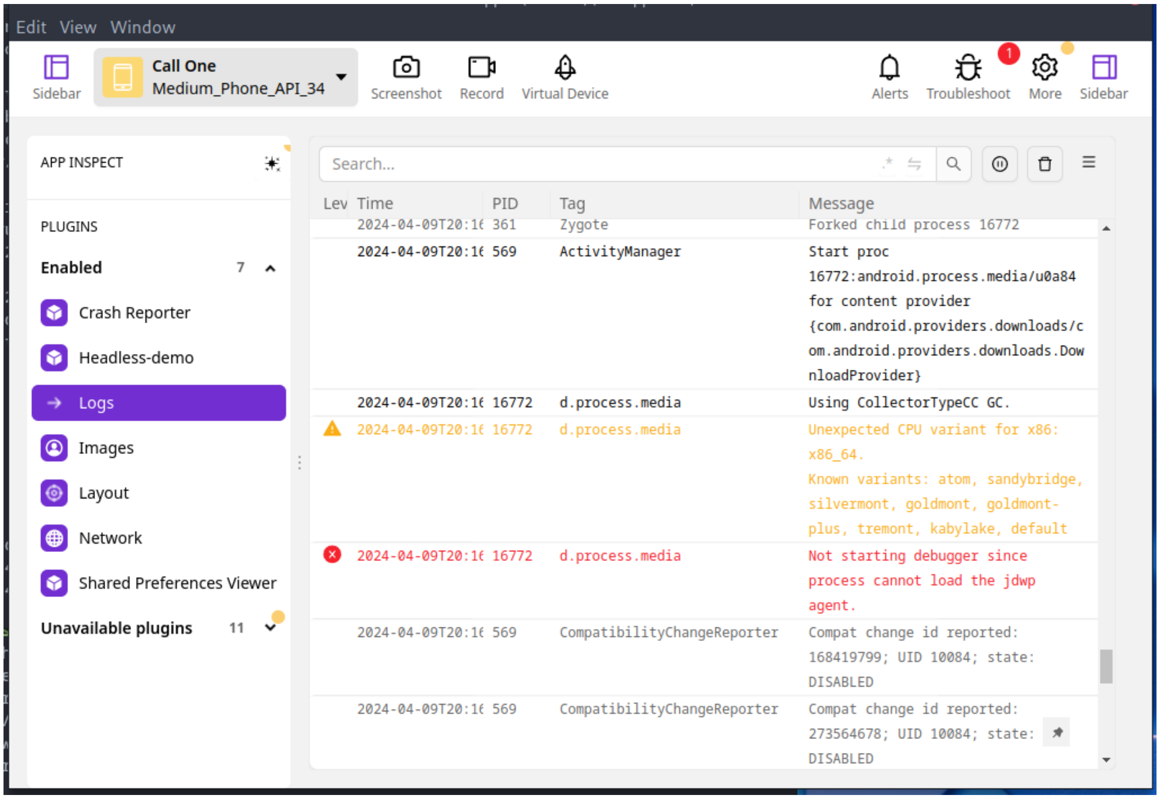
Figure 6.1: Jest Testing



PREFERENCE FILE: io.invertase.firebase

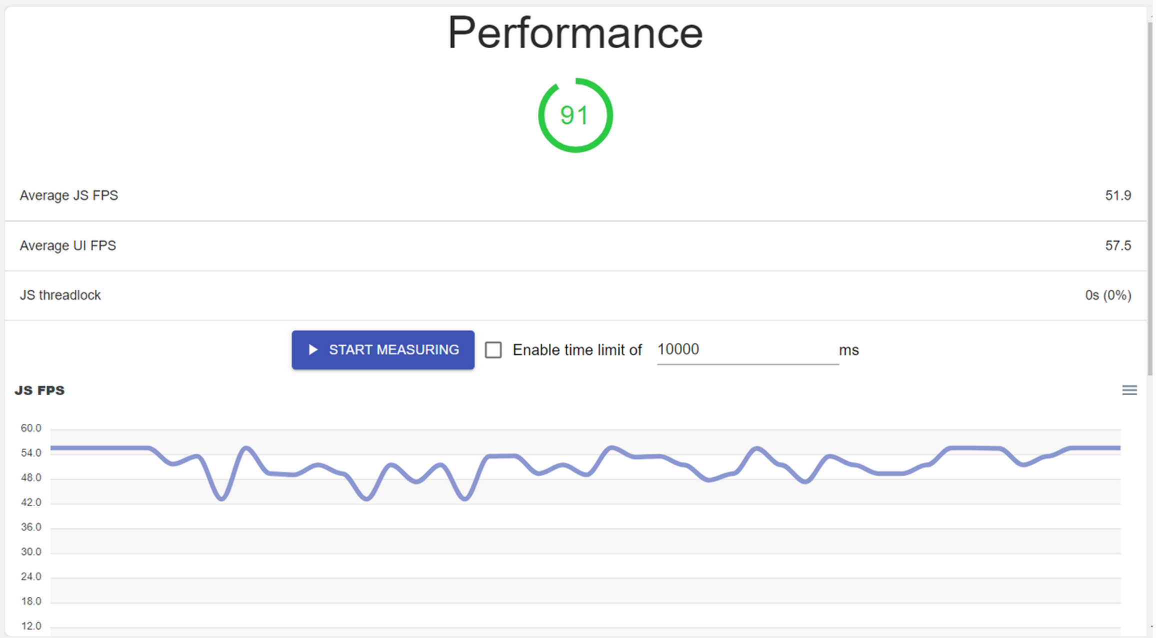
```
▾ {
    firebase_database_persistence_cache_size_bytes: 52428800
    firebase_database_persistence_enabled: ☑
  }
```

Figure 6.2: Testing and Debugging



```
Lev Time                 PID    Tag                          Message
    2024-04-09T20:1€    361    Zygote                       Forked child process 16772
    2024-04-09T20:1€    569    ActivityManager              Start proc
                                                            16772:android.process.media/u0a84
                                                            for content provider
                                                            {com.android.providers.downloads/c
                                                            om.android.providers.downloads.Dow
                                                            nloadProvider}
    2024-04-09T20:1€    16772  d.process.media              Using CollectorTypeCC GC.
⚠   2024-04-09T20:1€    16772  d.process.media              Unexpected CPU variant for x86:
                                                            x86_64.
                                                            Known variants: atom, sandybridge,
                                                            silvermont, goldmont, goldmont-
                                                            plus, tremont, kabylake, default
✖   2024-04-09T20:1€    16772  d.process.media              Not starting debugger since
                                                            process cannot load the jdwp
                                                            agent.
    2024-04-09T20:1€    569    CompatibilityChangeReporter  Compat change id reported:
                                                            168419799; UID 10084; state:
                                                            DISABLED
    2024-04-09T20:1€    569    CompatibilityChangeReporter  Compat change id reported:
                                                            273564678; UID 10084; state:
                                                            DISABLED
```

Figure 6.3: Flipper Debugging



Average JS FPS	51.9
Average UI FPS	57.5
JS threadlock	0s (0%)

□ Enable time limit of 10000 ms

Figure 6.4: Performance Testing

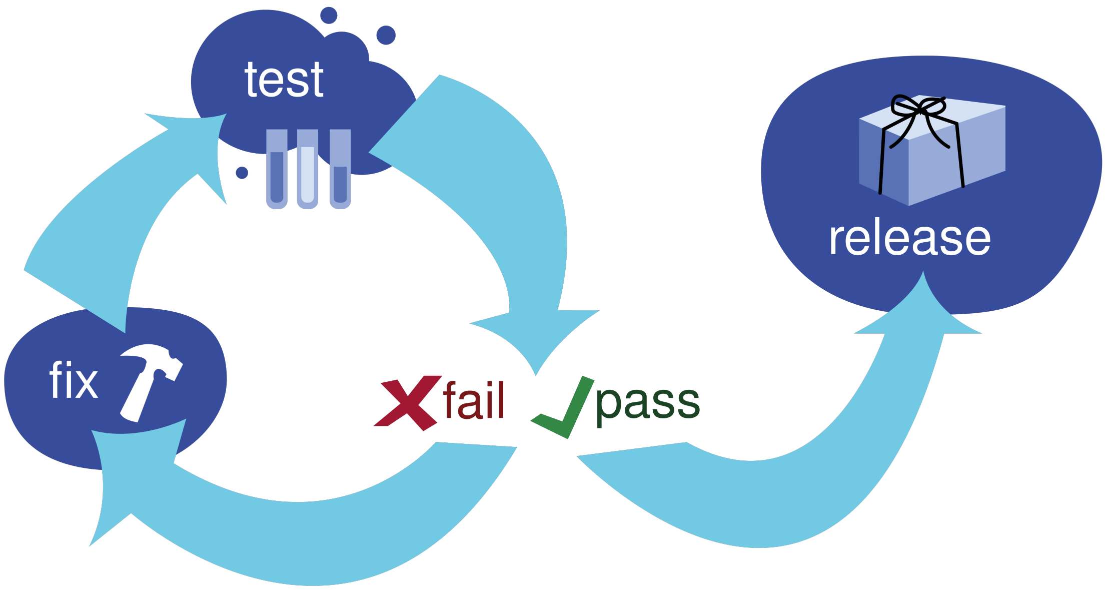


Figure 6.5: Testing

i. **Functionalities Verified:** All functionalities of the "Call One" app were verified and found to be working as expected.

ii. **Performance Optimization:** Performance testing revealed that the app performs optimally under various load conditions, ensuring smooth user experience.

After conducting the tests, all the test cases had been passed, the bugs had been fixed, and it's ready to be released. The flow of testing and fixing the bugs is depicted in the figure 6.5.

6.3 Screenshots and Photographs

Visual representations of the tested features, user interface, and hardware setup are provided below for reference and illustration.

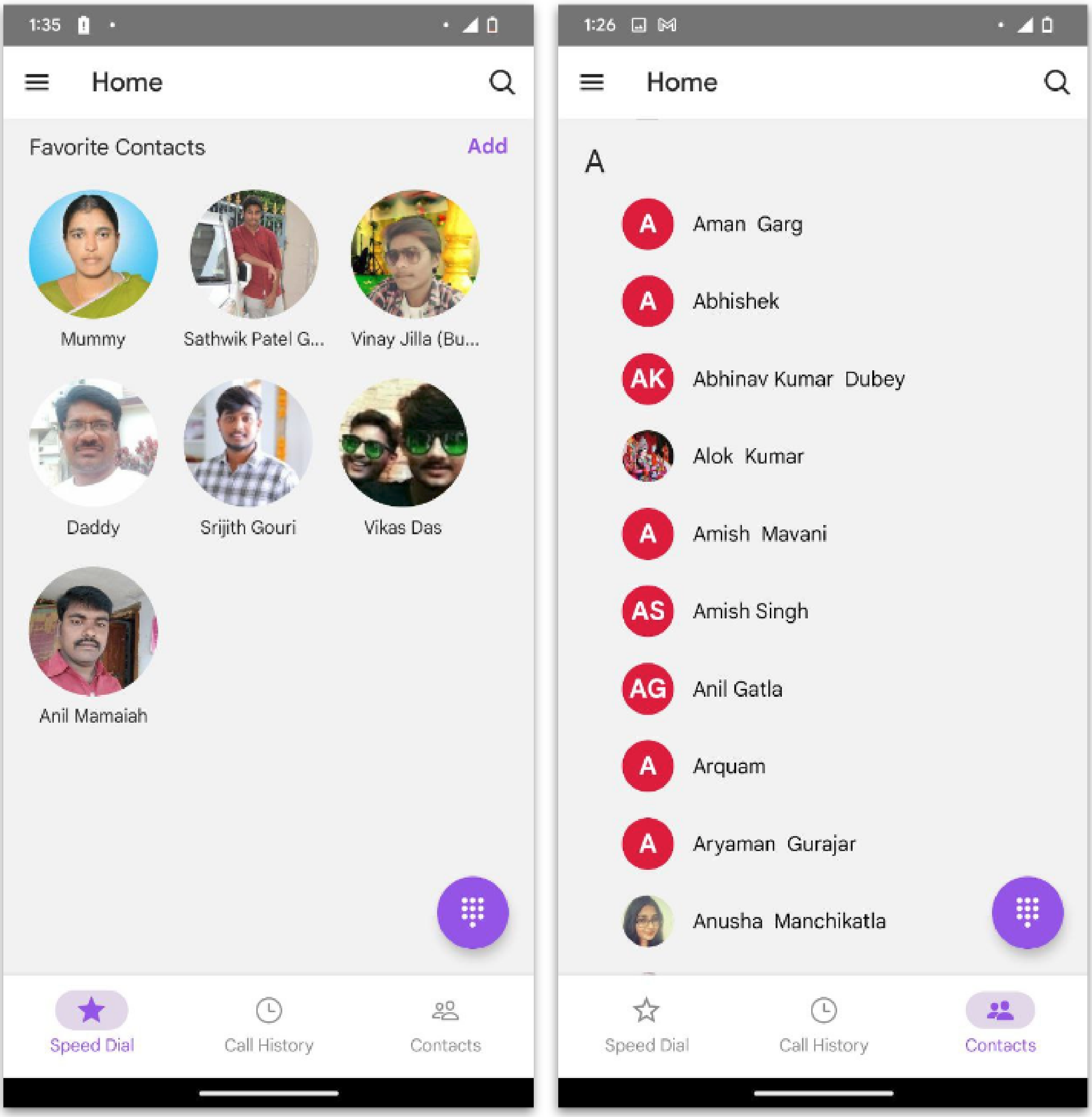
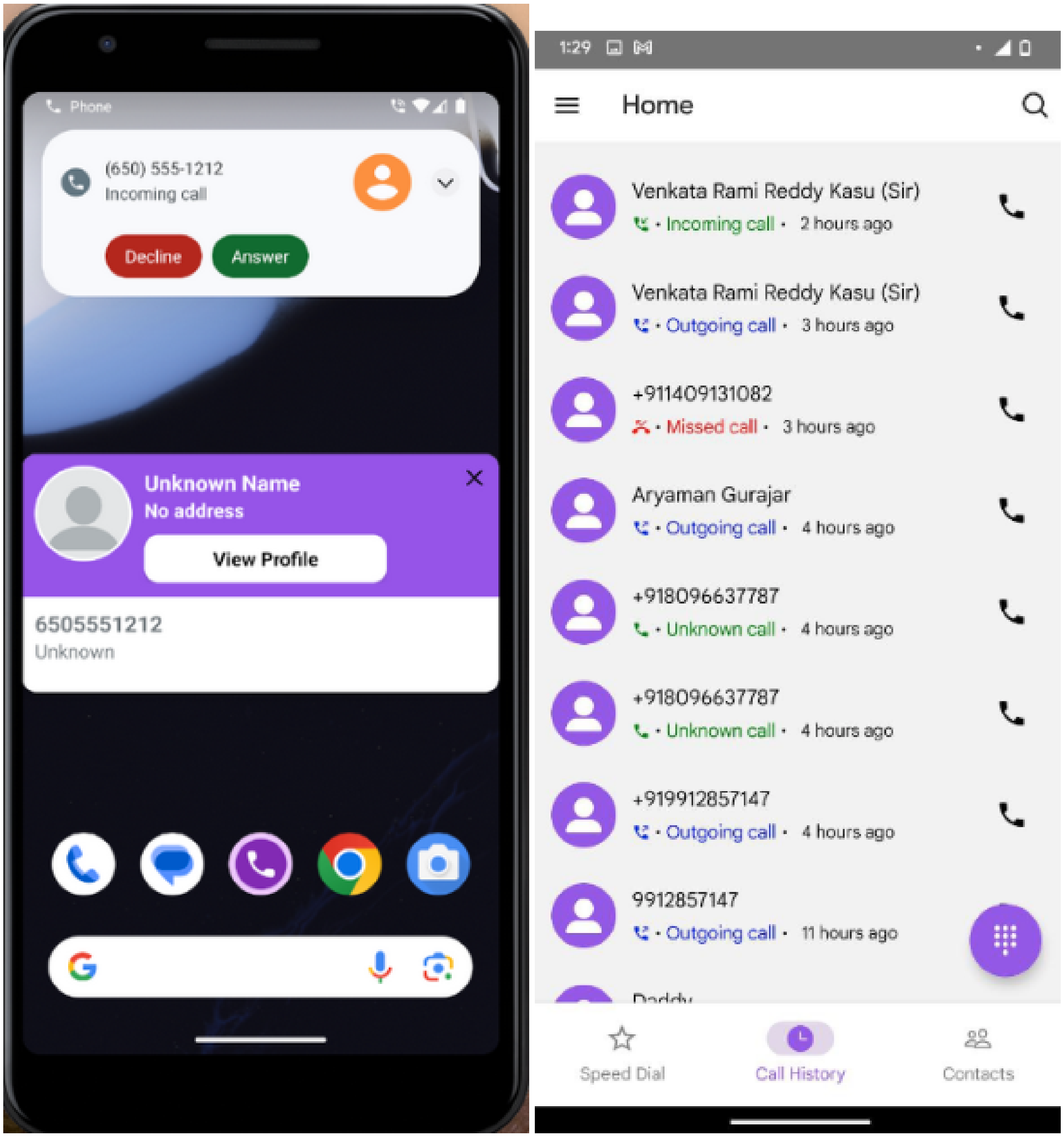


Figure 6.6: Demo



(650) 555-1212
Incoming call

Unknown Name
No address

6505551212
Unknown

Venkata Rami Reddy Kasu (Sir)
· Incoming call · 2 hours ago

Venkata Rami Reddy Kasu (Sir)
· Outgoing call · 3 hours ago

+911409131082
· Missed call · 3 hours ago

Aryaman Gurajar
· Outgoing call · 4 hours ago

+918096637787
· Unknown call · 4 hours ago

+918096637787
· Unknown call · 4 hours ago

+919912857147
· Outgoing call · 4 hours ago

9912857147
· Outgoing call · 11 hours ago

Daddy

Figure 6.7: Demo 2

Chapter 7

Conclusion and Future Scope

The development and implementation of the Open-source Intelligence Data Mining System have been successfully completed, the software is still under development to add more features. Throughout the project, various phases such as design, implementation, testing, and experimental results have been executed. The system design ensured scalability, security, and performance, while the implementation phase incorporated essential features such as data collection modules, database setup, security measures.

The current version of this application has successfully met its primary objectives; however, there are several areas that offer opportunities for future development and enhancement. Some of the key areas for potential future work include:

i. **Caller ID App:** Adding more setting options in Call One android app. Integrating advanced caller identification features to provide users with more information about incoming calls. This could include displaying caller name, identifying spam or fraudulent calls.

ii. **Collecting Device Information :** Collecting device information such Device ID, List of Apps the user installed and phone numbers the user is using.

iii. **Watch Position on android app:** Integrate watch position to capture the user's location while GPS is turned on.

iv. **Collecting other information:** Collecting information from various website and apps.

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