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: *Mr. 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)
(UI20CS21)

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

The aim of the **Open-source Intelligence Data Mining Application** is 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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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: ________

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CERTIFICATE OF INTERNSHIP

This is to certify that **Emmadi Sumith Kumar** has successfully completed his internship at **CTRACE SOFT SOLUTIONS PRIVATE LIMITED** as a **Full Stack Developer**, from **January 8, 2024**, to **June 28, 2024**. During this period, he contributed to **Open Source Intelligence Software**. His outstanding performance and dedication were evident throughout his internship.

We thank **Emmadi Sumith Kumar** for his hard work and valuable contribution. We wish him continued success in all his future endeavors.

CTRACE SOFT SOLUTIONS PRIVATE LIMITED ★
HYDERABAD

K.V. Rami Reddy

Kasu Venkata Rami Reddy
Senior Developer

P. Damodhar.

Polishetty Dhamodar
Human Resource Manager

Chapter 1

Introduction

The Open-source Intelligence Data Mining System (OSINT), as is depicted in Figure 1.1, is a newly developed sophisticated tool for a law enforcement agency, like the police department, to track theft and trafficking with the help of a precise analysis of call data records (CDRs) and tower dump data.Alongside the police, the one thing that this program needs is to gain huge data sets of the phone stuff and these huge sets that are cumulated are then finally processed and the results retrieved.

This is an application of the method to provide law enforcement agencies with a fast and quick way to analyze call data records (CDRs) and tower dump data. C-Trace OSINT software is a value-add for investigators as they receive a good number of options for decision making, which in turn is a major progression in their case investigation.

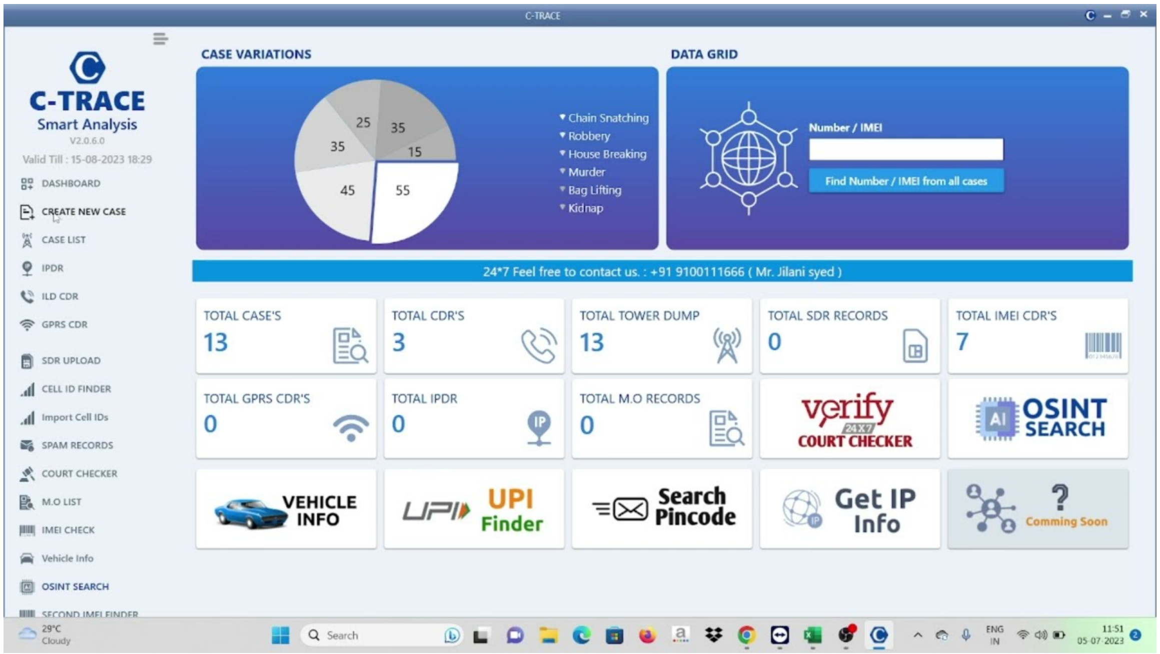
1.1 What is OSINT Data Mining System ?

The application developed is particularly made solely for police as a way to deal with crime by analyzing the call data record (CDR) information and tower dump data only.This tool provides a complex report on people using their phone number, IMEI number, PAN number, and such.It gains tower data, which can show all phone users that are living in a particular tower, by using azimuth ID. The report includes various pieces of information like a person's vehicle particulars, location data, IMEI numbers, phone numbers, PAN numbers, MNP, IP information, etc.And, the software also introduces a PDF that supplies all the necessary data about a person.

1.2 Features of OSINT Software

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

i. **Vehicle information** : RC MH02ZX1234



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

Figure 1.1: C-Trace OSINT Software

ii. **IP Lookup** : IP 192.168.01.01

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

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

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

vi. **IFSC Search** : (e.g., IFSC SBIN0062517 or IFSC SBI ATTAPUR)
Find bank details with IFSC code.

vii. **UPI Search** : UPI 8465802838
UPI Ids that are linked with a particular mobile number.

viii. **Court Case Search** : CC Name
Search court cases using the victim name.

ix. **OSINT Search** : OSINT 9848012345
Open source Intelligence infomation of UPI IDs, photos, social media accounts, and more.

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

xi. **Cell ID Search** : BTS 4044349032727
Tower infomation of a cell ID and active phone numbers under the tower.

xii. **MNP Lookup** : Network 9848012345
Get operator information of a mobile number

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.

1.3.1 Verify 24x7 Court checker

Verify 24x7 Court checker - is a third party tool, which keeps a large database of millions of court cases in India along millions of records that are refreshes during the day.

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, debugging, and testing of the application.

i. **Visual Studio Code**: A popular code editor developed by Microsoft, used to write and run code.[3] It is used to design the OSINT software, frontend, and backend of the application.

ii. **Flipper**: A desktop application developed by Facebook, used for debugging and checking the performance of the Android application. [10]

iii. **React Native Debugger**: Used for debugging component rendering on different screens, including their structure, alignment, and styling [6].

iv. **HTTPie**: A command-line HTTP client used for testing the APIs of the CallOne application [25].

v. **Android Studio**: An IDE used to design the Android application in Kotlin.

vi. **Android Emulator**: A tool used to simulate Android devices on a computer to test the application on various devices and Android API levels [32].

vii. **Git**: A version control system used for managing code among teams [30].

viii. **Chromium Browser**: Used to scrape various OSINT information of people from the internet.

ix. **DBeaver**: A database management tool used to connect, view, and edit the database of CallOne and OSINT software.

x. **Nginx**: A web server used to run the backend server in production.

xi. **Puppeteer**: A Node library used to scrape data from webpages without detecting automation.

2.2 Technologies

The following technologies are used for the development of the application.

i. **Kotlin**: A programming language used to build the Android application with Jetpack Compose [7].

ii. **Jetpack Compose**: A modern UI toolkit based on Material Design, used to create a responsive and visually appealing UI for the Android application [7].

iii. **TypeScript**: A superset of JavaScript that adds static types, used to catch errors early in the code editor [23].

iv. **Express.js**: A web framework for Node.js, used to create the backend application [18].

v. **Crypto-js**: An npm library used for encryption and decryption [35].

vi. **PostgreSQL**: A relational database management system used to store user data [9].

vii. **JSON Web Tokens (JWT)**: Used to authenticate users with the backend server, with each user receiving a unique token [11].

viii. **PDFKit**: A library for generating PDF documents in Node.js and the browser [29].

ix. **Baileys (WhatsApp Client)**: A WhatsApp client used to communicate with WhatsApp web sockets [27].

Chapter 3

Proposed System

This chapter provides a detailed overview of the **Open-source Intelligence Data Mining System**. The project main aim is to collect Open Source and Internet Exposed 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 provide default call app feature, spam call detection, 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 validating JSON Web tokens. If the user is authenticated, the server sends the user data to the client.

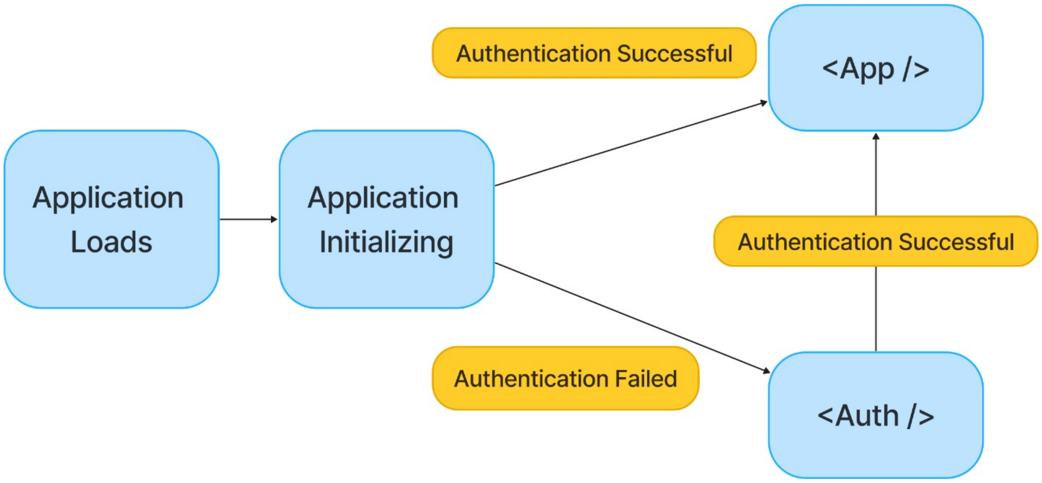


Figure 4.1: App Flow

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. **Successful 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 functionality. 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.

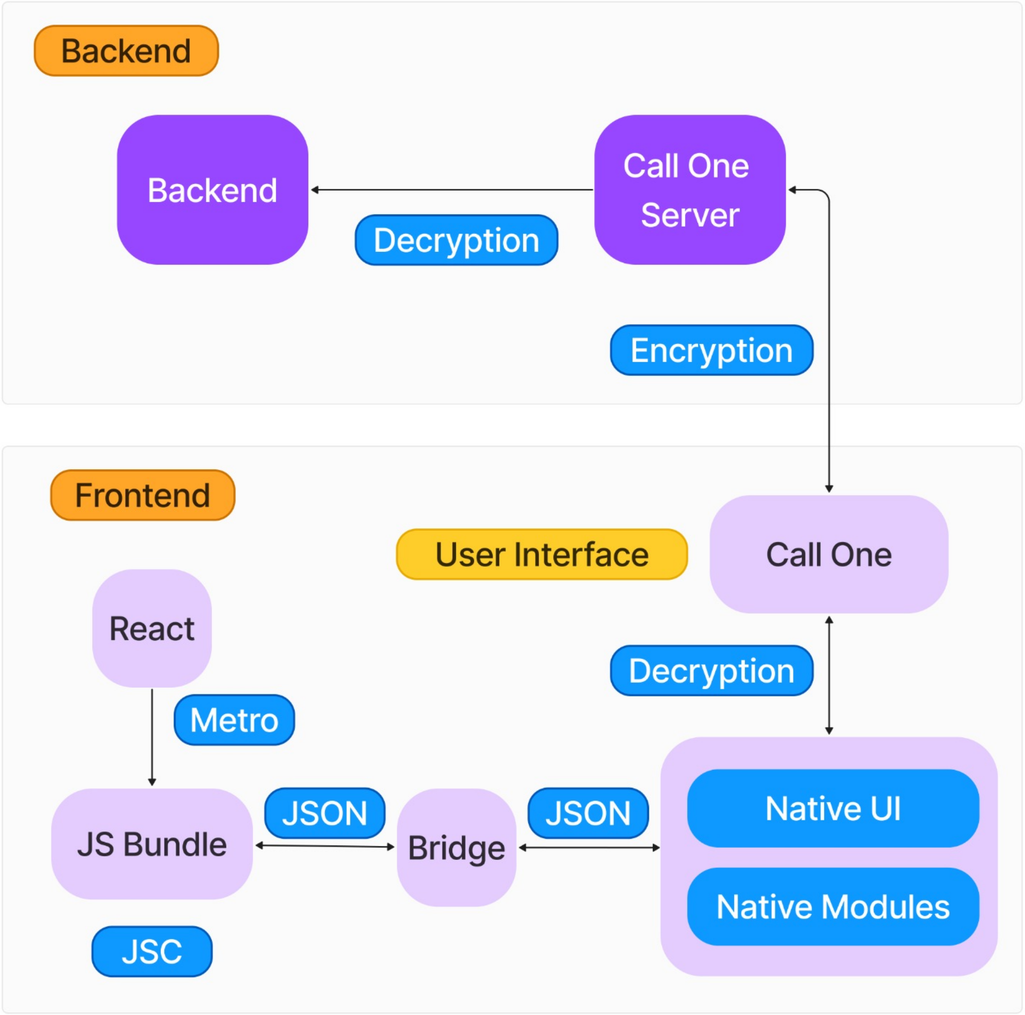


Figure 4.2: Android App Architecture

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.

4.3.3 What are the problems with this architecture ?

In this architecture, React Native is used as the primary framework. React Native, being based on JavaScript, relies on a JavaScript engine to execute code. This introduces performance bottlenecks, especially for applications handling large datasets.

i. **Performance Issues**:

- **JavaScript Engine**: The reliance on the JavaScript engine makes the app's performance suboptimal. The execution of JavaScript code can be slow, leading to noticeable delays in rendering and processing.
- **Large Call History**: Displaying a large call history significantly impacts performance. The app becomes unresponsive and may freeze when attempting to load or scroll through extensive call logs.
- **Contacts Handling**: Similar to call history, managing and scrolling through a large number of contacts can cause the app to stutter and become sluggish.

ii. **Overlay Service**:

- **Rendering Delays**: The overlay service, which is crucial for displaying call information and other notifications, suffers from slow rendering times. This delay can affect the user experience, making the app feel unresponsive and laggy.

4.3.4 Suggested Solutions

To address the performance issues in this architecture, consider the following solutions:

- **Adopt Kotlin as Primary Language**: Transitioning to Kotlin can significantly enhance performance. Kotlin, being a statically-typed language, compiles directly to native code, reducing reliance on the JavaScript engine and improving overall app responsiveness.
- **Implement RecyclerViews for Call Logs**: Utilize RecyclerViews for rendering call logs. RecyclerViews efficiently handle large datasets by recycling views, optimizing memory usage, and providing smooth scrolling experiences.
- **Implement App State Caching**: Implement caching of app state to reduce the need for frequent data retrieval from device. Caching can enhance performance by storing frequently accessed data locally, reducing load times and improving responsiveness.

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:**

   - .NET Framework: Proprietary framework by Microsoft, primarily for Windows.
   - WhatsApp Chatbot: Integrated for user interaction.

ii. **Backend:**

   - Express.js: Integrated with various technologies.
     1. **Court Checker:** Third-party tool with a large collection of Indian court cases, updated daily.
     2. **OSINT Search:** Gathers publicly available information to aid investigations.
     3. **Vehicle Information:** Retrieves details of vehicles using registration numbers.

iii. **Database:**

   - Data collected from external APIs.
     1. **Court Checker:** Third-party tool with a large collection of Indian court cases, updated daily.

    2. **OSINT Search:** Gathers publicly available information to aid investigations.
    3. **Vehicle Information:** Retrieves details of vehicles using registration numbers.

- Data collected from scraping users' data from the internet.
    1. **Facebook:** Scraping Facebook profile names, photos, emails, and cities with Puppeteer using a username.
    2. **WhatsApp:** Collecting WhatsApp user images, names, about, and online status.
    3. **Leak OSINT:** Scraping users' leaked data from the internet.
- Data collected from Call One App.
    1. **Contacts:** The app collects users' contacts when the user first registers to the app and when a new contact is created.
    2. **Call Logs:** The app collects users' call logs every day and resolves the names of unknown calls.
    3. **Location Information:** User location is captured by the app as per the security requirements. The shared location is used for law enforcement purposes to track users' locations by the police department.

5.1.1 Call One Old Architecture

The old architecture was built on React Native, but the app was very slow due to the bridge in React Native.

i. **Frontend:**

- React Native: Intuitive UI for data collection and settings.

ii. **Backend:**

- Express.js: Integrated with various technologies.
    1. **Express.js:** Minimal and flexible Node.js web application framework.
    2. **PostgreSQL:** Stores user details like contacts, call logs, and device information.
    3. **Crypto-js:** Uses AES Encryption to encrypt user information transmitted over the server.

5.1.2 Call One New Architecture

In the new architecture, Kotlin was used along with additional services and optimizations.

i. **Frontend:**

   - Kotlin: Used to develop the app with Jetpack Compose for UI.

ii. **Backend:**

   - Same as old architecture.

5.1.3 New Features in Call One

The new architecture introduced several new features:

- **App Speed:** App speed is increased by using kotlin.
- **New UI:** A new Material UI is used to android app with Jetpack Compose.
- **Default Dialer:** Added a option to set the app as a default dialer.
- **App Color Customization:** Users can customize the app's color scheme.
- **Language Setup:** Support for multiple languages.
- **Call Blocking:** Ability to block unwanted calls.
- **Date and Time Format:** Options to change the date and time format.
- **Phone Number Formatting:** Enhanced phone number formatting options.
- **Managing tabs:** Add a setting to customize tabs to be shown on screen.

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 build 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 a Node.js module is used to test the components of the android app and call one app's backend.

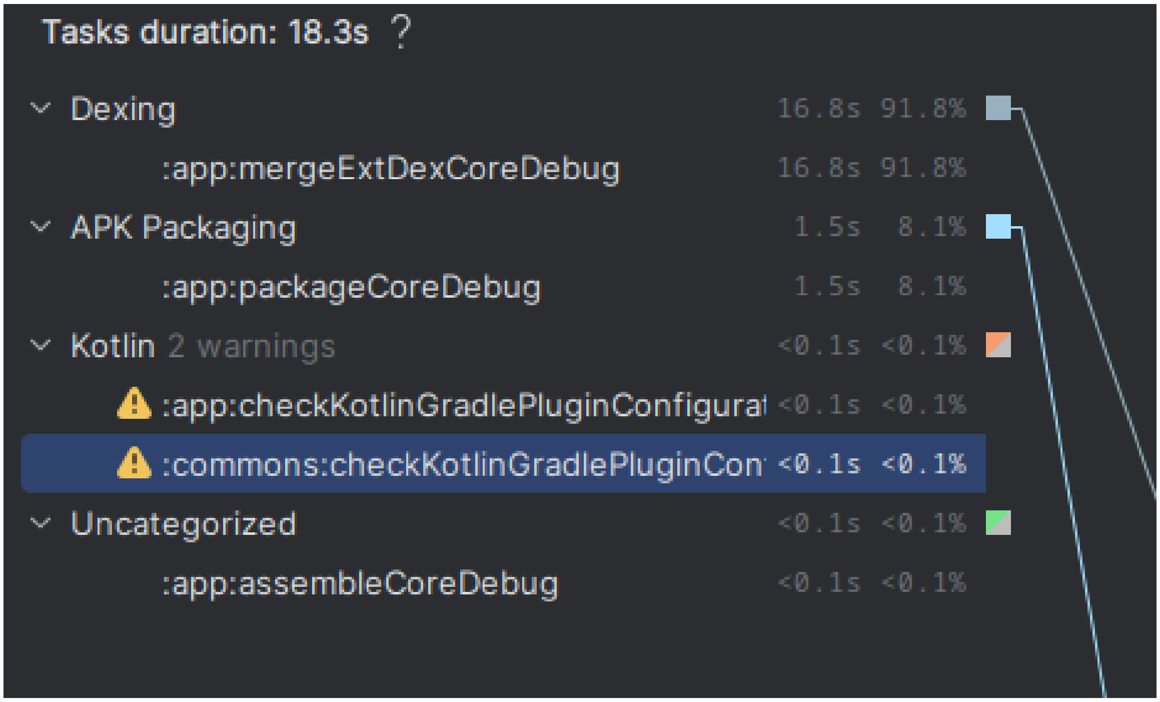
ii. **Testing and Debugging**: Used flipper to test the state of the application in different phase and checking shared preferences.

iii. **Performance Testing:** Assessing the app's performance under various load conditions. Used FlatList to render contacts and call logs to improve the performance. As showing in the Figure 6.2 the performance score is 91 and on average it is rendering 57 frames per second.

6.2 App Building

The process of preparing an application for device deployment includes development, compiling, dexing, APK packing, and Kotlin:

- **Development:** Coding and designing user interface features.



```
Tasks duration: 18.3s ?
⌄ Dexing                                        16.8s 91.8%
      :app:mergeExtDexCoreDebug                 16.8s 91.8%
⌄ APK Packaging                                  1.5s  8.1%
      :app:packageCoreDebug                      1.5s  8.1%
⌄ Kotlin 2 warnings                             <0.1s <0.1%
   ⚠ :app:checkKotlinGradlePluginConfigurat     <0.1s <0.1%
   ⚠ :commons:checkKotlinGradlePluginCon        <0.1s <0.1%
⌄ Uncategorized                                 <0.1s <0.1%
      :app:assembleCoreDebug                    <0.1s <0.1%
```

Figure 6.1: App

- **Compiling:** Source code conversion into executable bytecode.
- **Dexing:** Android-specific .class to .dex file conversion.
- **APK Packing:** Final app assembly into a downloadable file.

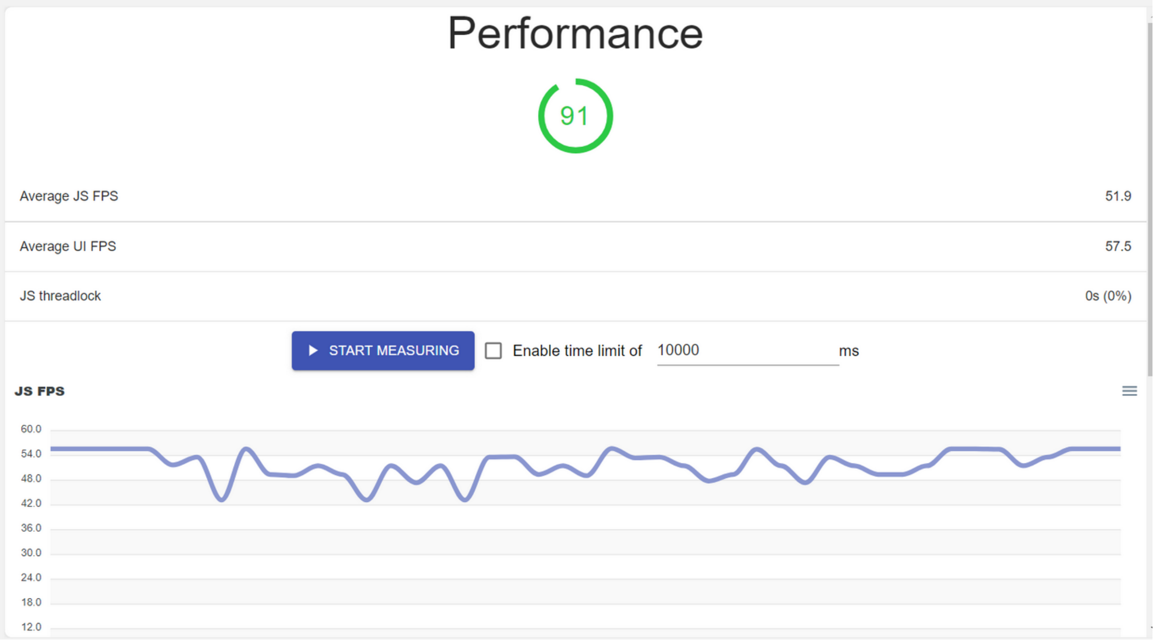
6.3 Experimental Results

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

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.



Performance

91

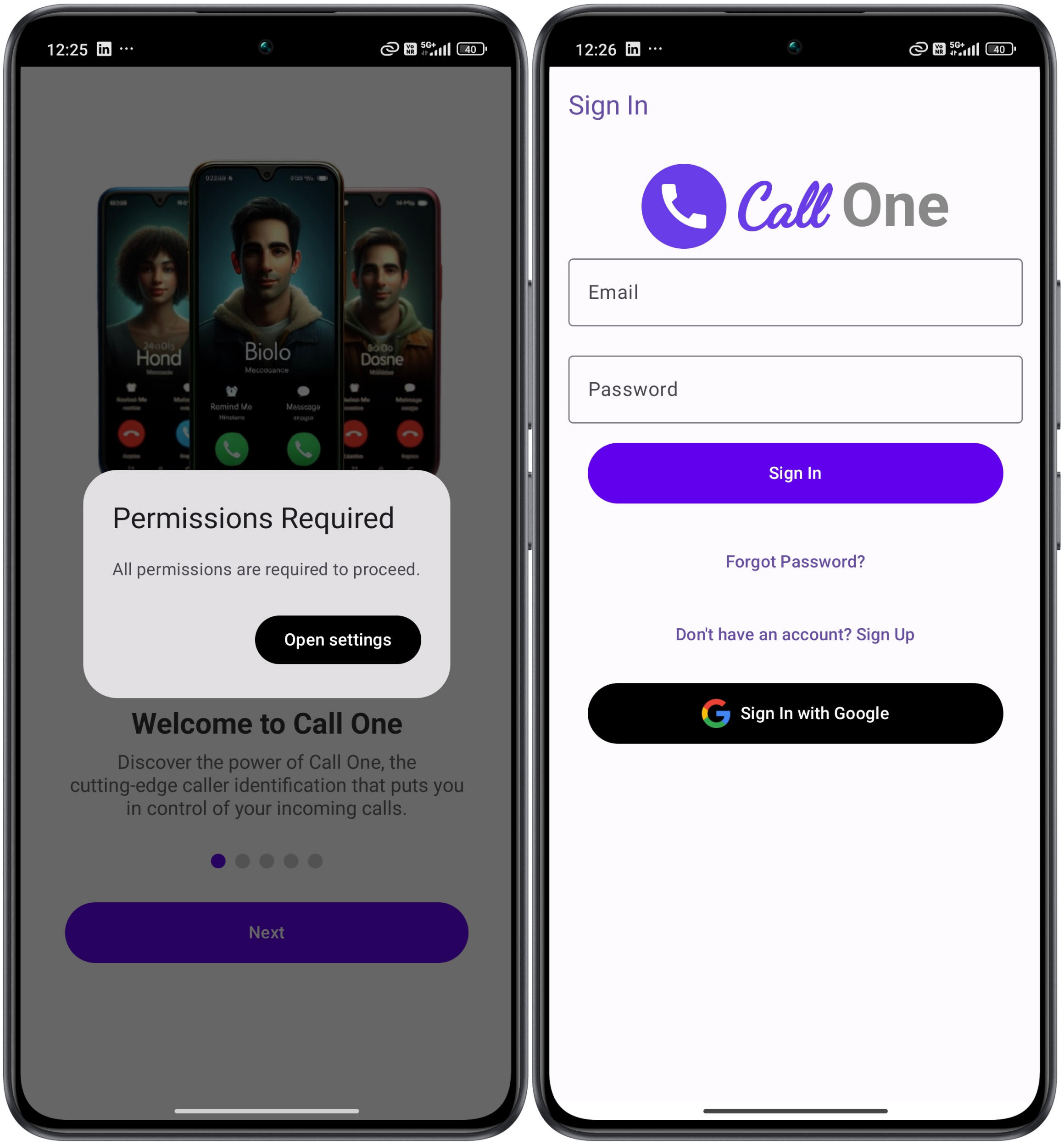
Average JS FPS	51.9
Average UI FPS	57.5
JS threadlock	0s (0%)

□ Enable time limit of 10000 ms

Figure 6.2: Performance Testing

6.4 Screenshots and Photographs

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



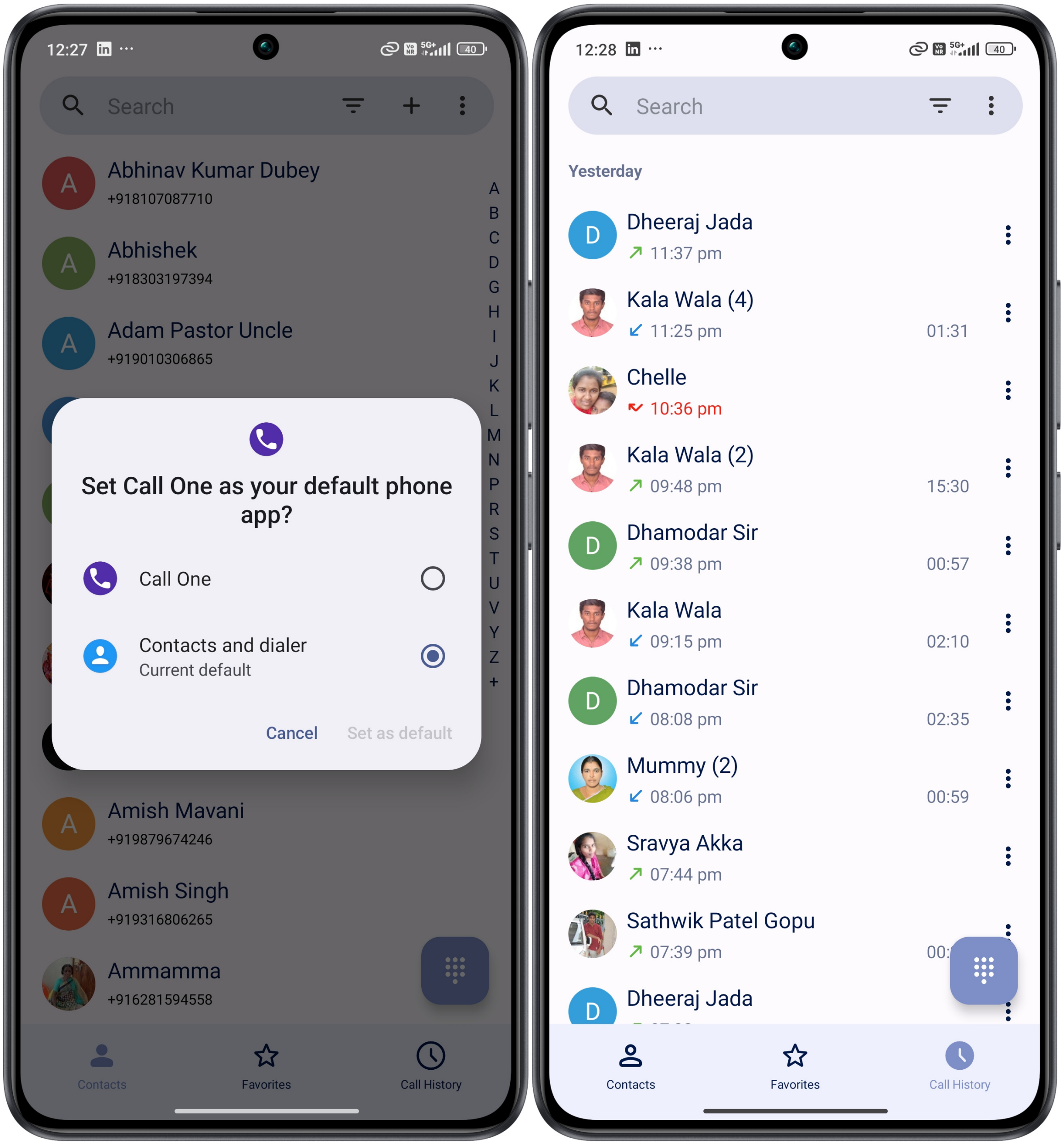
Permissions Required

All permissions are required to proceed.

Welcome to Call One

Discover the power of Call One, the cutting-edge caller identification that puts you in control of your incoming calls.

Figure 6.3: Call One App SignIn Screen



Abhinav Kumar Dubey
+918107087710

Abhishek
+918303197394

Adam Pastor Uncle
+919010306865

Set Call One as your default phone app?

Call One ○

Contacts and dialer
Current default ●

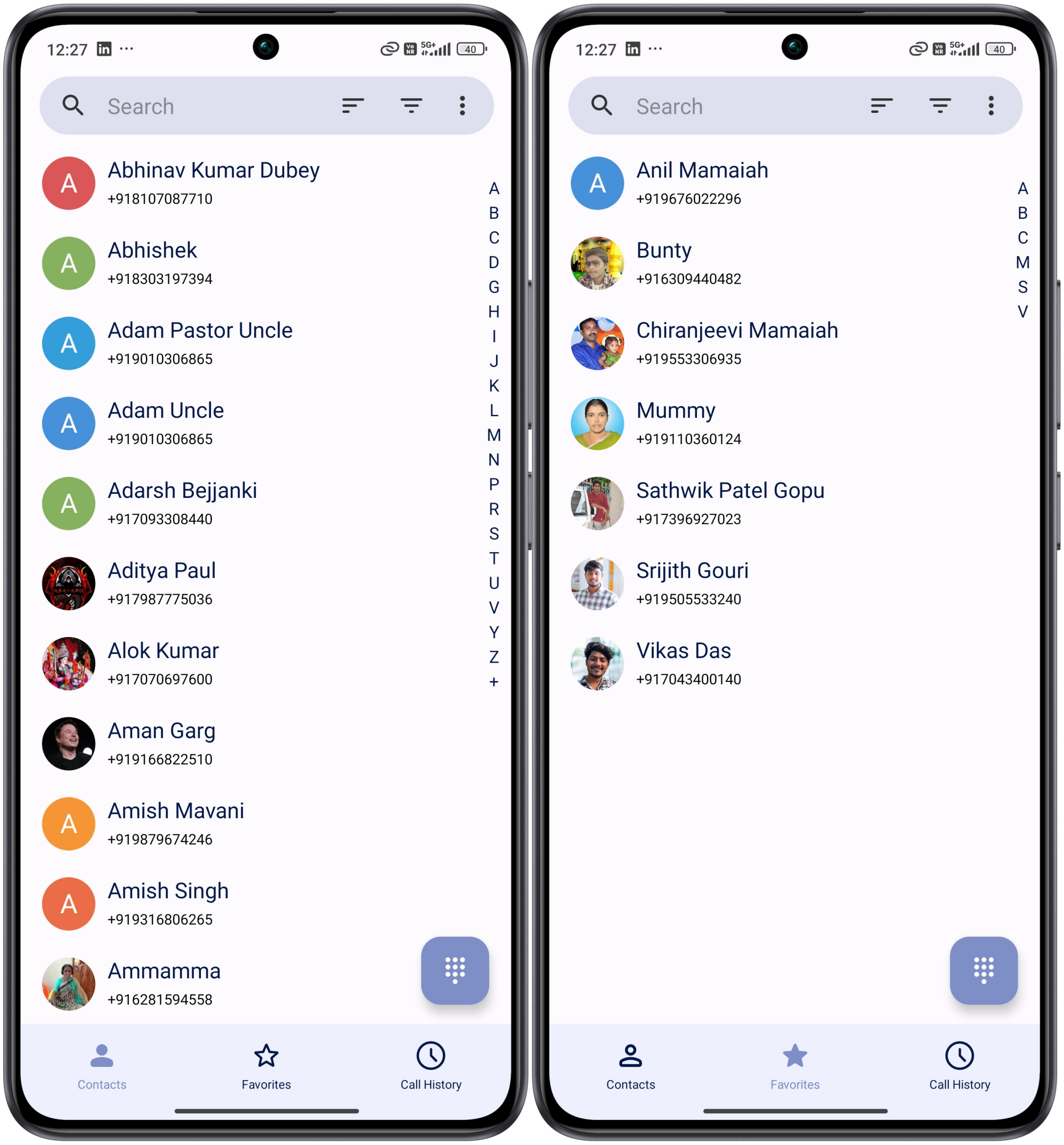
Amish Mavani
+919879674246

Amish Singh
+919316806265

Ammamma
+916281594558

Dheeraj Jada	↗ 11:37 pm	
Kala Wala (4)	↙ 11:25 pm	01:31
Chelle	10:36 pm	
Kala Wala (2)	↗ 09:48 pm	15:30
Dhamodar Sir	↗ 09:38 pm	00:57
Kala Wala	↙ 09:15 pm	02:10
Dhamodar Sir	↙ 08:08 pm	02:35
Mummy (2)	↙ 08:06 pm	00:59
Sravya Akka	↗ 07:44 pm	
Sathwik Patel Gopu	↗ 07:39 pm	00:
Dheeraj Jada		

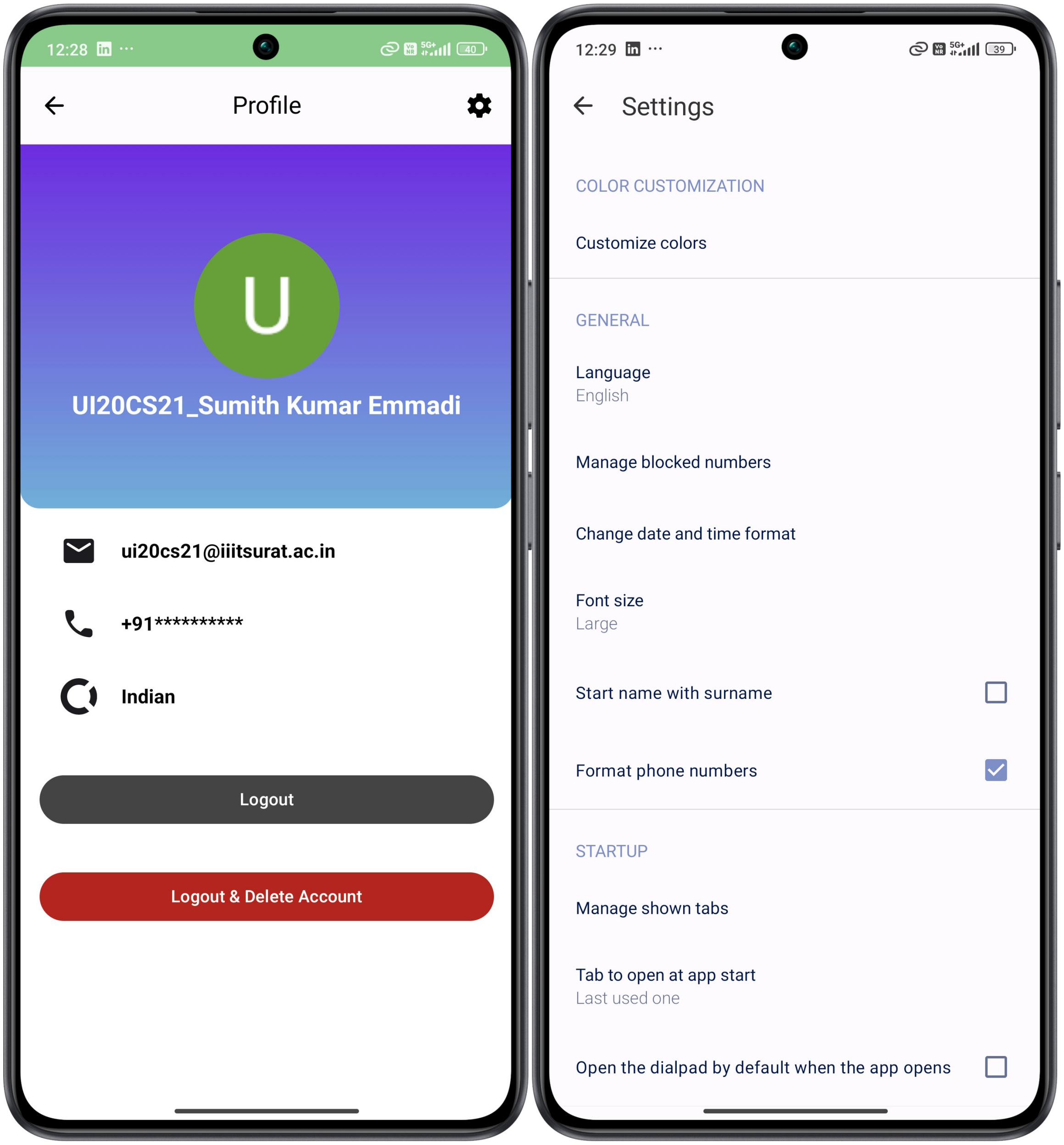
Figure 6.4: Default Dialer Setup and Call Logs Tab



Abhinav Kumar Dubey	+918107087710
Abhishek	+918303197394
Adam Pastor Uncle	+919010306865
Adam Uncle	+919010306865
Adarsh Bejjanki	+917093308440
Aditya Paul	+917987775036
Alok Kumar	+917070697600
Aman Garg	+919166822510
Amish Mavani	+919879674246
Amish Singh	+919316806265
Ammamma	+916281594558

Anil Mamaiah	+919676022296
Bunty	+916309440482
Chiranjeevi Mamaiah	+919553306935
Mummy	+919110360124
Sathwik Patel Gopu	+917396927023
Srijith Gouri	+919505533240
Vikas Das	+917043400140

Figure 6.5: Contacts and Call logs Tabs



UI20CS21_Sumith Kumar Emmadi

ui20cs21@iiitsurat.ac.in

+91**********

Indian

Language
English

Font size
Large

Start name with surname □

Format phone numbers ☑

Tab to open at app start
Last used one

Open the dialpad by default when the app opens □

Figure 6.6: Profile and Settings

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. **Redesign Caller ID Overlay Screen:** The current Caller ID overlay screen will be redesigned to improve user experience. This includes updating the visual design, optimizing the layout for better readability, and ensuring that it provides all necessary information about incoming calls.

ii. **Fixing Bugs with Opening About Screen in Production:** There are currently issues with the About screen not opening correctly in the production environment. This task involves identifying and resolving these bugs to ensure that users can consistently access the About screen.

iii. **Adding Contact Profile Screens:** New contact profile screens will be added to provide detailed information about individual contacts. These screens will display contact details, call history, and any notes or labels associated with the contact.

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Format-5

SUPERVISOR EVALUATION OF INTERN

Student Name: Emmadi Sumith Kumar Date: 28/06/2024

Work Supervisor: Kasu Venkata Rami Reddy Title: Senior Developer

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

Internship Address: #402, Mallik Chambers, Hyderguda, Himayath Nagar, Hyderabad - 500029

Dates of Internship: From 08/01/2024 To 28/06/2024

Please evaluate your intern by indicating the frequency with which you observed the following behaviours:

Parameters	Needs Improvement	Satisfactory	Good	Excellent
Behaviours				✓
Performs in a dependable manner			✓	
Cooperates with co-workers & supervisors				✓
Shows interest in work				✓
Learns quickly			✓	
Shows initiative			✓	
Produces high quality work			✓	
Accepts responsibility				✓
Accepts criticism				✓
Demonstrates organizational skills		✓		
Uses technical knowledge and expertise				✓
Shows good judgment		✓		
Demonstrates creativity/originality			✓	
Analyses problems effectively			✓	
Is self-reliant			✓	
Communicates well				✓
Writes effectively			✓	
Has a professional attitude			✓	
Gives a professional appearance			✓	
Is punctual			✓	
Uses time effectively			✓	

Overall performance of student intern:

(Needs Improvement/_______Satisfactory/________Good/________Excellent ✓

) Additional Comments if any:

Signature of Industry Supervisor K.V. Rai Reddy HR Manager P. Damodhar.

Format-6

STUDENT FEEDBACK OF INTERNSHIP (TO BE FILLED BY STUDENTS AFTER INTERNSHIP COMPLETION)

Student Name: Emmadi Sumith Kumar Date: 28/06/2024

Industrial Supervisor: Kasu Venkata Rami Reddy Title: Senior Developer

Supervisor Email: ram.kasu@gmail.com Internship is: ✓ Paid ____ Unpaid

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

Internship Address: #402, Mallik Chambers, Hyderguda, Himayath Nagar, Hyderabad-500029

Faculty Coordinator: Dr. Pradeep Kumar Roy Department: CSE

Dates of Internship: From 08/01/2024 To 28/06/2024

Please fill out the above in full detail

Give a brief description of your internship work (title & tasks for which you were responsible):

My internship project involves developing an Open Source Intelligence Data Mining System, a software used by the police department. The project has two primary tasks:

1) Data Collection from the Internet: Gathering various types of information, such as phone numbers, email and more.
2) Caller ID Application Development: Creating a Caller ID app that collects users' information. This includes contacts, call logs, and location data.

Was your internship experience related to your major area of study?

✓ Yes, to a large degree ____ Yes, to a slight degree ____ No, not related at all Indicate the degree to which you agree or disagree with the following statements.

This experience has:	Strongly Agree	Agree	No opinion	Disagree	Strongly Disagree
Given me the opportunity to explore a career field	✓				
Allowed me to apply classroom theory to practice		✓			
Helped me develop my decision-making and problem-solving skills	✓				
Expanded my knowledge about the work world prior to permanent employment	✓				
Helped me develop my written and oral communication skills		✓			
Provided a chance to use leadership skills (influence others, develop ideas with others, stimulate decision-making and action)		✓			
This experience has:	Strongly Agree	Agree	No opinion	Disagree	Strongly Disagree
Expanded my sensitivity to the ethical implications of the work involved	✓				
Made it possible for me to be more confident in new situations	✓				

Given me a chance to improve my interpersonal skills	✓				
Helped me learn to handle responsibility and use my time wisely	✓				
Helped me discover new aspects of myself that I didn't know existed before		✓			
Helped me develop new interests and abilities	✓				
Helped me clarify my career goals		✓			
Provided me with contacts which may lead to future employment		✓			
Allowed me to acquire information and/or use equipment not available at my Institute	✓				

In the Institute internship program, faculty members are expected to be mentors for students. Do you feel that your faculty coordinator served such a function? Why or why not?

Yes, my faculty supervisor has guided me very well.

How well were you able to accomplish the initial goals, tasks and new skills that were set down in your learning contract? In what ways were you able to take a new direction or expand beyond your contract? Why were some goals not accomplished adequately?

I have learned all the tasks from the internet and with the guidance of my internship mentor, which has enabled me to complete the internship successfully.

In what areas did you most develop and improve?

I have developed my skills in android developement and backend development.

What has been the most significant accomplishment or satisfying moment of your internship?

Company gave me access to publish the app to play store and gave full access to all the services it provides

What did you dislike about the internship?

Company is a startup, so company increases workload compared to usual.

Considering your overall experience, how would you rate this internship? (Circle one). (Satisfactory / Good / [✓ Excellent])

Give suggestions as to how your internship experience could have been improved. (Could you have handled added responsibility? Would you have liked more discussions with your professor concerning your internship? Was closer supervision needed? Was more of an orientation required?)

It was awesome.