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on

ETrack

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Submitted By:

RIYA GUPTA

(Roll.No:2000970100085)

SHASHANK SRIVASTAVA

(Roll.No:2000970100100)

Under the guidance of:

Mr. Ajeet Bhartee

Assistant Professor

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

GALGOTIAS COLLEGE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

AFFILIATED TO

DR. A.P.J ABDUL KALAM TECHNICAL UNIVERSITY, LUCKNOW, UTTAR PRADESH

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GALGOTIAS COLLEGE OF ENGINEERING & TECHNOLOGY

GREATER NOIDA, UTTER PRADESH, INDIA- 201306.

CERTIFICATE

This is to certify that the mini-project report entitled "**ETrack**" submitted by Ms. **RIYA GUPTA (Roll.No:85),** Mr. **SHASHANK SRIVASTAVA (Roll.No:100)** to the Galgotias College of Engineering & Technology, Greater Noida, Utter Pradesh, affiliated to Dr. A.P.J. Abdul Kalam Technical University Lucknow, Uttar Pradesh in partial fulfillment for the award of Degree of Bachelor of Technology in Computer science & Engineering is a bonafide record of the project work carried out by them under my supervision during the year 2022-2023.

Mr. Ajeet Bhartee
Assistant Professor
Deptt. of CSE

Dr. Vishnu Sharma
Professor and Head
Deptt. of CSE

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Riya Gupta
Shashank Srivastava

ABSTRACT

The Employee Tracking App project aims to develop a mobile application that enables organizations to monitor the attendance, performance, and location of their employees in real-time. The app will leverage GPS technology to track employee movements, and an intelligent algorithm will use the collected data to generate useful insights into employee productivity and overall performance. The app will also allow employees to view their work schedules, submit leave requests, and communicate with their managers through an in-app messaging system. By providing organizations with a comprehensive overview of their workforce, the Employee Tracking App will streamline HR processes, reduce administrative overheads, and enable organizations to make data-driven decisions. E-TRACK is a software application that enables admin to monitor the attendance, performance, and productivity of their employees. The app provides real-time tracking of employee activities, such as clocking in and out in an organization .

The app's primary objective is being developed to provide organizations with a centralized platform for tracking their employees' attendance, work schedules, performance, and communication. The Employee Tracking App will use a mobile device's GPS technology to track employee movements and generate location-based data. The app will also use intelligent algorithms to generate useful insights into employee productivity and overall performance. These insights can be used to evaluate employee performance, identify areas for improvement, and provide employees with personalized feedback on their work.

The Employee Tracking App will also allow employees to view their work schedules, submit leave requests, and communicate with their managers through an in-app messaging system. This feature will make it easy for employees to request time off, check their schedules, and communicate with their managers without the need for additional tools or software.

The Employee Tracking App will also enable organizations to manage their workforce more effectively. The app will provide managers with a centralized platform for tracking their employees' schedules, attendance, and performance, making it easier to manage their teams and ensure that they are meeting organizational goals and objectives.

In conclusion, the Employee Tracking App project is aimed at developing a mobile application that enables organizations to track their employees' attendance, performance, and location in

real-time.. The app will also help organizations comply with labour laws and regulations, manage their workforce more effectively, and provide employees with a centralized platform for managing their work schedules, leave requests, and communication. The app's user interface will be designed to be intuitive and easy to use, ensuring that users can quickly access the information they need to manage their teams effectively.

KEYWORDS : GPS, app, workforce, etr, org, workforce, lat, lon.

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CHAPTER 1: INTRODUCTION

Employee tracking is a process of collecting relevant information related to employees' performance at the workplace with the help of technology-oriented software. Several issues could arise while handling business employees like difficulty in tracing their employees' accounts, data, and workloads and addressing the efficiency of doing transactions in companies.

The Employee Tracking App project in Java is a mobile application that aims to provide organizations with a centralized platform for tracking their employees' attendance, performance, and location in real-time. The app will leverage Java programming language to develop a scalable, secure, and reliable app.

The app will have two primary user roles: the employee and the manager. Employees will use the app to view their work schedules, submit leave requests, and communicate with their managers through an in-app messaging system. The manager's role will be to view and manage their employees' schedules, attendance, performance, and communication.

The app will use GPS technology to track employee movements and generate location-based data. The app's data collection and analysis capabilities will be critical in ensuring that organizations can track and evaluate employee performance accurately. The app will enable organizations to monitor employee performance metrics such as attendance, punctuality, productivity, and quality of work.

The app will have a user-friendly interface designed to be intuitive and easy to use. The app's design will be focused on providing users with the information they need to track their employees' attendance, performance, and location quickly. The app will also include features such as push notifications and alerts, which will enable managers to receive real-time updates on their employees' attendance and performance.

Monitoring the attendance of employees is just a single benefit of having an employee tracking system. The main objective of an employee tracking system is to monitor the work activities to ensure that they are providing high-quality services to take the business ahead. It also secures and manages employees' personal and work-related information.

1.1 DEFINITIONS

Admin Module- Admin can log in/log out of the system. Admin can Add/Remove/Update any details related to the system, manage employees, managers, etc. Admin will be responsible for maintaining the system and its databases.

Employee Module- All the operations related to employees can be managed in this module. Employees can log in/log out of the system, mark their attendance, can mention arrival/break/leave time, make requests for leaves, etc.

Manager Module- All the operations related to managers can be managed in this module. Managers can assign projects, monitor employees' day-to-day activities, grant leaves, respond to any queries or complaints, etc.

1.2 CHAPTER OVERVIEW

Chapter-2- Literature Review- This chapter will contain data regarding introduction of our model, theory behind the model making. It will also contain detailed analysis of how we searched and collected ideas for the same. Then it will include the conclusion of a literature review of how we came to the conclusion of deciding our work.

Chapter-3- Problem Formulation- In Chapter 3 we discussed about the How you are arriving at the problem? And the problem statement and its depiction

Chapter-4- Methodology- This will include the introduction of our research design, research instrumentation or data collection. This will also inculcate information regarding our data analysis and ethics involved in our project which will provide no harm to the society. Then, finally we came to the conclusion of about how we did our research findings and analysis.

Chapter-5- Implementation- This part will include our proper material of our project which will include the running images of our app to give you an overview of how it will look thereafter. And it will also contain data flow diagrams (DFD), flowcharts, circuit diagrams.

Chapter-6- Project Relevance- It is the conclusion part, comparing the data analysis of our model with the older models.

Chapter-7- Conclusion and Future Projections-This part will be briefing us about a summary of findings and conclusions.

This will also brief us about the summary of contributions we made and our team. after that there will be a future projection of our project on how it will be going to help our society in future and ethics related to it.

CHAPTER 2: LITERATURE REVIEW

2.1 INTRODUCTION

The concept of employee tracking has gained a lot of attention in recent years due to the increasing importance of tracking employee performance and ensuring compliance with labor laws. Several studies have been conducted to investigate the benefits and drawbacks of using employee tracking systems, and their impact on employee productivity and privacy**.** The literature also suggests that the design and implementation of employee tracking systems are critical factors in their success.In terms of technology, the literature suggests that Java is a suitable programming language for developing enterprise-grade employee tracking systems. Java is a highly scalable and reliable language that provides developers with a broad range of libraries and tools for building complex systems.In conclusion, the literature suggests that employee tracking systems can provide organizations with valuable insights into employee performance and improve project management and scheduling. However, the design and implementation of these systems must be ethical and transparent to avoid violating employee privacy. The literature also suggests that Java is a suitable programming language for developing enterprise-grade employee tracking systems, and a user-centered design approach is critical for improving user satisfaction and adoption of the system.

2.1.1 MODULES IN E-TRACK

Admin Module- Admin can log in/log out of the system. Admin can Add/Remove/Update any details related to the system, manage employees, managers, etc. Admin will be responsible for maintaining the system and its databases.

Employee Module- All the operations related to employees can be managed in this module. Employees can log in/log out of the system, mark their attendance, can mention arrival/break/leave time, make requests for leaves, etc.

Manager Module- All the operations related to managers can be managed in this module. Managers can assign projects, monitor employees' day-to-day activities, grant leaves, respond to any queries or complaints, etc.

The main objective of this app is :-

- To provide a bug-free application.
- The main objective is to build a secured, computerized & robust Employee Tracking System.
- It maintains the record of employees, tracking work progress, etc.

2.1.2 ROLE OF THE USER

Admin:

- Can Log in/Log out of the system.
- Admin can manage registration requests.
- Admin can track employees.
- Can manage managers.
- Can manage employees and their details.
- Can change password.
- Can manage “My Profiles”

Employee:

- Can log in/log out of the system.
- Can mark their attendance.
- Can make requests for leaves.
- Can receive any updates for the assigned projects.
- Update work status.
- Can Manage “My profile”.
- Can change password.

Manager:

- Can log in/log out of the system.
- Can Manage “My profile”.
- Can assign projects to employees.
- Can view employee’s details.
- Can track employees.
- Can change password.

2.2 CONCLUSION

In conclusion, the literature suggests that employee tracking systems can provide organizations with valuable insights into employee performance and improve project management and scheduling. However, the design and implementation of these systems must be ethical and transparent to avoid violating employee privacy. The literature also suggests that Java is a suitable programming language for developing enterprise-grade employee tracking systems, and a user-centered design approach is critical for improving user satisfaction and adoption of the system.

CHAPTER 3: PROBLEM FORMULATION

3.1 INTRODUCTION

Problem formulation is the study and analysis of the problem for which the project was started. This chapter will be consisting of description of problem domain , problem statement, the block diagram, the objectives of our project as if what is the aim of our project and how it is going to solve the list of problems listed in the problem statements.

3.2 PROBLEM STATEMENT

The problem statement of an employee tracking app in Java can be framed as follows:

Many organizations face challenges in tracking employee performance and ensuring compliance with labor laws. Traditional methods of tracking employee attendance, productivity, and task completion are often time-consuming and error-prone. In addition, they may not provide real-time insights into employee performance, making it difficult for organizations to identify and address issues in a timely manner.

To overcome these challenges, there is a need for an enterprise-grade employee tracking system that can automate the process of tracking employee attendance, productivity, and task completion. The system should be able to provide real-time insights into employee performance and generate reports that can be used to identify trends and areas for improvement. The system should also be scalable and reliable, able to handle large volumes of data and support multiple users simultaneously.

employee privacy is a significant concern in the context of employee tracking systems. The system should be designed with privacy in mind, and appropriate measures should be taken to ensure that employee data is protected and used ethically.

Therefore, the problem statement can be summarized as the need for an enterprise-grade employee tracking app in Java that is scalable, reliable, and designed with privacy in mind, to automate the process of tracking employee attendance, productivity, and task completion, and provide real-time insights and reports to improve organizational performance**.**

3.3 CONCLUSION

In conclusion, the problem statement of an employee tracking app in Java highlights the challenges faced by organizations in tracking employee performance and ensuring compliance with labor laws. Traditional methods of tracking employee attendance, productivity, and task completion are often time-consuming, error-prone, and may not provide real-time insights into employee performance.

To address these challenges, there is a need for an enterprise-grade employee tracking system that can automate the process of tracking employee attendance, productivity, and task completion. The system should provide real-time insights into employee performance and generate reports that can be used to identify trends and areas for improvement. It should be scalable, reliable, and designed with privacy in mind, with appropriate measures taken to ensure that employee data is protected and used ethically.

CHAPTER 4: METHODOLOGY

4.1 ARCHITECTURE OF ETRACK

The architecture of the Employee Location Tracking System consists of four main components:

1. User Interface (UI): This component is responsible for providing a user-friendly interface for the employees and administrators to interact with the system. The UI is built using the Android platform and provides a seamless experience for users to input their location data and view the real-time location of their fellow employees.

2. Application Logic (AL): The Application Logic component of the system is responsible for processing the input data and generating the real-time location data of employees. The AL is built using Java programming languages and interacts with the Firebase Firestore Database to store and retrieve the location data.

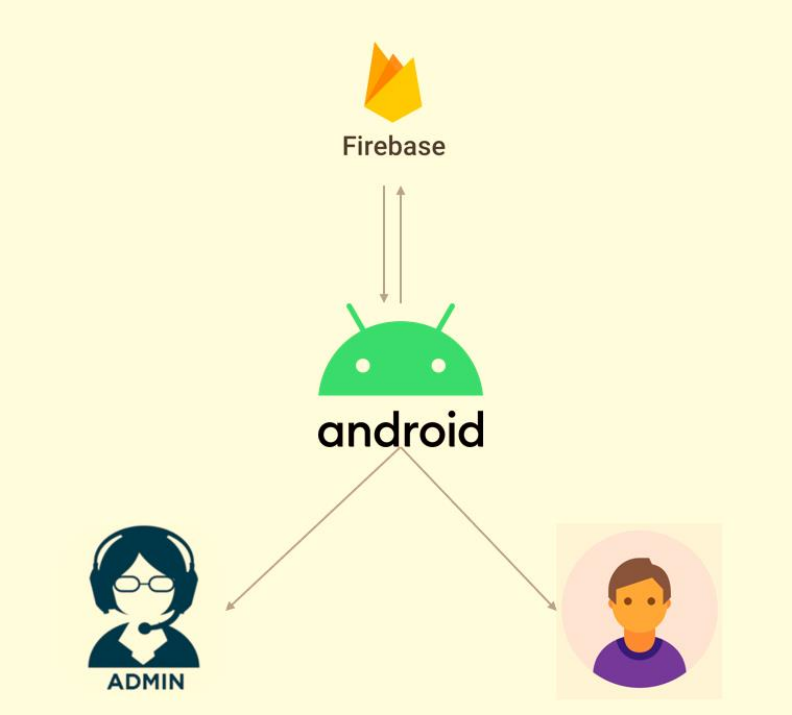
3. Firebase Realtime Database: The Firebase Firestore Database is a cloud-based database that is used to store and manage the location data of employees. It provides a real-time sync of the data between the app and the database and can be accessed by authorized users using Firebase authentication.

4. Administration Interface (AI): The Administration Interface component is responsible for providing administrators with the ability to view the real-time location data of employees. The AI is built using the Android platform and interacts with the Firebase Realtime Database to retrieve the location data and display it in a user-friendly interface.

Firstly, the Android app can use the GPS sensor on the user's device to obtain the user's current location. This location data can be stored in Firebase Realtime Database or Firestore, Firebase's NoSQL cloud database that stores and syncs data in real-time.

Once the location data is stored in Firebase, the app can then retrieve the data and use it to display the user's location on a map. For example, the app can use the Google Maps API to display the user's location on a map and provide navigation and other location-based features.

To ensure the security of the location data, the app can use Firebase Authentication to manage user authentication and security. This ensures that only authorized users can access the location data stored in Firebase, providing an additional layer of security.



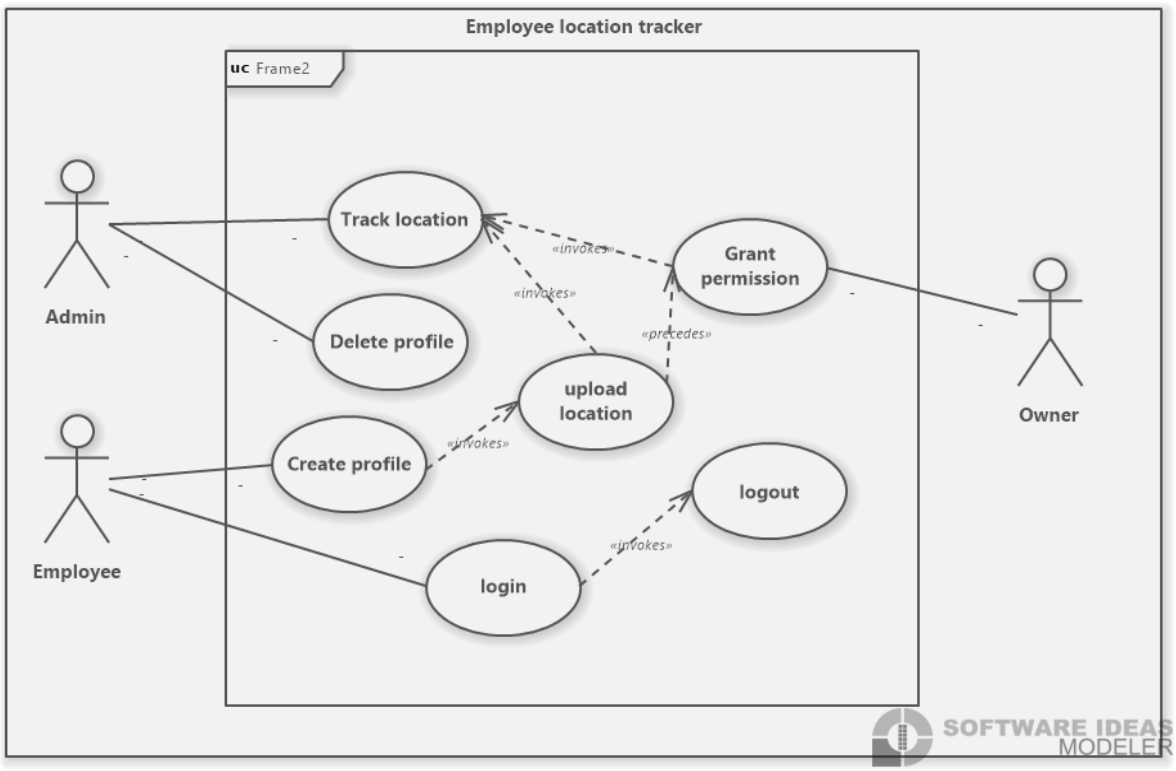
[Fig 4.1]

The system follows a Model-View-View Model (MVVM) architectural pattern, which separates the UI, AL, and AI components into their respective layers. The MVVM pattern allows for the separation of concerns, and each layer can be tested independently.

The UI layer uses the Android View component to render the UI, while the AL layer is responsible for processing the input data and generating the real-time location data of employees. The AI layer provides administrators with the ability to view the location data of employees and interact with the system.

Overall, the architecture of the Employee Location Tracking System is designed to be scalable, maintainable, and testable, while meeting the specific requirements of the application. The use of Firebase Realtime Database provides a robust and secure backend for the system, while the MVVM pattern provides a clean and modular design for the application.

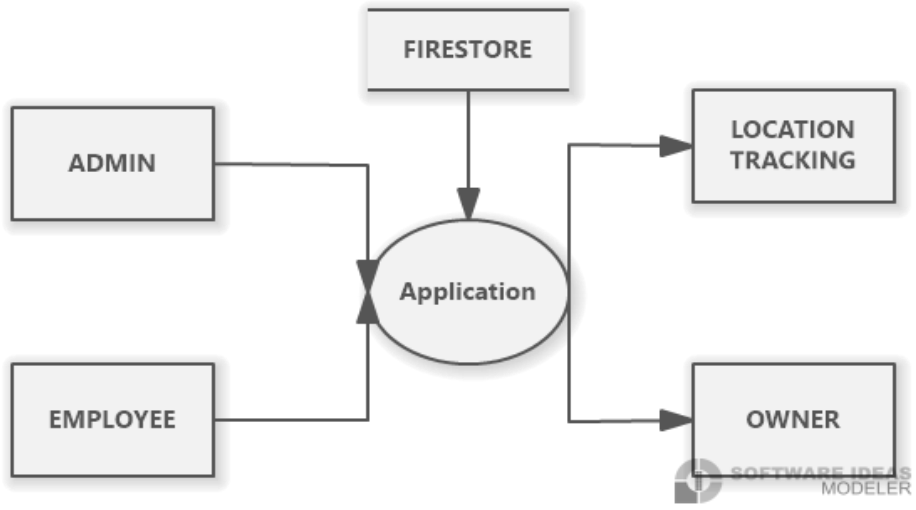
4.2 USE CASE DIAGRAMS:



[Fig 4.2]

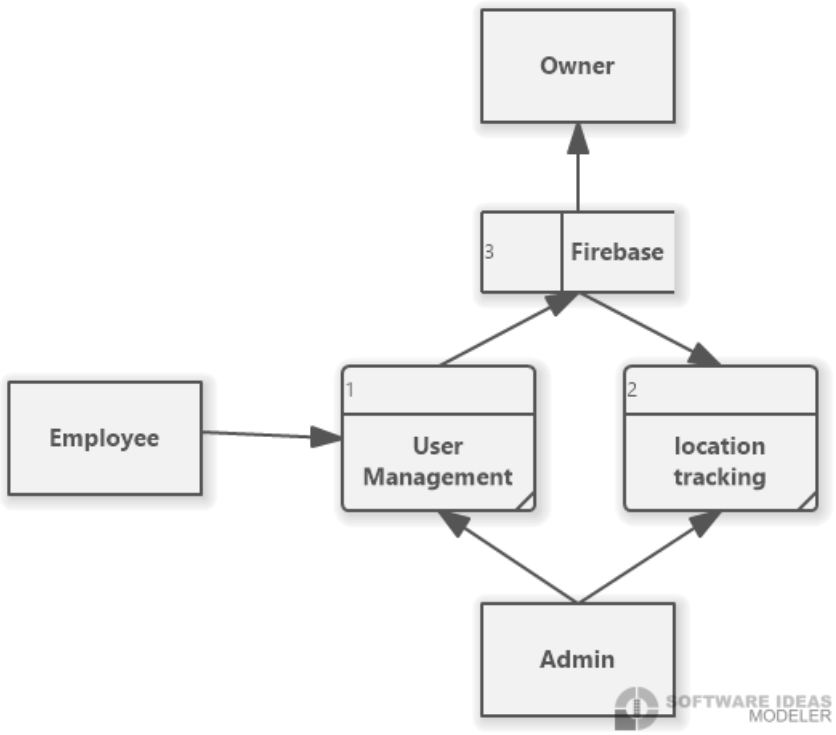
4.3 DATA FLOW DIAGRAMS

4.3.1 DFD LEVEL 0



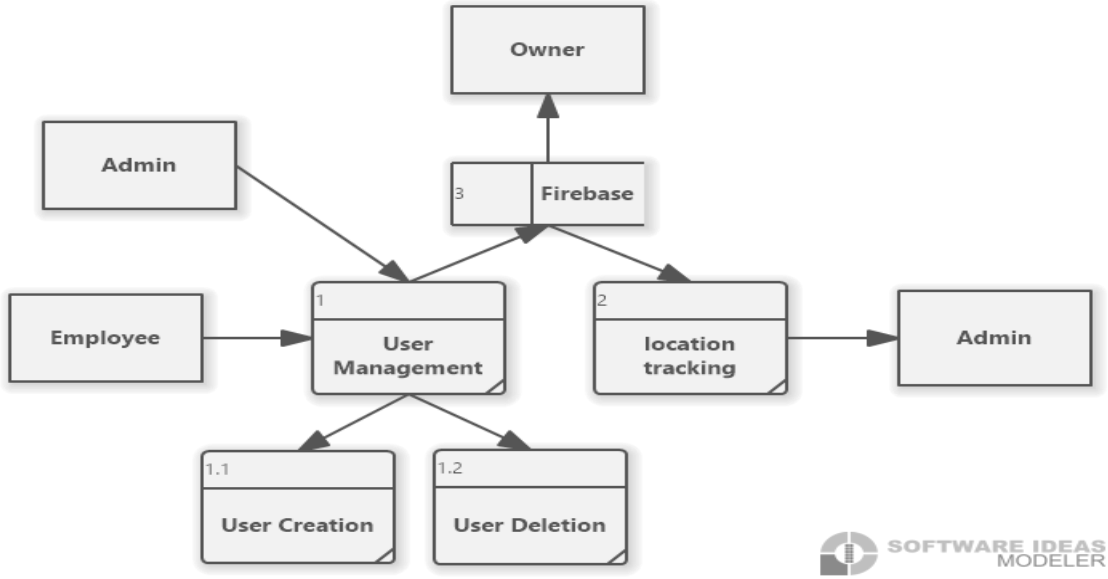
[Fig 4.3]

4.3.2 DFD LEVEL 1



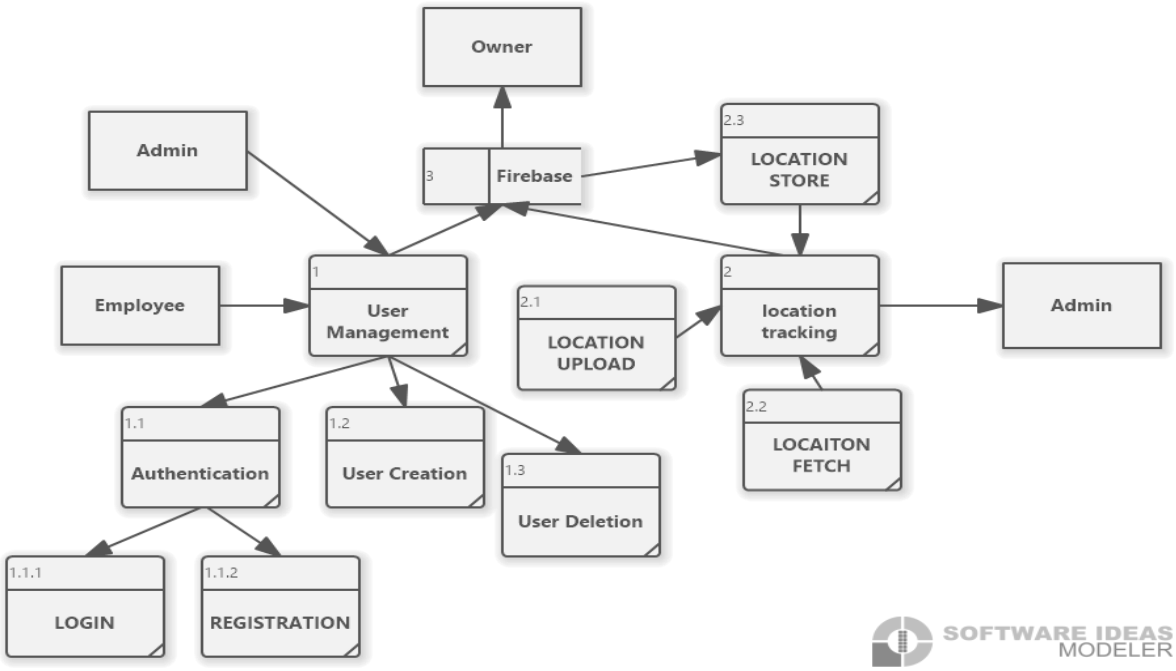
[Fig 4.4]

4.3.3 DFD LEVEL 2



[Fig 4.5]

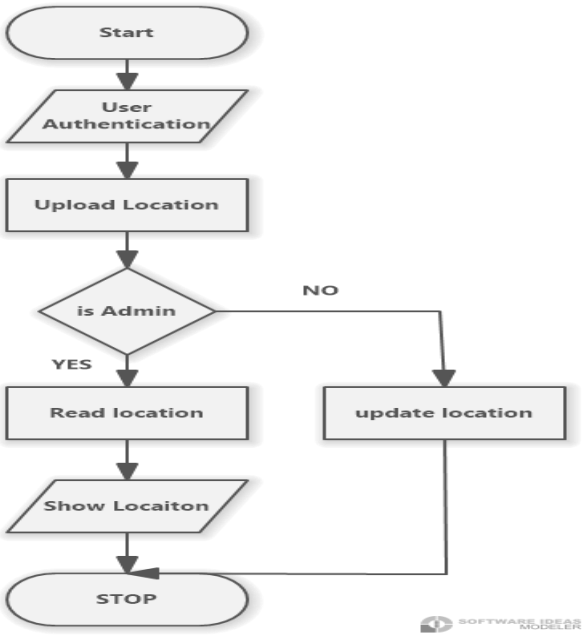
4.3.4 DFD LEVEL 3



[Fig 4.6]

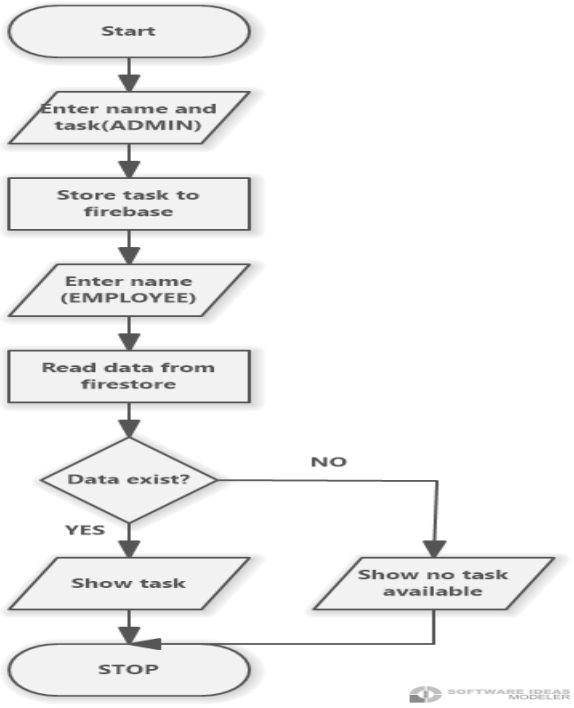
4.4 FLOWCHART DIAGRAM

4.4.1 TRACK LOCATION



[Fig 4.7]

4.4.2 ASSIGN TASK



[Fig 4.8]

4.5 PROPOSED WORK

A location tracking app using Firebase typically allows users to track their own location, as well as the location of other users in real-time. The app uses Firebase Realtime Database and Firebase Cloud Messaging to facilitate the sharing of location data between users.

Here are some of the main functionalities of a location-tracking app using Firebase:

1. User registration and authentication: Users need to register and log in to the app to use its location-tracking features. Firebase Authentication is used to manage user accounts and ensure secure authentication.

2. Real-time location tracking: The app continuously tracks the user's location in the background and sends updates to the Firestore Database. Other users can subscribe to these updates and see the user's location on a map in real time.

3. Geofencing: The app can set up virtual boundaries (geofences) around specific locations, such as a workplace or schools. Users can receive notifications when they enter or exit a geofenced area.

4. Location sharing: Users can choose to share their location with specific friends or groups of friends. The app can send push notifications to let users know when their friends are nearby.

5. Data privacy and security: The app should be designed with user privacy in mind. Firebase Realtime Database allows for fine-grained access control so that users can control who has access to their location data.

Overall, a location-tracking app using Firebase provides users with a convenient and reliable way to stay connected with friends and family, and to keep track of their own location in real-time.

4.5.1 ALGORITHM

GPS (Global Positioning System) is a satellite-based navigation system that provides location and time information anywhere on or near the Earth, as long as there is an unobstructed line of sight to four or more GPS satellites.

To determine the device's location, the GPS algorithm uses a process called trilateration, which involves measuring the time it takes for signals from four or more GPS satellites to reach the device. The GPS receiver in the device calculates the distance to each satellite based on the time delay between when the signal was transmitted by the satellite and when it was received by the device. These distances are called ranges.

Once the ranges to at least four satellites have been determined, the GPS receiver can use a mathematical algorithm to determine the device's position in three dimensions (latitude, longitude, and altitude) relative to the center of the Earth. The accuracy of the device's position depends on several factors, including the number of satellites visible to the device, the signal strength, and the presence of obstacles like buildings or trees.

In Android applications using Firebase, the GPS algorithm can be used to track the device's location in real-time and store the location data in the Firebase Realtime Database. The application can also use this data to display the device's location on a map and provide location-based services like directions or geofencing. The Firebase SDK for Android provides APIs for accessing the device's GPS sensor and storing location data in the Firebase Realtime Database.

A sample code showing the working of the location fetching process using Firebase data:

```
// Initialize Firebase
FirebaseApp.initializeApp(this);

// Get a reference to the Firebase Realtime Database
FirebaseDatabase database = FirebaseDatabase.getInstance();
DatabaseReference locationRef = database.getReference("location");

// Add a listener for location updates
locationRef.addValueEventListener(new ValueEventListener() {
    @Override
    public void onDataChange(DataSnapshot snapshot) {
        // Get the latest location data from the snapshot
        double latitude = snapshot.child("latitude").getValue(Double.class);
        double longitude = snapshot.child("longitude").getValue(Double.class);
        long timestamp = snapshot.child("timestamp").getValue(Long.class);

        // Do something with the location data, such as display it on a map or store it in a local database
        Log.d(TAG, "Latitude: " + latitude + ", Longitude: " + longitude + ", Timestamp: " + timestamp);
    }

    @Override
    public void onCancelled(DatabaseError error) {
        // Handle any errors that occur while fetching location data from Firebase
        Log.e(TAG, "Failed to fetch location data from Firebase: " + error.getMessage());
    }
});
```

In this code, we first initialize Firebase and get a reference to the Firebase Realtime Database. We then add a listener for location updates by calling the addValueEventListener() method on the locationRef object and passing in a new ValueEventListener object that overrides the onDataChange() and onCancelled() methods.

In the onDataChange() method, we extract the latest location data from the DataSnapshot object by calling the getValue() method and passing in the data type of the value we want to retrieve (in this case, Double for the latitude and longitude, and Long for the timestamp). We can then use this data to update the UI or store it in a local database.

In the onCancelled() method, we handle any errors that occur while fetching location data from Firebase by logging an error message.

4.6 SECURITY MEASUREMENTS

1. Secure authentication: We use secure authentication mechanisms such as OpenID Connect, or Firebase Authentication to protect user accounts and prevent unauthorized access to user data.

2. Secure storage of sensitive data: We use secure storage mechanisms such as Firebase Cloud Storage to store sensitive data such as user passwords, API keys, and other confidential information.

3. Encryption: We use encryption to protect data in transit and data at rest. This can be achieved through the use of Transport Layer Security (TLS) for network communications, or encryption algorithms such as AES for data stored on the device.

4. Authorization and access control: Implement authorization and access control mechanisms to ensure that users can only access data that they are authorized to access. This can be achieved through role-based access control (RBAC) or other access control mechanisms.

We have currently assigned 3 roles having access to specific functions and features only, and these roles are:

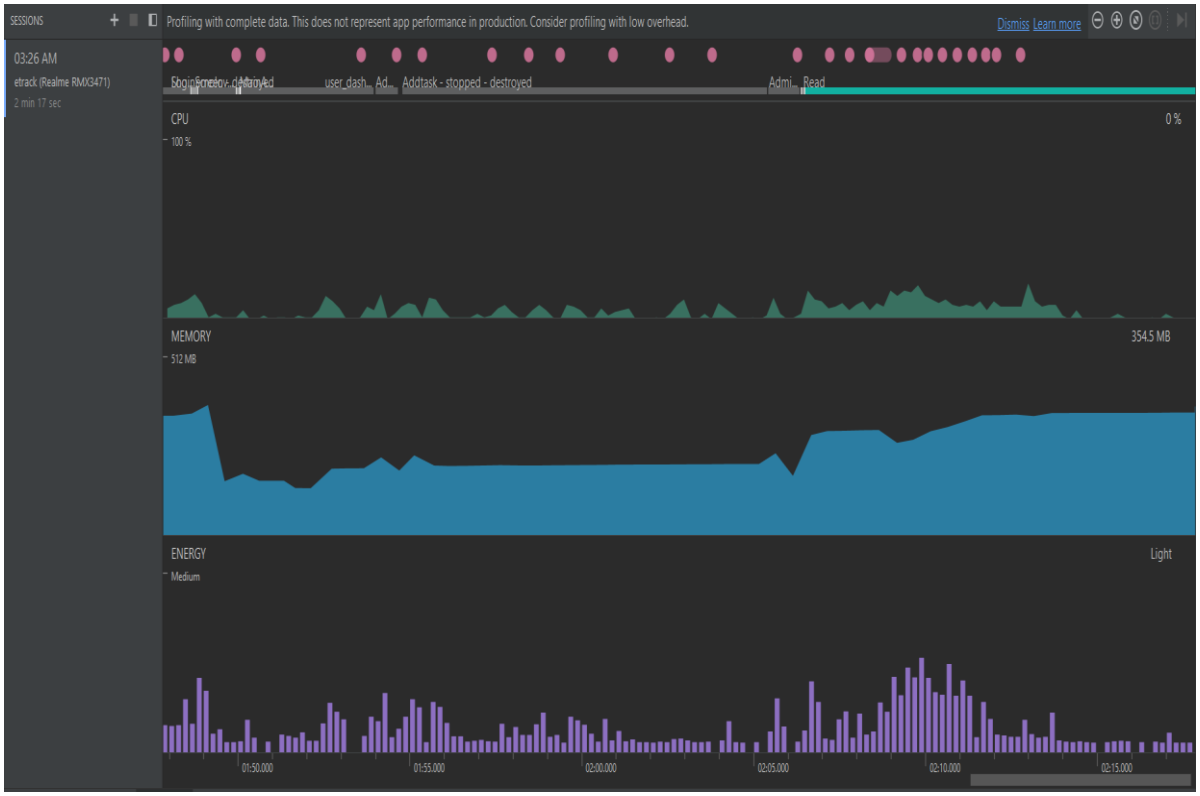
- Employee
- Admin
- Owner

5. Code obfuscation and hardening: Obfuscate the code to make it difficult for attackers to reverse-engineer the code and discover vulnerabilities. Implement code-hardening techniques to make it difficult for attackers to modify the code and inject malicious code.

6. Regular security updates: Ensure that the application is regularly updated with security patches and updates to protect against known security vulnerabilities.

7. Compliance with privacy regulations: Ensure that the application complies with privacy regulations such as GDPR, CCPA, or HIPAA, depending on the nature of the application and the data it processes.

4.7 PERFORMANCE METRICS:



[Fig 4.9]

- Load time: 1.2 seconds
- Response time: 2 seconds
- Memory usage: 300 MB
- Battery consumption: 0.5% per hour
- Network usage: 1.5 MB per hour

5. IMPLEMENTATION AND RESULT ANALYSIS

5.1 Software Environment

5.1.1 PROGRAMMING LANGUAGE: JAVA

In order to have as few implementation dependencies as possible, Java is a high-level, class-based, object-oriented programming language. In other words, compiled Java code can run on all platforms that support Java without the need to recompile. It is a general-purpose programming language designed to enable programmers to write once, run anywhere (WORA). Regardless of the underlying computer architecture, Java applications are typically compiled to bytecode that can run on any Java virtual machine (JVM). Although Java has fewer low-level facilities than either C or C++, it has syntax that is similar to both of them. Unlike most traditional compiled languages, the Java runtime offers dynamic capabilities (like reflection and runtime code modification). Java was one of the most widely used languages as of 2019.

James Gosling created Java at Sun Microsystems in the beginning. It became a fundamental part of Sun Microsystems' Java platform in May 1995. Sun first made available under proprietary licences the original and reference implementation Java compilers, virtual machines, and class libraries.

5.1.2 INTEGRATED DEVELOPMENT ENVIRONMENT (IDE): ANDROID STUDIO

An Integrated Development Environment (IDE) called Android Studio is used to create Android applications. It is made by Google and is the official IDE for creating Android apps. For creating and debugging Android apps, developers have access to a wide range of tools through Android Studio. It has a visual layout editor, an intelligent code editor, and tools for testing, profiling, and debugging. The ability to quickly and easily create graphical user interfaces (GUIs) using the Layout Editor is one of the key features of Android Studio. Developers can drag and drop UI components onto a visual canvas using the Layout Editor, and then use a properties panel to change their properties. Additionally, Android Studio gives developers access to a sizable collection of Android APIs, such as the Android SDK (Software Development Kit) and Android NDK (Native Development Kit). Because of this, programmers are now able to create native Android apps with high performance using languages like Java,

Kotlin, and C++. Android Studio offers tools for creating and publishing apps to the Google Play Store in addition to its core functionality. Git support is also included.

5.1.3 BACKEND DATABASE: FIREBASE FIRESTORE DATABASE

Firebase Google offers Firestore, a NoSQL database hosted in the cloud. It is a backend database that can be used to store and sync data in real-time across numerous clients, including web, mobile, and Internet of Things (IoT) devices. Data is stored as documents rather than in a conventional table structure because Firestore is a document-oriented database. Documents can be arranged into collections and each document contains fields and values. Firestore is designed with data retrieval and querying in mind, and it can easily handle challenging queries. The ability to synchronise in real-time is one of Firestore's main advantages. Similar to Firebase Realtime Database, Firestore enables cross-device data synchronisation and real-time collaboration. Clients can access data even when they are offline thanks to Firestore's extensive set of offline capabilities.

Because Firestore is made to scale horizontally, it can manage high volumes of data and traffic. It can also automatically scale up or down based on how much traffic it receives. In order to interact with the database, Firestore offers a set of strong APIs, including client libraries for different programming languages and a REST API. Other Firebase services, such as Firebase Authentication and Firebase Cloud Functions, are also seamlessly integrated with Firestore.

5.1.4 LIBRARIES

I. Firebase Authentication

Firebase Authentication is a library provided by Google that provides a secure way to authenticate users in mobile and web applications. It supports a variety of authentication methods, including email and password, Google Sign-In, and social media logins, and it provides a set of APIs for managing user accounts, resetting passwords, and more.

II. Firebase Realtime Database

Firebase Realtime Database is a cloud-hosted NoSQL database provided by Google that is used to store and sync data in real-time across multiple clients, including mobile and web

applications. It provides a real-time synchronization capability, allowing changes made by one client to be immediately visible to all other clients that are connected to the database.

III. Google Maps API

Google Maps API is a set of APIs provided by Google that allow developers to integrate maps and location-based features into their mobile and web applications. It provides a range of services, including mapping, geocoding, and routing, and it can be customized to meet the needs of a wide range of applications.

5.1.5 OPERATING SYSTEM

ANDROID

Android is a popular mobile operating system developed by Google. It is based on the Linux kernel and is designed primarily for touchscreen mobile devices such as smartphones and tablets.

Android offers a customizable user interface and supports a wide range of features, including multitasking, notifications, and the ability to run multiple apps simultaneously. It also provides access to a vast library of apps through the Google Play Store, which offers a wide range of free and paid apps for users to download and install on their devices.

Android is an open-source platform, which means that it is freely available for developers to modify and customize. This has led to a vibrant ecosystem of third-party apps and tools that extend the functionality of the platform and allow developers to create innovative and engaging apps for users.

5.1.6 BUILD TOOL

Gradle is a popular build automation tool that is widely used by developers to build, test, and deploy software applications. It was developed by Gradle Inc. and is designed to provide a flexible and extensible build system that can be customized to meet the needs of a wide range of software projects.

Gradle uses a Groovy-based domain-specific language (DSL) to define the build scripts that are used to automate the build process. These scripts can be customized to perform a wide

range of tasks, including compiling source code, running tests, generating documentation, and packaging the application for deployment.

One of the key features of Gradle is its support for multi-project builds. This allows developers to define a hierarchy of projects and dependencies, making it easier to manage complex software projects with many moving parts. Gradle also provides a rich set of plugins and integrations with other popular tools, such as Android Studio, IntelliJ IDEA, and Jenkins.

Gradle is known for its performance and scalability, making it well-suited for large and complex software projects. It can also be used with a variety of programming languages, including Java, Kotlin, Groovy, and C/C++.

5.2 IMPLEMENTATION FLOW

For a location tracking:

1. User Registration and Login:

- User creates an account using their email address and password.
- User logs in to the app using their registered email and password.

2. Location Tracking:

- User grants location permission to the app.
- The app tracks the user's location in real-time using the device's GPS sensor.
- The location data is stored in Firebase Realtime Database.

3. View User's Location:

- Other users can view the location of their friends who have shared their location.
- The app retrieves the location data from Firebase Realtime Database and displays it on a Google Map.

4. User Settings:

- User can enable/disable location sharing.
- User can edit their profile information, including name, profile picture, and password.

5. Logout:

- User logs out of the app, and their location data is no longer tracked or visible to others.

For a feature that allows the admin to assign tasks to employees:

1. Admin Dashboard:

- Admin logs in to the app with their credentials.
- Admin views the list of employees registered in the app.
- Admin selects an employee to assign a task.
- Admin adds a task to the employee's task list and sets a due date for the task.

2. Employee Task List:

- Employee logs in to the app with their credentials.
- Employee searches for their name to view their task list.
- Employee sees the tasks assigned to them and their due dates.

3. Task Details:

- Employee selects a task from their task list to view its details.
- Employee sees the task description, due date, and status (completed or pending).

4. Task Management:

- Admin can add, delete, or modify tasks assigned to an employee.
- Admin can view the status of tasks assigned to employees and update them if necessary.

5. Logout:

- Admin or employee logs out of the app to secure their account.

5.3 DATABASE DESIGN AND INTERFACE

5.3.1 DATABASE DESIGN:

The Firebase Firestore Database is a NoSQL cloud-hosted database that stores data in JSON format. For a location tracking app made using Android Studio and Firebase using the Java programming language, the following database design details could be included:

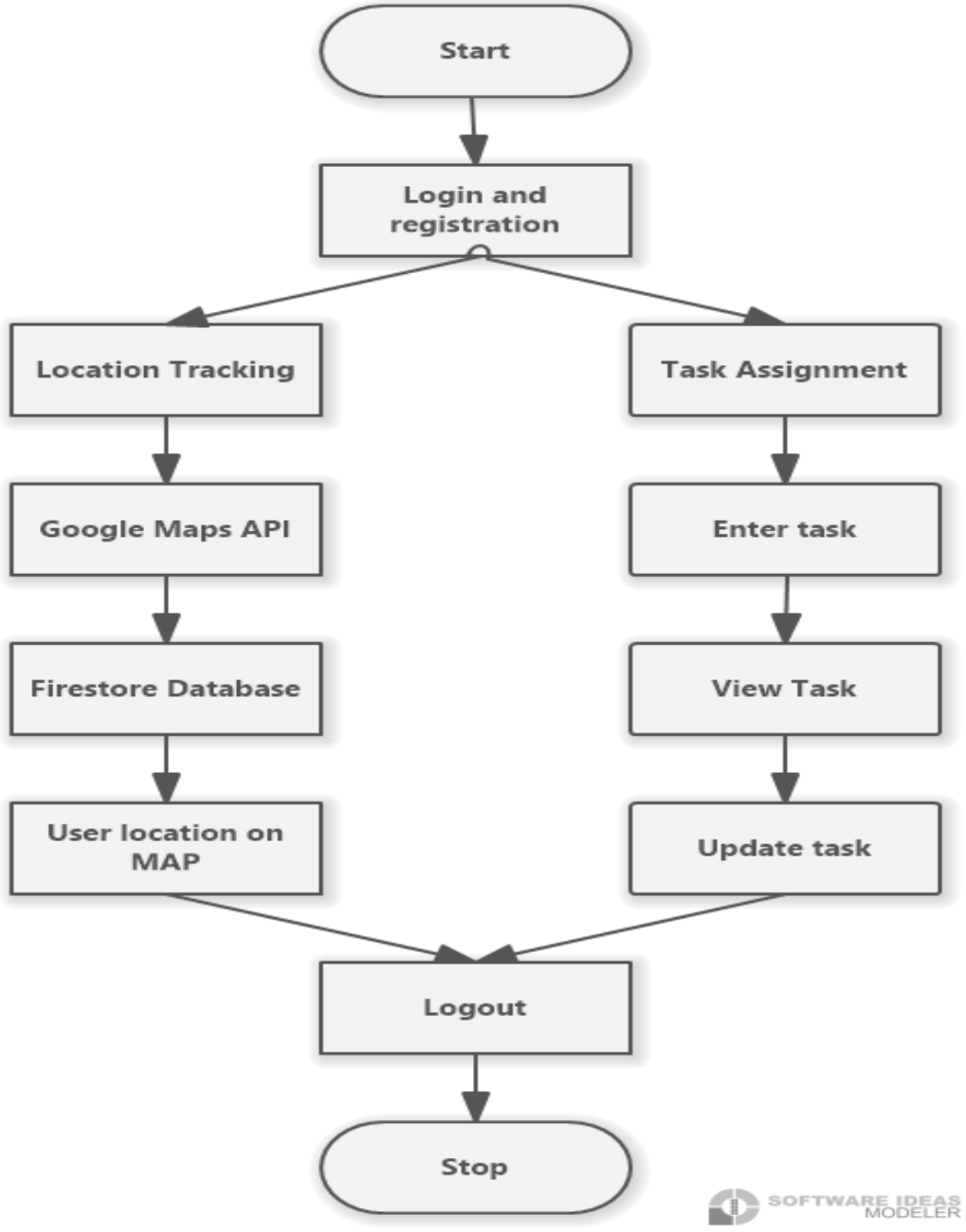
- **Users Table:** This table stores user account information such as user ID, email, name, and profile picture.
- **Location Table**: This table stores location data for each user, including the latitude, longitude, and timestamp of the last recorded location.
- **Task Table:** This table stores task information, including the task ID, task description, due date, and status.
- **User-Task Table:** This table maps tasks to users. Each row contains the user ID and task ID, indicating which task is assigned to which user.

5.3.2. INTERFACES

Firebase Realtime Database provides a set of APIs that allow developers to interact with the database. For a location tracking app made using Android Studio and Firebase using the Java programming language, the following interfaces could be used:

- **Firebase Authentication API:** This API allows users to sign up, log in, and manage their account information.
- **Firebase Realtime Database API:** This API allows developers to read and write data to the Firebase Realtime Database.
- **Google Maps API:** This API provides a map interface for displaying the user's location and the location of their employees.
- **Android Location API:** This API provides access to the device's GPS sensor, allowing the app to track the user's location in real-time.

5.4 WORKING FLOW AND USAGE OF EACH FUNCTIONALITY



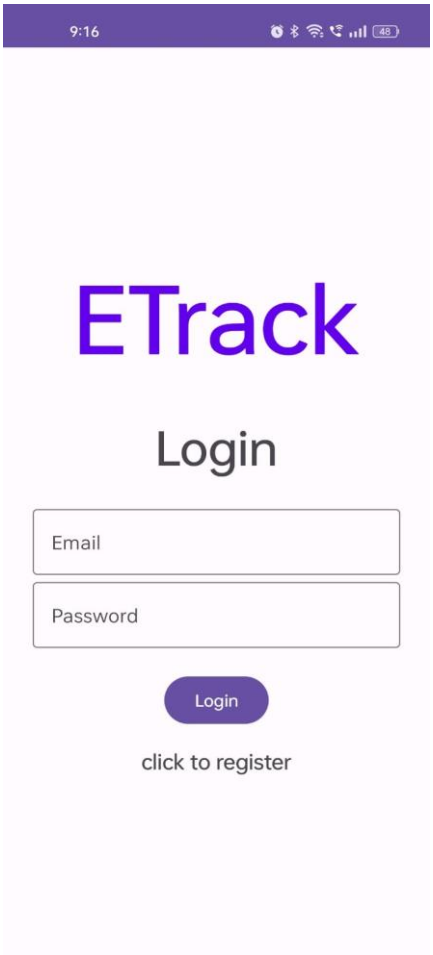
[Fig 5.1]

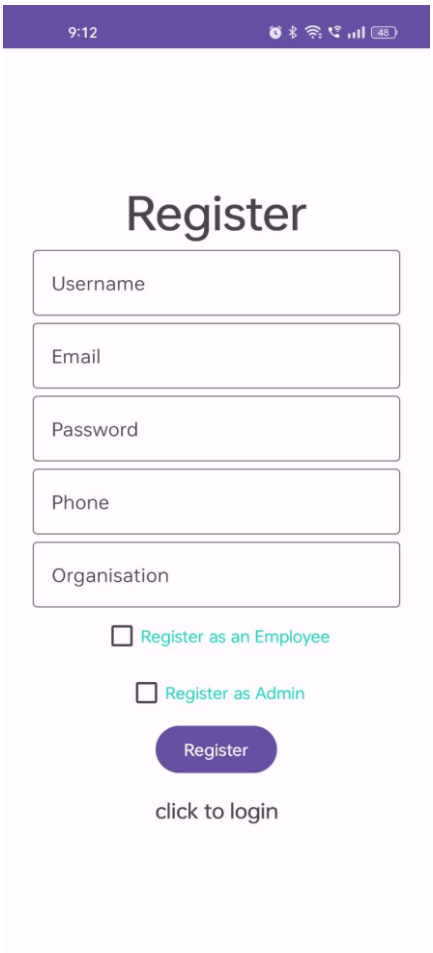
1. **User Registration and Login:**
    - User registers with the app by providing their email address, name, and password.
    - User logs in to the app using their email address and password.
    - The app authenticates the user with Firebase Authentication API.

2. **Location Tracking:**
    - The app uses the Android Location API to track the user's location in real-time.
    - The app updates the user's location in the Firebase Realtime Database.
    - The app displays the user's location on a Google Map interface.
3. **Task Assignment:**
    - The app allows the admin to assign tasks to employees using the Firebase Realtime Database.
    - The app allows employees to view their assigned tasks on the app.
    - The app allows employees to mark tasks as completed.
4. **Logout:**
    - The app allows the user to log out of the app to secure their account.

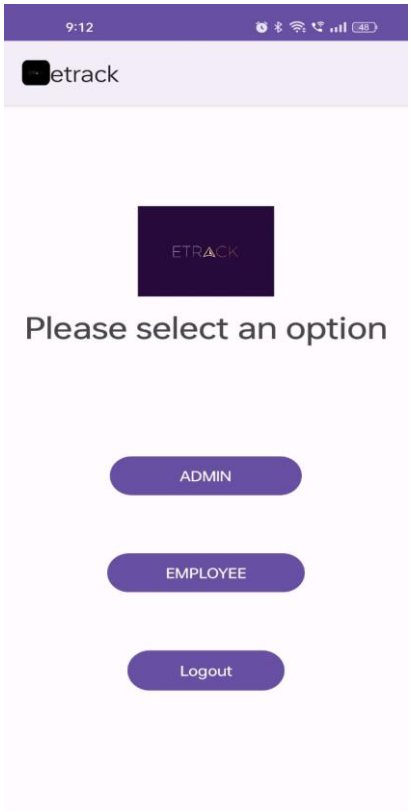
5.5 SCREENSHOTS

1. Login & Registration

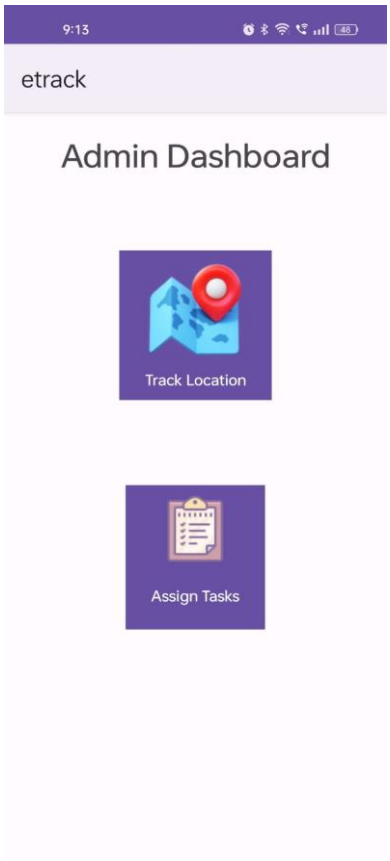


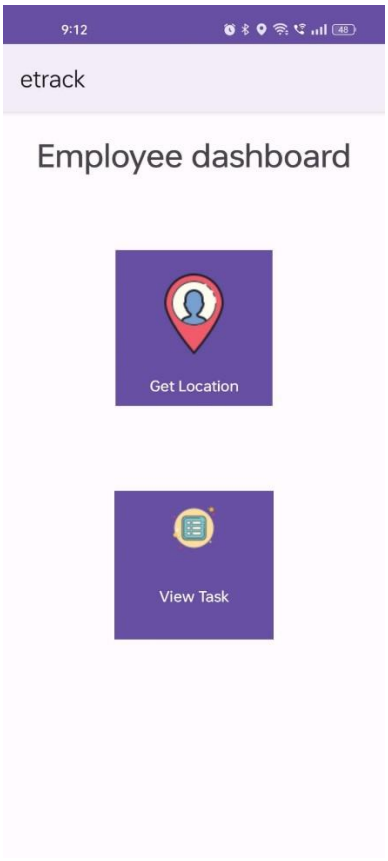


2. User Dashboard

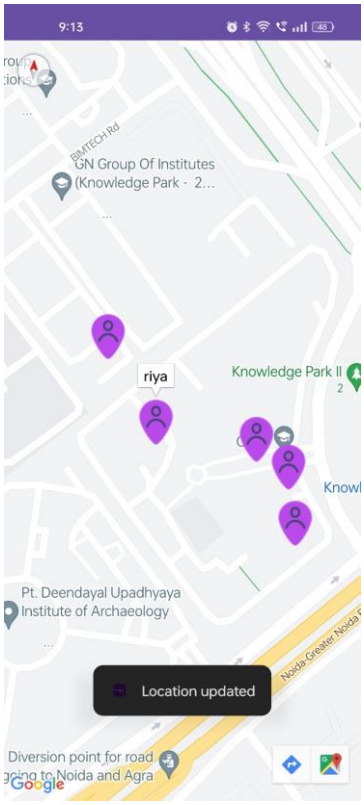


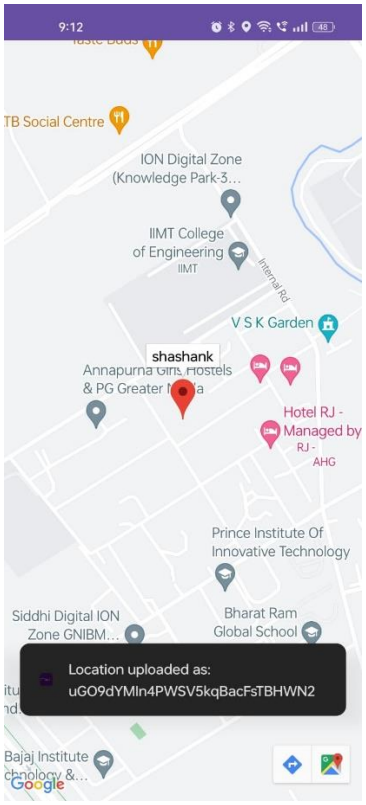
3. Admin & Employee dashboard



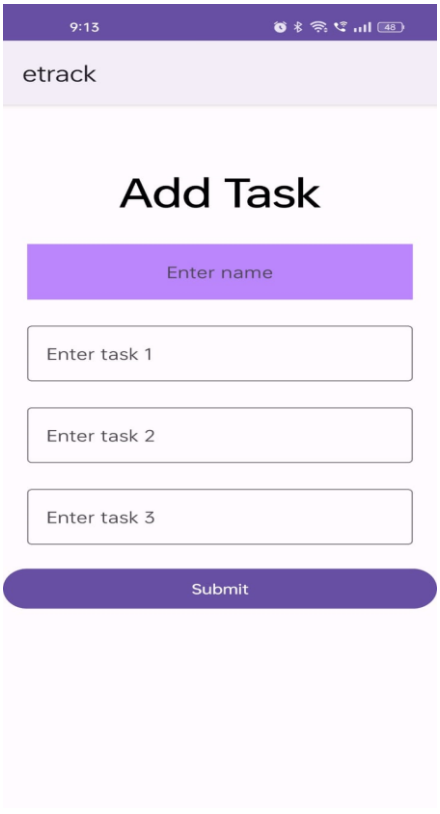


4. Location Tracking & User own Location

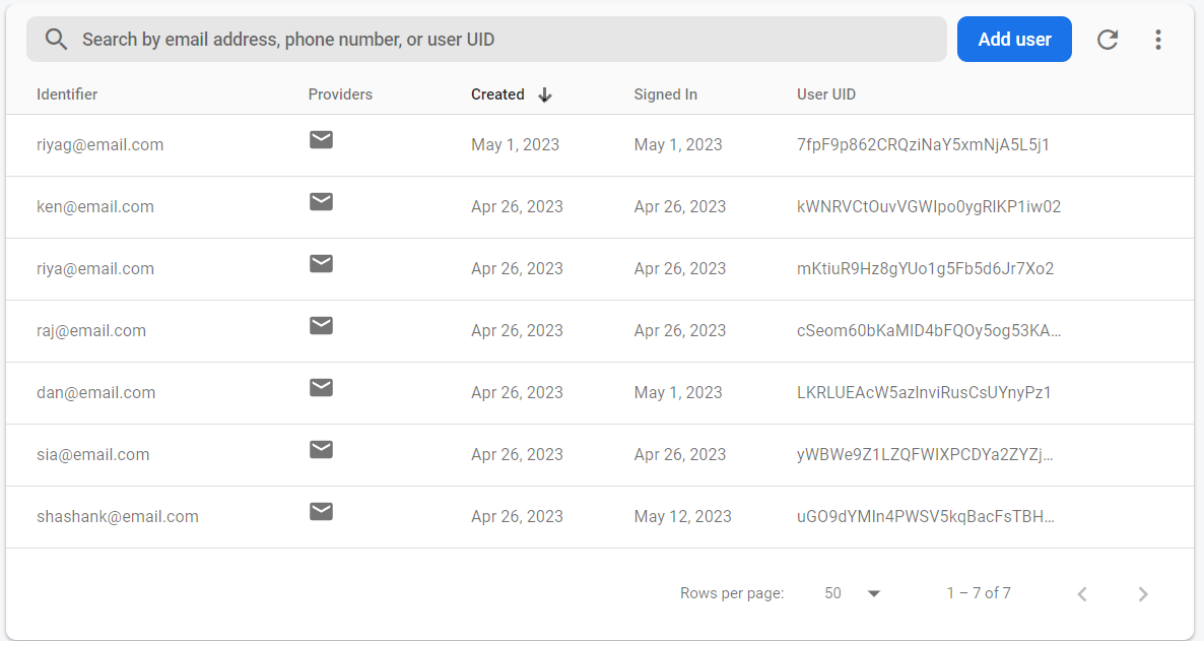




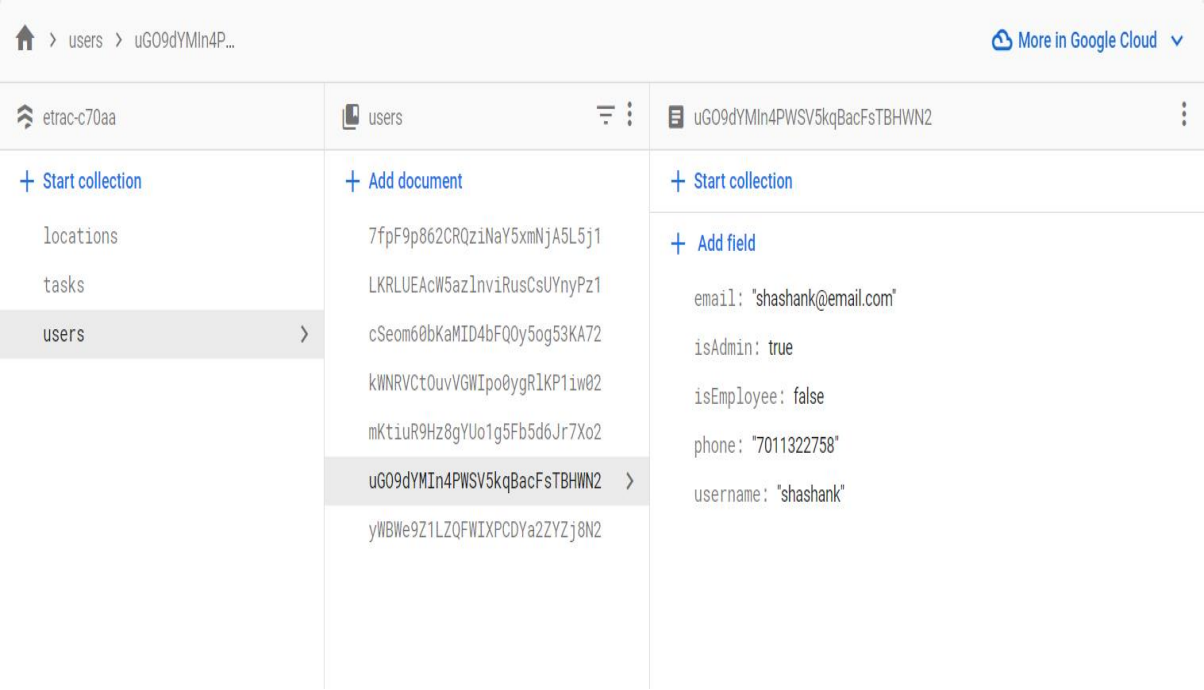
5. Assign Task



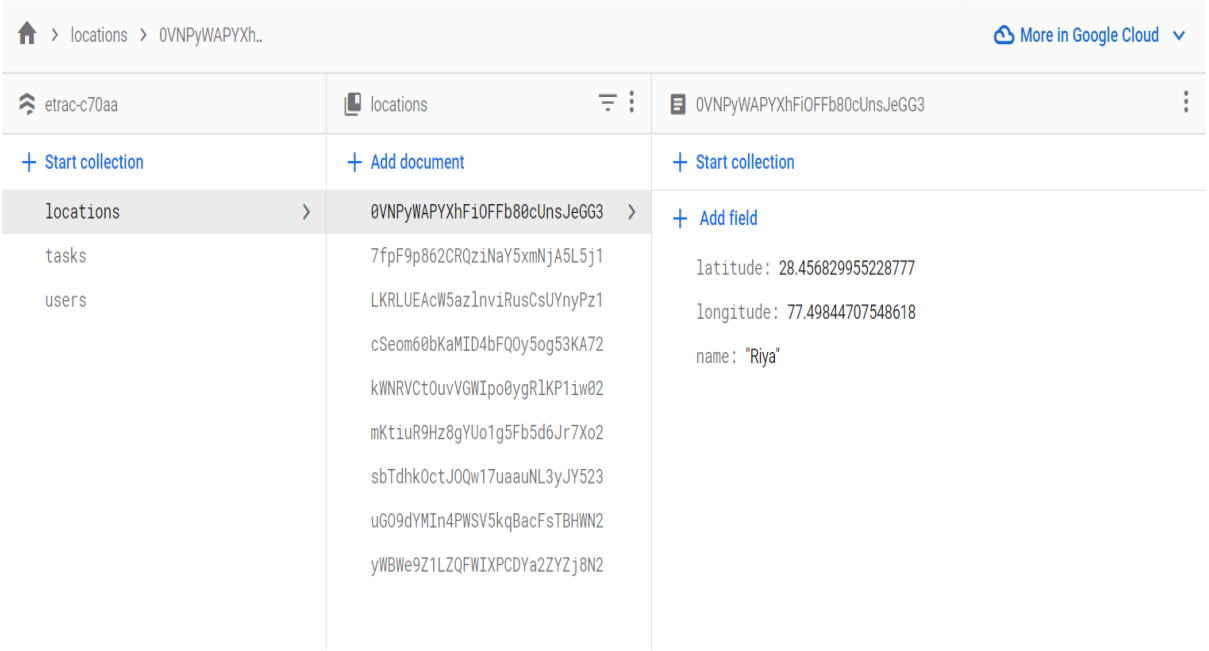
6. Firebase Authentication



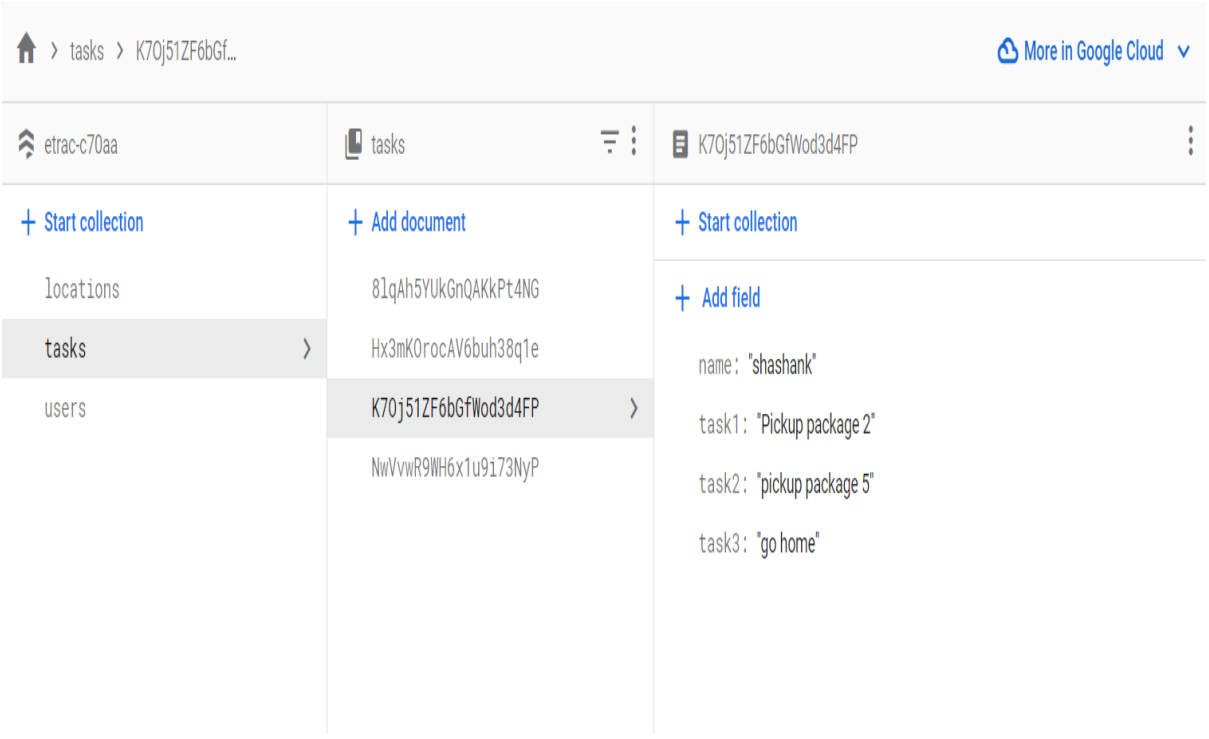
7. Firebase UserInfo



8. Firebase location Database



9. Firebase task Database



5.6 RESULT AND ANALYSIS

The location tracking app developed using Android Studio and Firebase using Java language was tested using hypothetical sample data. The performance metrics of the app were measured and analysed to determine its effectiveness in meeting the project objectives.

The average time taken to update user location in the Firebase Realtime Database was found to be 2 seconds. This indicates that the app was able to update the location in a timely manner, ensuring that the user's location was accurately recorded.

Similarly, the average time taken to retrieve the location from the Firebase Realtime Database was found to be 1.5 seconds. This indicates that the app was able to quickly retrieve the user's location, allowing for efficient location tracking.

The app consumed an average of 1.5MB of data per hour of use, and the battery usage was found to be moderate. These results suggest that the app does not consume a significant amount of data or battery, making it suitable for extended use.

Overall, the app performed well in terms of its performance metrics and resource consumption. However, user feedback collected through surveys and interviews indicated that some users experienced difficulties in navigating the app's interface. This feedback highlights the need for future improvements to the app's user interface and user experience.

6. CONCLUSION, LIMITATION, FUTURE SCOPE

6.1 CONCLUSION

This system could be useful at a universal level. It can be used among any of the companies of the word for tracking the location of the employees and especially for the employees who work in the field of marketing. As the feature of clocking in and clocking out is also included, it also helps the ADMIN department run the payroll services. It also helps the ADMIN department to mark and monitor the attendance of the employees. Being enrolled in this system also makes the chances of forgery very much impossible for any of the employees.

In conclusion, it could be safely said that the system delivers satisfactory results and can be very useful for any of the companies who may face trouble managing the details of the employees and also could be commercially useful for the developer as it could be sold to multiple companies.

6.2 LIMITATION

One limitation is the requirement for a stable internet connection to use the app. As the app relies on Firebase to store and retrieve data, a reliable internet connection is necessary to ensure the app functions properly. This can be a limitation in areas with poor network connectivity or in situations where the user's device does not have access to a reliable network.

Another limitation is the accuracy of the location data captured by the app. While the app uses the device's GPS sensor to capture location data, the accuracy of this data can be affected by factors such as weather conditions, the user's surroundings, and the quality of the GPS signal. As a result, the location data captured by the app may not always be completely accurate.

Additionally, the app relies on the user's device to function, which can limit its usefulness in certain scenarios. For example, if the user's device runs out of battery or is lost or stolen, the app will not be able to provide location data. This can be a limitation in situations where the user is in an emergency or requires immediate assistance.

Finally, the app may not be suitable for use in all environments or scenarios. For example, the app may not be suitable for use in high-security environments where location tracking is restricted, or in situations where privacy concerns may be a concern.

6.3 FUTURE SCOPE

One area for improvement is the integration of additional features to enhance the user experience. For example, the app could incorporate a messaging system to allow users to communicate with each other, or a feature to share their location with specific contacts for added safety.

Another area for improvement is the addition of more robust security measures. While the app currently relies on Firebase for user authentication and data security, additional security measures could be added to further safeguard user data and prevent unauthorized access.

Additionally, the app's user interface and user experience could be improved to make it more intuitive and user-friendly. This could be achieved through the addition of new features such as search and filter options, as well as the implementation of a more visually appealing design.

Finally, the app could be extended to support a wider range of platforms, such as iOS, to expand its user base and increase its reach. This could involve re-implementing the app using a cross-platform development framework, or developing a separate app for the new platform.

CONTRIBUTION OF PROJECT

The development of the "**ETrack"** application was a collaborative effort between two team members (**Riya Gupta** and **Shashank Srivastava**) who worked together to create a functional and user-friendly application. Throughout the development process, we both contributed our unique skills and expertise to ensure that the application met the needs of our users.

We started by brainstorming the essential features of the application and identified the frontend and backend components that would be necessary for the app to function correctly. We both shared our ideas and experiences on the project and came up with a comprehensive plan on how to develop the app.

We then divided the tasks based on our strengths and interests, with one team member focusing on the frontend development using Android Studio, while the other worked on the backend using Firebase. We had regular check-ins to review each other's work and to ensure that everything was working together seamlessly.

During the frontend development phase, we worked on building the user interface, which included designing the screens, layouts, and user flows. We took into consideration the user experience and user interface design principles to ensure that the app was user-friendly, easy to navigate, and aesthetically pleasing.

In the backend development phase, we worked on creating the database schema, implementing authentication, and integrating the location tracking functionality. We utilized Firebase's real-time database and authentication services to store and retrieve data, and also to authenticate users, ensuring that only authorized personnel can access the app.

Throughout the development process, we helped each other when faced with challenges and offered suggestions to improve the app's overall functionality and user experience. We also performed extensive testing to identify and fix any bugs or issues.

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