Android Employee Tracker Application

Software Testing, Validation, and verification

Dr. Esraa afify
Eng. Haidy Ahmed

Contents

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Intoduction

The modern workplace demands innovative solutions to optimize efficiency and productivity.
This document outlines the development requirements for an Android Employee Tracker application designed to address these needs.
This user-friendly application empowers organizations to manage their workforce more effectively by facilitating features.

Purpose

The purpose of this document is to outline the requirements for the development of an Android-based Employee Tracker application.
The application is designed to help organizations keep track of their employees and their work activities, thereby increasing productivity and efficiency.
The Employee Tracker will be an intuitive and user-friendly application that will enable admins to check in, check out and check out the employee's daily activities.

The application will be developed to work on Android smartphones and tablets and will be compatible with the latest versions of the Android operating system. This document will define the functional and non-functional requirements for the Employee Tracker application, including system features, security requirements, performance criteria, and other important details.

Product goal

There can be multiple goals of having or using the android employee tracking system such as it can increase employee productivity by monitoring their activities and identifying areas for improvement which it can be beneficial because by tracking employee activities and identifying areas for improvement, businesses can take steps to optimize work processes and increase.
Also using the system can improve the employee's accountability by tracking their attendance, work hours and their location which can have a huge benefit because employee tracking systems can help businesses ensure that employees are working when they are supposed to and are meeting their performance goals.

Employee Tracking System has the capacity to Monitoring Employee Activity, mark their attendance, and check organizational resource usage, their personal details and salary details in which organization engage in employee monitor to track performance, avoid legal liability and address other security concerns.

Overall Description

This system is a combination of web as well as android application where the user will be using the android application and admin as well as HR will work with web application.
This application is meant for field work Employers. The **Employee** will have this application in his android phone, when the user will login to the system his image will be captured and his GPS location will be send to the **admin** where **admin** will view image and GPS location in web application.
After Login, GPS location of the employee will be tracked automatically by the **system** and send to the **admin** after every 5 minutes .
When **employee** logout the system again the image will be captured as well as GPS location will be send to the **admin**.
In order to keep track of the attendance as well as payroll of the employee, this system plays a major role.

The role of the **admin** is to add new employee by entering his personal details and **admin** will provide the employee with identity number and password to the user so that he can access the application in his android phone.

Admin can view the GPS location of the employee by entering Employee Identity Number as well as Date.
Admin can check the salary of the particular employee by entering date and employee ID.
Admin can view latitude and longitude of the GPS location sent by the employee.
Admin can change the password of the employee. When the HR login to the system he can check the GPS location of the employee by entering employee ID and date.
HR can check salary of the particular employee by entering employee identity number and date.

This application helps admin and HR to easily check the salary of the employee.
Since GPS location of the employee is tracked, so employee will not attempt to add proxy attendance.

Product Functions

- **Admin can:**

1. Access system with admin id, password.
2. Add, remove employee and employee details.
3. View location, images of employee by entering employee id.
4. View salary details of employee.
5. View weekly employee reports.
6. Receive alarm on abnormal behavior of employee.
7. Change employee password.

- **Employee Can:**

1. Access system using id, password.
2. Add personal details.
3. View personal details.

- **HR Manager can:**

1. Add remove employee.
2. View location, images of employee by entering employee id.
3. View salary details of employee.

System Features

Functional requirements are specific features and functionalities that a software system must have to meet user needs.
They focus on the system's behavior and functionality, serving as the foundation for design, development, testing, and validation.

Functional requirements:

- Admin Login
- Add Employee
- View Location
- Check Salary
- View Point
- Change Password
- HR Login
- Check Location
- Check Salary
- User Login
- Tracking GPS Location
- User Logout
- Profile management
- Time tracking
- Notifications
- Admin management

Functions Description

- **Admin Login :** Admin will access the system with admin ID and password
- **Add Employee:** Admin,HR Manager will add new employee by entering employee personal details (id, password).
- **View Location:** Admin can view GPS location of the particular employee by entering employee ID and date.
- **Check Salary:** Admin can check salary of the employee by entering employee id and date.
- **View Point:** Admin will view latitude and longitude of the GPS location of the employee.
- **Change Password:** Admin can change password of the employee.
- **HR Login:** HR can access system by entering HR ID and password.
- **Check Location:** HR can check GPS location of the employee by entering employee ID and date.

- **Check Salary:** Hr can check salary of the employee by entering employee id and date.

- **User Login:** User will access the system with his user identity number and password with his android phone. User will capture his image and clicks on submit. User's Image and GPS location will send to admin.

- **Tracking GPS Location:** System will Track GPS location of the employee and will be automatically sent to admin after every 5 minutes

- **User Logout:** Once the user logout the system, image of the user and current GPS location will be send to admin.

- **Profile management:** Enables employees to view and manage their personal information.

- **Time tracking:** Tracks the work hours of employees by starting and stopping a timer.

- **Notifications:** Sends notifications to employees about important events.

- **Admin management:** Allows administrators to manage employee accounts and assign different roles and permissions.

Non-functional Requirements

- **Performance Requirements**

High availability
Low latency
Scalable location tracking
Offline storage
Minimal battery usage
Minimal user input
Fast response times

- **Safety Requirements**

Secure employee data (access).
Track only during work hours/purposes.
Clear guidelines on non-work tracking.
Transparent instructions/warnings for employees.
Regular security updates and testing.
Prioritize employee safety and device protection.

- **Security Requirements**

Secure data (encryption)
Prevent data loss (backups, access control)
Secure devices (theft prevention)
Comply with data privacy laws

- **Software Quality Attributes**

Reliability:

- Admin/HR/Employee access, Clear UI (text/icons/colors), Audio alerts

Portability:

- Web & Android with backup support

Robustness:

- Cost-effective development, Efficient location tracking

Extendibility:

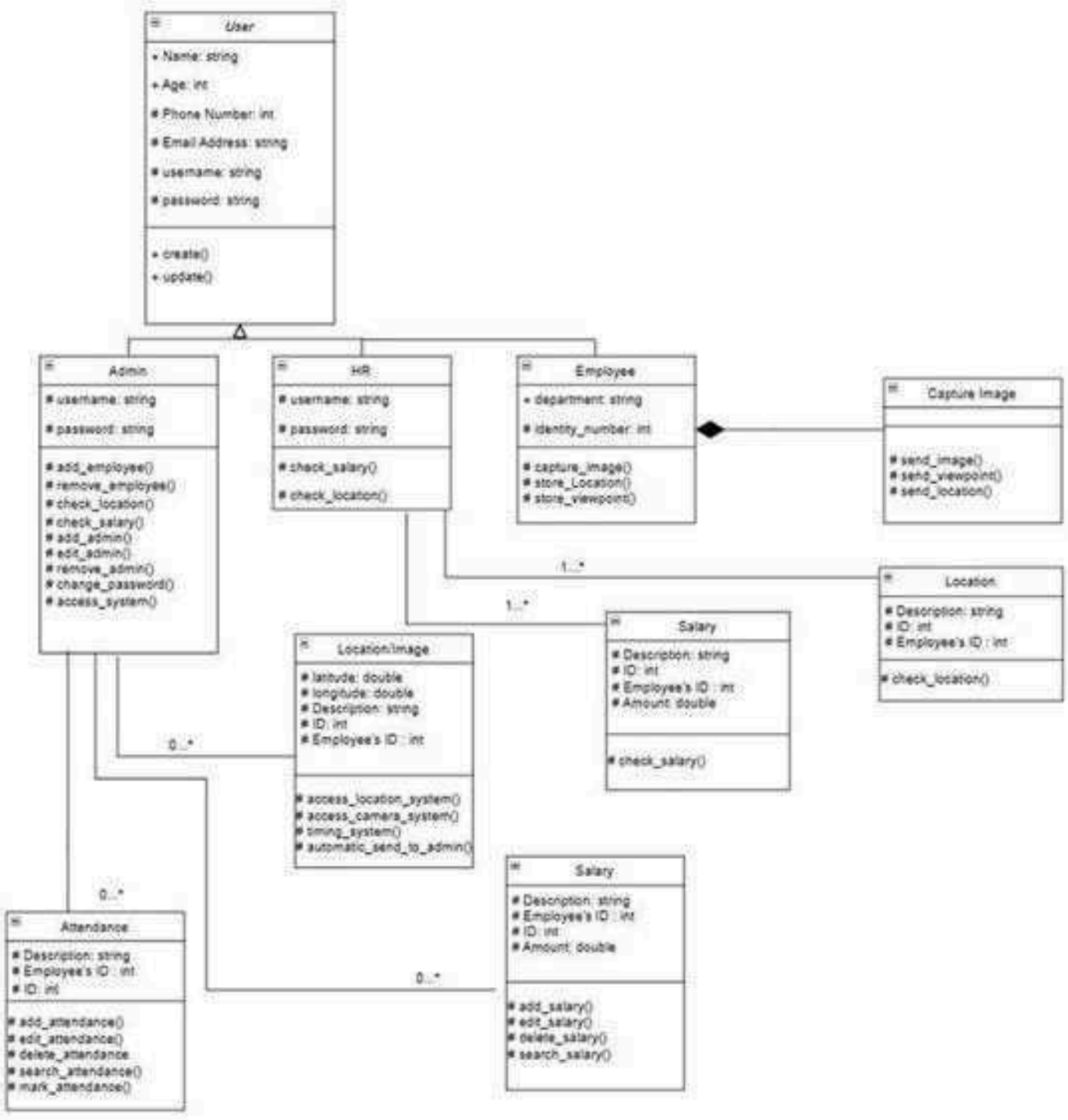
- Easy integration of new features

- **Business Rules**

Track Attendance (check-in/out)
Manage Working Hours (flex, shifts, overtime)
Automate Salary Calculations (job, experience, performance)
Track Location (optional: image verification)

Some important diagrams.

UML Diagram


User
+ Name: string
+ Age: int
# Phone Number: int
# Email Address: string
# username: string
# password: string
+ create()
+ update()
Admin
username: string
password: string
add_employee()
remove_employee()
check_location()
check_salary()
add_admin()
edit_admin()
remove_admin()
change_password()
access_system()
HR
username: string
password: string
check_salary()
check_location()
Employee
+ department: string
# identity_number: int
# capture_image()
# store_Location()
# store_viewpoint()
Capture Image
send_image()
send_viewpoint()
send_location()
Location
Description: string
ID: int
Employee's ID : int
check_location()
Salary
Description: string
ID: int
Employee's ID : int
Amount: double
check_salary()
Location/Image
latitude: double
longitude: double
Description: string
ID: int
Employee's ID : int
access_location_system()
access_camera_system()
timing_system()
automatic_send_to_admin()
Salary
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Employee's ID : int
ID: int
Amount: double
add_salary()
edit_salary()
delete_salary()
search_salary()
Attendance
Description: string
Employee's ID : int
ID: int
add_attendance()
edit_attendance()
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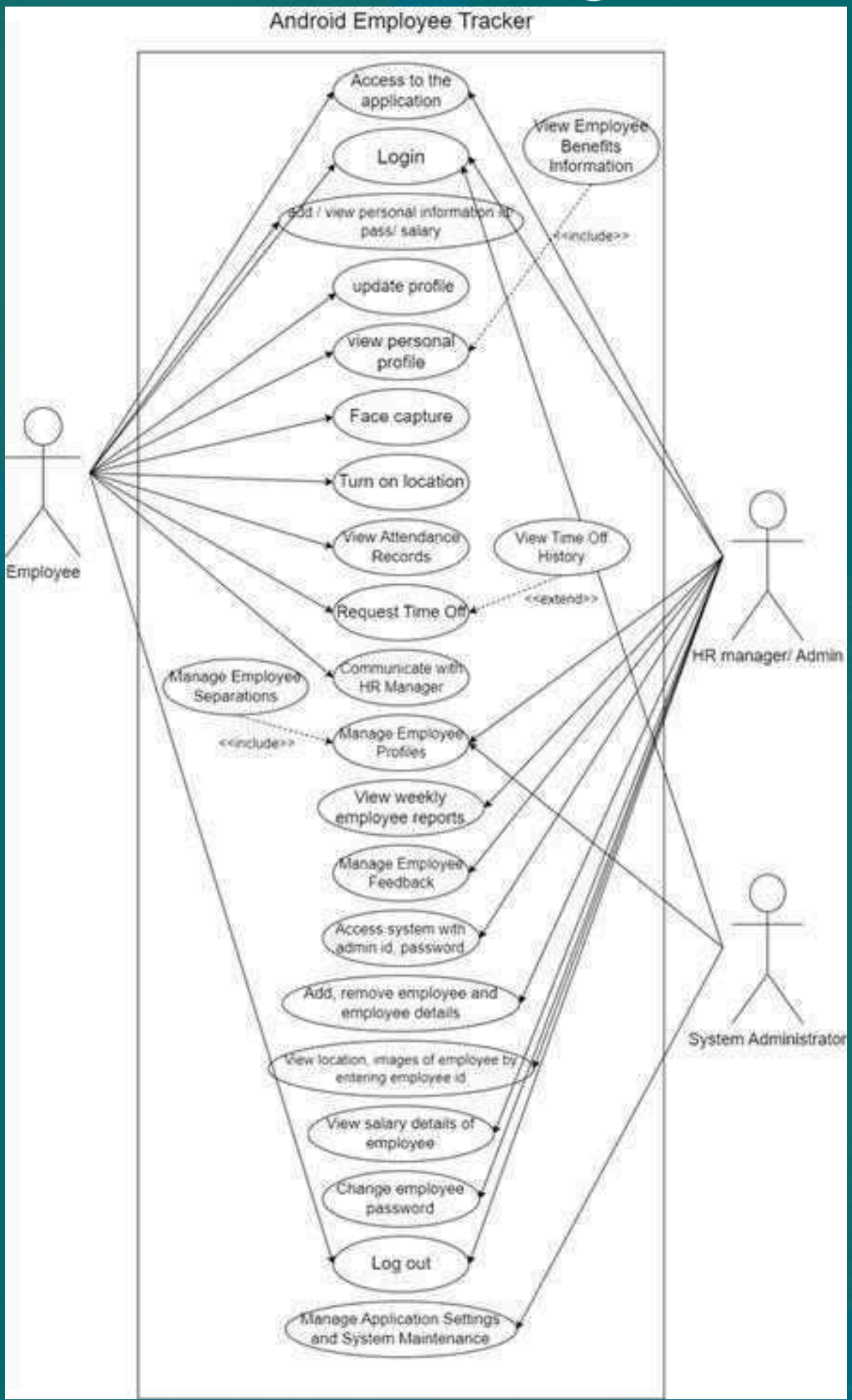
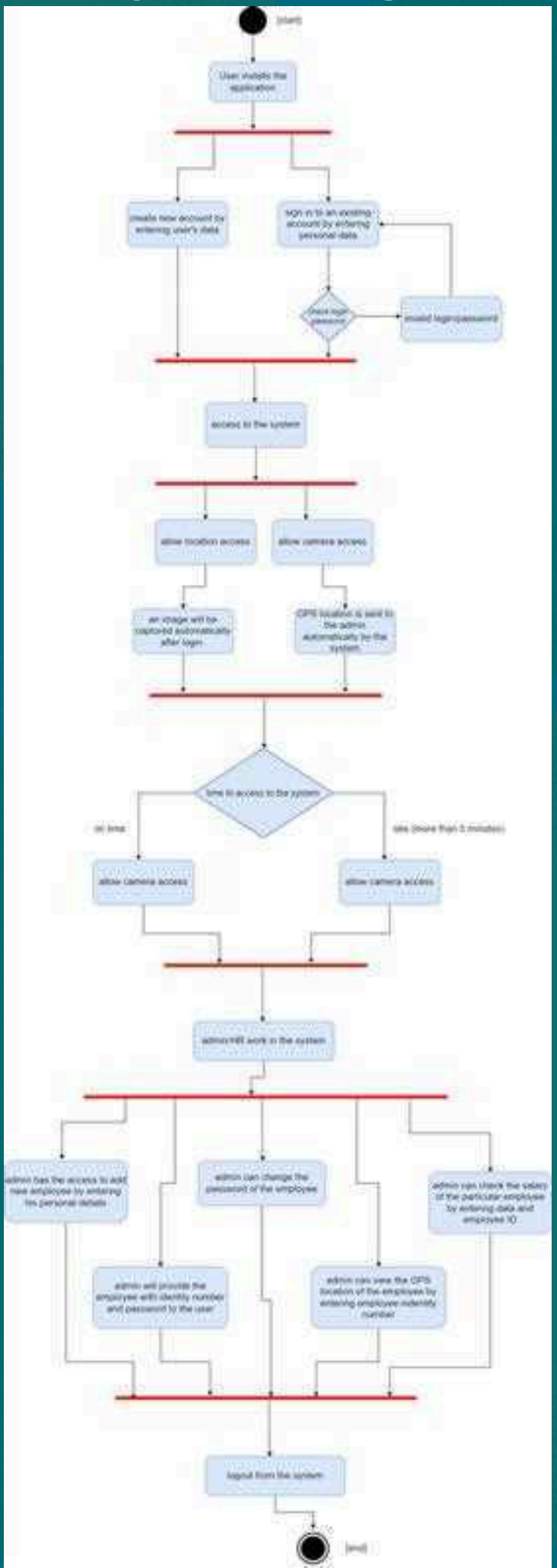
search_attendance()
mark_attendance()
1..*
1..*
0..*
0..*
0..*

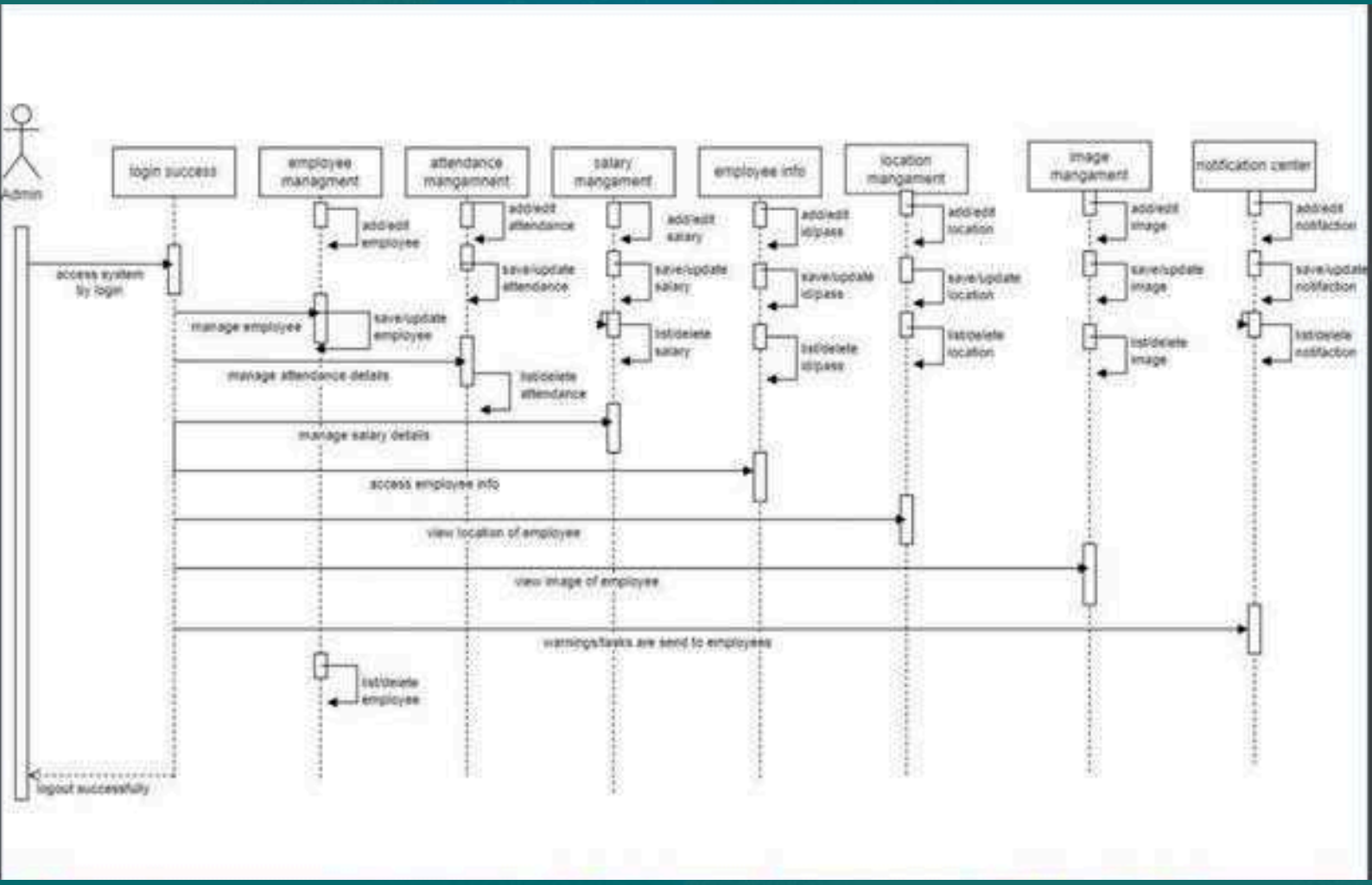
Use Case Diagram



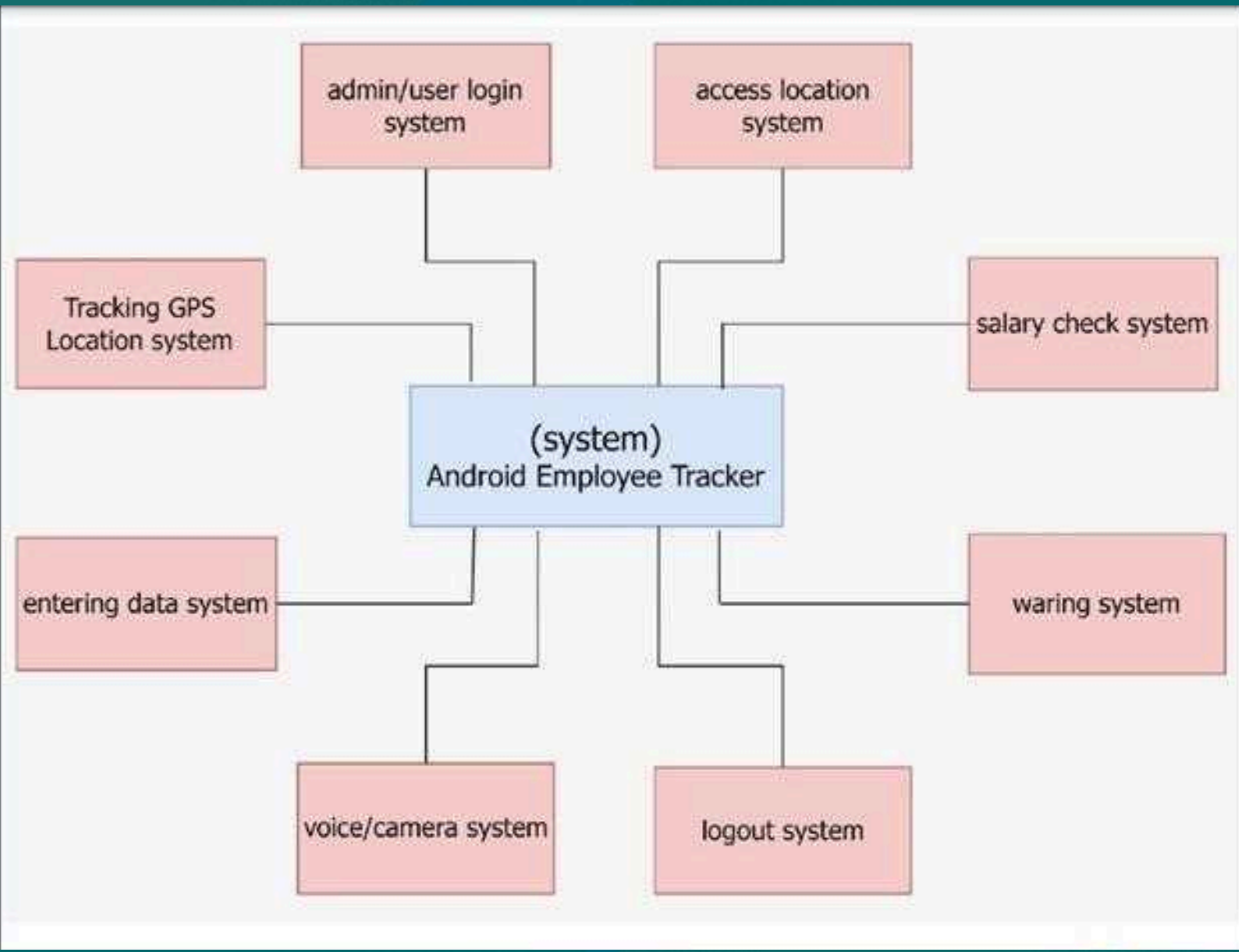
Activity Diagram



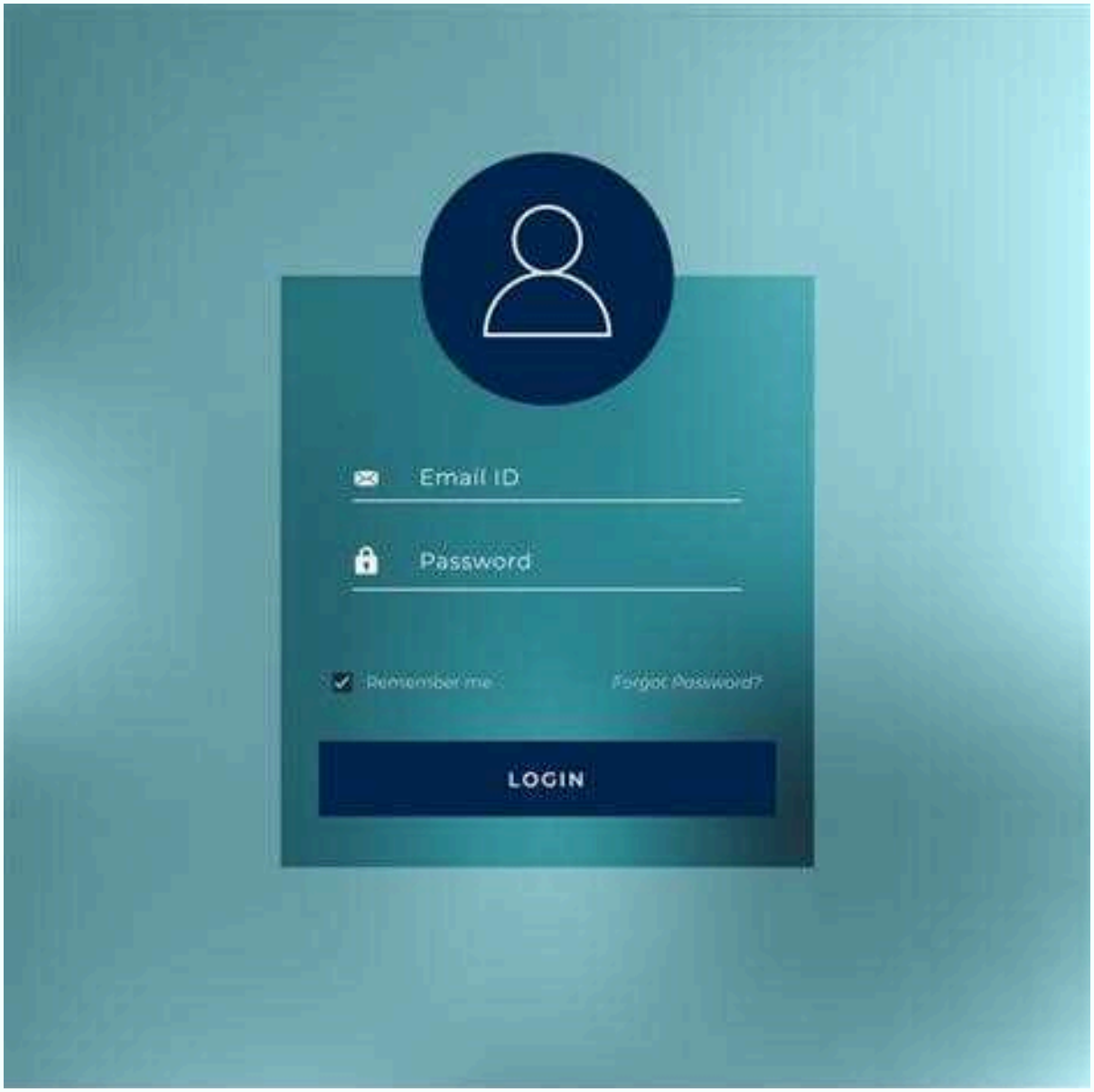
Sequence Diagram



Context Diagram



UI for login screen



Unit Testing

Functional Requirement Testing:

1. **Admin Login:**
 - Test Case: Admin successfully logs in with correct admin ID and password.
 - Expected Outcome: Admin gains access to admin functionalities.

 - Test Case: Admin fails to log in with incorrect credentials.
 - Expected Outcome: Error message displayed, access denied.

2. **Add Employee:**
 - Test Case: Admin adds a new employee with valid details.
 - Expected Outcome: New employee added to the system successfully.

 - Test Case: Admin tries to add an employee with an existing ID.
 - Expected Outcome: Error message displayed, employee not added.

3. **View Location:**
 - Test Case: Admin views the GPS location of an employee by entering valid employee ID and date.
 - Expected Outcome: Location details displayed accurately.

 - Test Case: Admin views location with invalid employee ID or date.
 - Expected Outcome: Error message displayed, location not found.

4. **Check Salary:**
 - Test Case: Admin checks the salary of an employee by entering valid employee ID and date.
 - Expected Outcome: Salary details displayed accurately.

 - Test Case: Admin checks salary with invalid employee ID or date.
 - Expected Outcome: Error message displayed, salary not found.

5. **View Point:**
- Test Case: Admin views latitude and longitude of the GPS location of an employee.
- Expected Outcome: GPS coordinates displayed accurately.

6. **Change Password:**
- Test Case: Admin changes the password of an employee.
- Expected Outcome: Password updated successfully.

- Test Case: Admin tries to change password for a non-existent employee.
- Expected Outcome: Error message displayed, password not updated.

7. **HR Login:**
- Test Case: HR successfully logs in with correct HR ID and password.
- Expected Outcome: HR gains access to HR functionalities.

- Test Case: HR fails to log in with incorrect credentials.
- Expected Outcome: Error message displayed, access denied.

8. **Check Location:**
- Test Case: HR checks the GPS location of an employee by entering valid employee ID and date.
- Expected Outcome: Location details displayed accurately.

- Test Case: HR checks location with invalid employee ID or date.
- Expected Outcome: Error message displayed, location not found.

9. **Check Salary:**
- Test Case: HR checks the salary of an employee by entering valid employee ID and date.
- Expected Outcome: Salary details displayed accurately.

- Test Case: HR checks salary with invalid employee ID or date.
- Expected Outcome: Error message displayed, salary not found.

10. **User Login:**
- Test Case: User successfully logs in with correct user ID and password.
- Expected Outcome: User gains access to user functionalities.

- Test Case: User fails to log in with incorrect credentials.
- Expected Outcome: Error message displayed, access denied.

11. **Tracking GPS Location:**
- Test Case: System tracks GPS location of employees and sends updates to admin every 5 minutes.
- Expected Outcome: GPS locations updated regularly and sent to admin.

12. **User Logout:**
- Test Case: User logs out of the system.
- Expected Outcome: User's image and current GPS location sent to admin.

13. **Profile Management:**
- Test Case: Employee updates personal information in their profile.
- Expected Outcome: Profile information updated successfully.

14. **Time Tracking:**
- Test Case: Employee starts and stops the timer to track work hours.
- Expected Outcome: Timer records accurate work hours.

15. **Notifications:**
- Test Case: Admin sends notifications to employees about important events.
- Expected Outcome: Employees receive notifications promptly.

16. **Admin Management:**
- Test Case: Admin manages employee accounts and assigns different roles and permissions.
- Expected Outcome: Changes in employee accounts reflected accurately.

Non-Functional Requirement Testing:

1. **Performance Requirements:**
 - Test Case: Measure system uptime over a period to ensure it meets the requirement of 99% uptime.
 - Expected Outcome: System uptime meets or exceeds the specified requirement.
 - Test Case: Measure response time for different operations to ensure it meets the requirement of 3s response time.
 - Expected Outcome: Response time for operations meets or is under the specified requirement.

2. **Safety Requirements:**
 - Test Case: Ensure that employee data is securely stored and accessible only to authorized users.
 - Expected Outcome: Employee data encrypted and accessible only to authorized users.
 - Test Case: Validate that tracking occurs only during work hours and for work-related purposes.
 - Expected Outcome: Tracking only active during work hours and for work-related purposes.

3. **Security Requirements:**
 - Test Case: Verify that data transmission between client and server is encrypted using HTTPS.
 - Expected Outcome: Data transmission encrypted using HTTPS protocol.
 - Test Case: Ensure that only authorized users can access sensitive functionalities.
 - Expected Outcome: Access to sensitive functionalities restricted to authorized users.

4. **Software Quality Attributes:**
- Test Case: Ensure reliability of admin/HR/employee access and UI clarity.
- Expected Outcome: Access to functionalities and UI elements clear and reliable.
- Test Case: Test portability of the application across web and Android platforms.
- Expected Outcome: Application functions smoothly on both platforms with backup support.
- Test Case: Evaluate robustness of the application and its cost-effectiveness.
- Expected Outcome: Application robust and development cost-effective.
- Test Case: Test extendibility by integrating new features.
- Expected Outcome: New features seamlessly integrated into the application.

5. **Business Rules:**
- Test Case: Track attendance and manage working hours as per business rules.
- Expected Outcome: Attendance tracked accurately and working hours managed efficiently.
- Test Case: Automate salary calculations based on job, experience, and performance.
- Expected Outcome: Salary calculations accurate and automated.
- Test Case: Track location and enforce clear guidelines on non-work tracking.
- Expected Outcome: Location tracking compliant with business rules and guidelines.

Integral Testing

Integration Testing for Android Employee Tracker Application

1.Admin Management & Employee Management Integration:

- **Scenario**: After successfully logging in, the admin navigates to the employee management section and adds a new employee by entering their personal details, including ID and password.

    - **Expected Outcome:** Upon submission, the system accurately stores the employee's information, ensuring seamless integration between admin management and employee management functionalities.

2. Location Tracking & Notification Integration:

- **Scenario**: As an employee moves throughout the day, the system continuously tracks their GPS location. If the employee enters or leaves a predefined area, such as the office premises, the system sends a notification to the admin.

    - **Expected Outcome**: The location tracking feature operates seamlessly, providing real-time updates on employee movements. Notifications are promptly sent to the admin, ensuring efficient monitoring of employee whereabouts.

3. Authentication & Access Control Integration:

- **Scenario**: Upon logging in, the admin accesses employee details based on their role and permissions. For instance, HR managers may have access to salary information, while regular employees can only view their own profile.

    - **Expected Outcome:** The authentication system grants access to functionalities based on user roles and permissions. Admins can securely access and manage employee data, ensuring compliance with access control policies.

4. Performance & Scalability Integration:

- **Scenario**: The system undergoes stress-testing with a simulated high number of simultaneous users, up to the specified scalability limit. Performance metrics, such as response time and resource utilization, are monitored under varying load conditions.

  - **Expected Outcome:** The system maintains optimal performance and scalability, even under heavy load. Response times remain within the specified threshold, ensuring uninterrupted operation for all users.

5. Security & Data Privacy Integration:

- **Scenario**: Employee data, including personal details and location information, is encrypted during transmission and securely stored on the server. Access to sensitive data is strictly controlled through authentication mechanisms.

  - **Expected Outcome:** Security measures, including encryption protocols and access controls, are seamlessly integrated into the system. Employee data remains protected against unauthorized access, ensuring compliance with data privacy regulations.

6. User Interface & User Experience Integration:

- **Scenario**: Users interact with the system's user interface to perform various tasks, such as viewing employee details and tracking location. The interface is intuitive, with clear navigation and informative feedback messages.

  - **Expected Outcome**: The user interface provides a seamless experience for administrators and employees alike. Navigation is intuitive, and functionalities are easily accessible. Feedback messages are informative, guiding users through their interactions with the system.

The Team

Team leader:
Merna Hesham
192100080

Merna Ahmed
192100144

Ali Hazem
192100116