WanderPlan - Personalized Food and Travel Recommendation Ecosystem

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by

ABDULLAH AHTSHAM

MUHAMMAD BILAL BUTT

MUHAMMAD NABEEL AWAIS

BS. Software Engineering, Riphah International University

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by

45679

44712

43944

SUPERVISOR:

Shahzad Ahmad Khan

RIPHAH INTERNATIONAL UNIVERSITY, ISLAMABAD

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Final Approval

This is to certify that we have read the report submitted by **Abdullah Ahtsham (45679)**, **M. Bilal Butt (44712)** and **M. Nabeel Awais (43944)** for the partial fulfillment of the requirements for the degree of **Bachelor of Science in Software Engineering (BSSE)**.

It is our judgment that this report is of sufficient standard to warrant its acceptance by **Riphah International University, Islamabad** for the award of the degree of **Bachelor of Science in Software Engineering (BSSE)**.

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Dr. Shahzad Ahmad Khan
Associate Professor

_____

Dr. Musharraf
Head of Department, Faculty of Computing

Declaration

We hereby declare that this document titled **"WanderPlan"**, neither as a whole nor in part, has been copied or reproduced from any source. It is further declared that we have completed this project and the accompanying report entirely on the basis of our personal efforts, under the proficient guidance of our supervisor, **Mr. Shahzad Ahmad Khan**.

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Abdullah Ahtsham — 45679

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M. Bilal Butt — 44712

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M. Nabeel Awais — 43944

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Dedication

To our Creator — the One who deserves all unconditional praise and worship,
the One who merely says "Be," and it is.

(Qur'an, 36:82)

To our loving and caring parents, who have worked tirelessly to raise us,
our friends and teachers, whose wisdom and guidance have shaped our journey.

Acknowledgment

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Abdullah Ahtsham – 45679

M. Bilal Butt – 44712

M. Nabeel Awais – 43944

Abstract

WanderPlan is a mobile-based travel companion application that integrates budget planning, local recommendations, and real-time navigation into a unified platform. The aim of this project is to help tourists manage their travel expenses efficiently while discovering authentic local food, attractions, and experiences — all within their defined budget.

Unlike existing fragmented solutions that require users to rely on multiple applications for food discovery, accommodation, and transportation, WanderPlan offers an all-in-one solution through its intelligent recommendation and budget management system. The system dynamically allocates a tourist's budget across accommodation, travel, and dining, while suggesting optimal and authentic options powered by user-generated content (UGC) and location-based data.

The application also incorporates a community-driven review system that enables contributors to share their experiences and earn rewards, thus promoting engagement and authenticity. Real-time mapping and navigation features enhance usability by allowing users to explore nearby attractions, restaurants, and deals, with transparent distance and cost estimation.

Ultimately, WanderPlan aims to transform how tourists plan and experience their journeys by offering an integrated, efficient, and user-centered travel management solution. The project contributes to accessible and culturally immersive tourism while leveraging technology for convenience, personalization, and engagement.

Contents

Chapter 1

Introduction

1.1   Opportunity & Stakeholders

The global travel and tourism industry continues to grow rapidly, driven by advancements in digital technologies and increased accessibility of information. The modern traveler seeks convenience, personalization, and efficiency. Whether it is choosing the right destination, managing trip expenses, or discovering the best food spots, travelers expect intelligent and unified tools that streamline their journey. Despite this demand, most existing applications in the travel ecosystem remain fragmented — some focus solely on navigation, others on reviews, and a few on budgeting. This lack of integration creates inefficiencies, forcing users to juggle multiple applications during a single trip.

Our project, **WanderPlan**, addresses this gap by offering a single mobile platform that integrates trip budgeting, food and accommodation recommendations, maps, reviews, and gamified user engagement. It introduces a data-driven and AI-powered approach to trip management, reducing cognitive load for users and enabling smarter travel planning.

1.1.1   Industry Context and Emerging Opportunity

According to the World Tourism Organization (UNWTO), the demand for personalized digital travel assistance has never been higher. The increasing role of artificial intelligence, data analytics, and user-generated content (UGC) in decision-making processes provides an opportunity to develop a next-generation travel solution that bridges gaps in cost management and experience personalization.

Travelers today are not only looking for places to visit — they are seeking meaningful, budget-friendly, and memorable experiences. In this evolving ecosystem, a platform that integrates travel budgeting with AI-based discovery can transform how people plan and experience trips.

1.1.2   Stakeholders

To ensure a user-centered design, multiple stakeholders were identified during requirement analysis:

- **Tourists/End Users:** Individuals who use the app to plan trips, input budgets, explore attractions, view maps, and leave reviews. They are the core users driving the application's ecosystem.

- **Local Contributors:** Users who share reviews, ratings, images, and feedback for places and restaurants. Their contributions enrich platform authenticity and assist others in decision-making.

- **Businesses and Partners:** Restaurants, hotels, and tourist services that collaborate through the *Business & Ads Module* to promote deals, sponsored listings, and advertisements.

WanderPlan connects these four groups into a shared ecosystem where every interaction adds value — whether through feedback, engagement, or collaboration.

1.2   Motivations & Challenges

1.2.1   Motivation

The primary motivation behind WanderPlan stems from the fragmented experience that travelers face while using current travel-related applications. A single trip might require:

- Using Google Maps for navigation,

- Foodpanda or Yelp for restaurant discovery,

- Airbnb or Booking.com for accommodation,

- Splitwise or a spreadsheet for budgeting.

This multi-app dependency creates confusion, wastes time, and limits the sense of personalization. Moreover, these applications typically do not communicate with each other — meaning users cannot automatically calculate how a restaurant visit affects their daily travel budget or how nearby attractions align with their financial plan.

The idea of WanderPlan emerged to combine these separate functionalities into a cohesive mobile platform that acts as a "smart companion" for travelers. It leverages AI-driven recommendations, real-time data integration, and user contributions to create a holistic travel experience. By empowering travelers to plan and act within a single ecosystem, WanderPlan bridges convenience and intelligence.

1.2.2   Challenges

The development of a multi-functional travel app like WanderPlan presents several challenges — technical, functional, and operational.

1. Data Aggregation and Integration

The platform depends on multiple APIs — including Google Maps, food discovery services, and hotel listing databases. Integrating these diverse datasets while maintaining accuracy, performance, and up-to-date information is a major challenge.

2. Dynamic Budgeting

Designing a **Dynamic Budget Engine** that adjusts cost allocations (for food, transport, and accommodation) based on trip duration, region, and user preferences required robust logic and testing. Ensuring these estimates remain accurate and regionally consistent was a complex task.

3. User-Generated Content (UGC) Authenticity

While UGC enhances personalization, it introduces risks such as spam, biased reviews, or inaccurate data. Implementing effective moderation, credibility scoring, and gamified engagement required thoughtful backend design.

4. Scalability & System Efficiency

As the app grows in popularity, maintaining scalability becomes critical. Handling large numbers of concurrent users, managing database queries, and ensuring low-latency responses demanded optimized architecture and cloud-ready deployment strategies.

5. UI/UX Design and Navigation Flow

Integrating multiple modules — trip planning, reviews, maps, and business ads — while maintaining a minimalistic, intuitive, and SORA-friendly interface was another design-level challenge.

1.3   Goals & Objectives

1.3.1   Introduction

WanderPlan's central goal is to simplify and enhance the travel experience through an integrated digital platform. It not only guides tourists in planning and budgeting their trips but also fosters an engaging environment through community participation and rewards.

1.3.2   Overall Goal

The project's ultimate goal is to design and implement an AI-powered mobile application that:

1. Helps tourists plan and manage trips based on personalized budgets.

2. Provides real-time, location-based recommendations for food, hotels, and attractions.

3. Enables users to contribute reviews and earn gamified rewards.

4. Supports small local businesses through targeted advertisements.

1.3.3   Rationale

The rationale for developing WanderPlan lies in the increasing need for a unified, intelligent, and socially driven travel platform. Unlike existing applications that focus on singular functions, WanderPlan unites diverse domains — budgeting, recommendations, mapping, and UGC — under a single, cohesive architecture. This integration not only enhances usability but also aligns with modern travel behaviors where decision-making is data-driven and social in nature.

1.3.4   Timeline

The project followed a structured timeline divided into three main phases:

- **Phase 1 – Research & Design (Weeks 1–10):** Market analysis, competitor study, user personas, UI/UX prototyping, and architectural documentation.

- **Phase 2 – Development (Weeks 11–22):** Implementation of mobile frontend (Flutter), backend (Node.js/Express), and database (MongoDB/Firebase) modules.

- **Phase 3 – Testing & Deployment (Weeks 23–30):** Integration testing, UI evaluation, cloud deployment, and user acceptance testing.

1.3.5 Success Criteria

The system is deemed successful if:

1. The AI recommendation module produces contextually relevant results.

2. The budget engine maintains consistent accuracy across different trip scenarios.

3. The UGC module supports high engagement while filtering low-quality content.

4. The UI remains smooth and responsive under load.

5. The system is deployable on both Android and iOS platforms.

1.4 Scope & Limitations

1.4.1 Scope

The scope of WanderPlan includes the design, development, and testing of a complete travel management mobile application with the following functionalities:

- **Trip and Budget Management:** Users can input budgets, generate trip plans, and manage financial allocations dynamically.

- **AI-based Recommendations:** Personalized suggestions for restaurants, accommodations, and tourist attractions based on preferences, distance, and budget.

- **Maps and Navigation:** Route mapping, distance estimation, and cost calculation integrated with real-time location services.

- **UGC Module:** Interactive review feeds, reactions, comment threads, and contributor engagement.

- **Gamification & Rewards:** A system that motivates user participation through badges, milestones, and discount coupons.

- **Business Integration:** Restaurants and hotels can advertise deals and manage business profiles directly.

1.4.2 Limitations

Despite its robustness, WanderPlan operates within certain boundaries:

- The application currently relies on external APIs whose rate limits can affect data availability.

- Offline functionality is limited; continuous connectivity is required for live recommendations.

- Real-time currency conversion and halal/haram filtering are planned as future modules.

- Business advertisement analytics are in the basic version; future releases will enhance data visualization.

1.5   Solution Overview

1.5.1   Personalized Budget Engine

At the core of WanderPlan lies a **Dynamic Budget Engine** that allows users to specify their total trip budget, which the system intelligently divides across categories such as food, lodging, and transportation. The engine adapts to regional costs and user priorities, using cost prediction models derived from API data and real user submissions.

1.5.2   AI-based Recommendation System

The recommendation engine integrates AI algorithms and API data to present tailored suggestions. Based on user preferences, location, and prior interactions, the system ranks and displays top-rated attractions, restaurants, and experiences — ensuring personalization and variety.

1.5.3   Maps & Navigation Integration

Powered by Google Maps API, WanderPlan provides turn-by-turn navigation, route optimization, and nearby suggestions. It also calculates approximate travel costs and integrates seamlessly with the budgeting engine, updating expense estimates dynamically.

1.5.4   Reviews & Contributor System

This module transforms users into active contributors. Tourists can post reviews, upload media, and interact with others via likes, comments, and replies — similar to microblogging platforms. A moderation layer ensures authenticity, while a reward system encourages engagement through redeemable points.

1.5.5   Gamification & Business Module

Businesses can showcase sponsored listings or offer exclusive deals. The gamification system tracks user milestones and converts engagement into coupons, thereby promoting both user retention and business visibility.

1.6   Report Outline

- **Chapter 1: Introduction** – Discusses the background, motivation, goals, and solution overview of the WanderPlan system.

- **Chapter 2: Literature / Market Survey** – Provides an in-depth review of existing systems such as TripAdvisor, Yelp, and Splitwise, identifying key gaps and opportunities.

- **Chapter 3: Requirement Engineering** – Documents functional and non-functional requirements, user personas, and system use cases.

- **Chapter 4: System Design** – Describes system architecture, UI/UX frameworks, data flow, and database schema.

- **Chapter 5: Implementation & Testing** – Outlines the actual development, integration, and testing methodologies.

- **Chapter 6: Conclusion & Future Work** – Concludes with results, limitations, and potential expansions such as AR exploration and halal/haram filtering.

Chapter 2

Literature / Market Survey

2.1 Introduction

The travel industry has undergone a major digital transformation in the past decade. With the proliferation of smartphones and internet connectivity, travelers now rely heavily on mobile applications for nearly every aspect of their journey— from budgeting and navigation to restaurant discovery and accommodation booking. However, while the ecosystem of travel-related applications continues to grow, there remains a lack of integration among different services. Users must depend on multiple platforms to perform tasks that could otherwise be managed seamlessly in one place.

This chapter presents an in-depth review of the technologies, systems, and platforms related to WanderPlan's proposed solution. It highlights the evolution of travel and expense management systems, the gaps in existing solutions, and the opportunities that informed the design of our project.

2.2 Literature Review / Technologies Overview

2.2.1 Historical Context

Early travel management solutions were limited to desktop-based tools, focusing mainly on itinerary creation and manual data entry. As mobile technologies evolved, applications like TripAdvisor and Yelp transformed travel by introducing crowd-sourced reviews and ratings. Later, budgeting tools such as Splitwise and Trabee Pocket simplified expense tracking during trips. Despite these advancements, users still face challenges in synchronizing travel planning, financial management, and discovery experiences.

The recent trend toward AI-driven personalization and predictive recommendations has created an opportunity for integrated systems like WanderPlan. The shift toward unified digital ecosystems—where data from multiple domains (budget, navigation, food, and experiences) is connected—forms the foundation of this project.

2.2.2   Key Concepts and Theories

The following technological concepts serve as the backbone of WanderPlan's system design:

- **User-Centered Design (UCD):** Emphasizes the importance of designing around the needs, behaviors, and expectations of travelers. UCD ensures intuitive navigation, simplicity, and emotional engagement.

- **Personalization Algorithms:** AI models and recommendation systems analyze user preferences, trip data, and local trends to generate tailored travel and food suggestions.

- **Gamification in User Experience:** Incorporating reward systems, badges, and milestones increases engagement and user retention—essential in platforms relying on continuous UGC participation.

- **API-driven Architecture:** RESTful APIs enable interoperability with external services like Google Maps, Yelp, or Foodpanda for real-time information access.

- **Community-driven Data (UGC):** Encourages authentic reviews and ratings while fostering trust through social validation mechanisms.

2.2.3   Related Work

Several existing systems and research projects explore components relevant to WanderPlan, such as recommendation algorithms, expense tracking, and integrated user experiences. For instance:

- **TripAdvisor (2010–Present):** Pioneered user-generated reviews in the tourism industry, providing travelers with decision-making power through shared experiences.

- **Splitwise:** Simplified group expense management but lacks integration with travel-specific costs like fuel, meals, or accommodations.

- **Google Travel:** Offers itinerary management but with limited customization and budget forecasting capabilities.

While these systems individually perform their roles well, there remains a need for an integrated, context-aware mobile application that merges budgeting, discovery, and travel analytics under one ecosystem.

2.2.4 Gap Identification

Despite the technological advancements in the travel and hospitality sectors, the following key gaps exist:

1. **Fragmented User Experience:** Current applications focus on narrow domains, forcing users to toggle between multiple platforms during travel.

2. **Lack of Smart Budgeting:** Most travel apps do not offer adaptive financial planning or predictive expense allocation.

3. **Absence of Cross-Domain Insights:** Few systems link user behavior (reviews, expenses, travel routes) to personalized recommendations.

4. **Limited Gamified Engagement:** Engagement mechanisms are mostly static; few apps reward continuous community participation.

WanderPlan addresses these issues by unifying travel budgeting, AI-based discovery, navigation, and user-generated engagement into a single, scalable mobile application.

2.3 Brainstorming and Conceptualization

During the conceptual phase, multiple brainstorming sessions were conducted to identify critical user pain points and potential market gaps. Each team member contributed insights based on real-life travel experiences, user surveys, and competitor analysis.

Some of the recurring problems identified included:

- Difficulty in maintaining travel budgets across different categories.

- Dependence on multiple apps for accommodation, food, and attractions.

- Lack of verified and authentic local reviews.

- Poor user retention in travel-related applications due to low engagement.

Through these insights, the concept of WanderPlan evolved — an integrated travel ecosystem that personalizes experiences, simplifies budgeting, and creates a self-sustaining review community.

2.4   Existing Systems / Comparative Study

This section evaluates several existing systems similar to WanderPlan to understand their strengths, weaknesses, and potential contributions to our design decisions.

2.4.1   TripAdvisor

TripAdvisor remains one of the most recognized platforms in the travel domain. It provides comprehensive data about attractions, restaurants, and accommodations with user-generated reviews and ratings. However, its limitation lies in its lack of real-time budgeting and route optimization. WanderPlan takes inspiration from TripAdvisor's review structure but integrates it directly into the travel budgeting workflow.

2.4.2   Google Travel

Google Travel consolidates bookings, itineraries, and destination insights, offering trip summaries and schedules. However, it functions more as a passive aggregator rather than an interactive planner. WanderPlan enhances this model by allowing dynamic budget inputs, custom route planning, and cost calculations that adapt based on real-time data.

2.4.3   Foodpanda

Foodpanda specializes in food delivery and restaurant listings but does not connect with travelers' location-based exploration needs. WanderPlan integrates food discovery within its recommendation module, helping travelers find restaurants nearby or along their routes — with options categorized by cuisine, ratings, and budget range.

2.4.4   Yelp

Yelp focuses on reviews and recommendations across categories, relying heavily on UGC. However, its interface is primarily static and lacks the element of engagement through gamification. WanderPlan's approach uses similar UGC systems but enriches them through interaction features, like comment threads, reactions, and milestone-based contributor rewards.

2.4.5   Splitwise

Splitwise is widely used for expense tracking, especially among group travelers. However, it lacks AI-driven prediction and cannot suggest where or how users should spend to stay within budget. WanderPlan's Dynamic Budget Engine combines predictive analytics and real-world cost data to automate budget allocations and recommendations.

2.4.6 Trabee Pocket

Trabee Pocket allows offline expense tracking, making it useful for travelers without internet access. Nevertheless, it lacks automation and integration with external APIs. In contrast, WanderPlan automates data retrieval, offering near-real-time synchronization of trip expenses and recommendations.

2.4.7 Comparison Table

TABLE 2.1: Comparison of Existing Travel and Budgeting Systems

Application	Key Features	Limitations	Inspiration for WanderPlan
TripAdvisor	User reviews, attractions, ratings	No budgeting or navigation integration	Review and rating interface
Google Travel	Itinerary management, bookings	No cost prediction or UGC	Real-time data integration
Foodpanda	Restaurant listings and delivery	Limited to food ordering	Restaurant discovery for travelers
Yelp	UGC-based reviews across categories	Static UI, lacks gamification	Interactive and engaging review system
Splitwise	Expense sharing and tracking	No predictive budgeting or maps	Budget engine foundation
Trabee Pocket	Offline expense tracking	No real-time updates	Enhanced online expense tracking

2.5 Survey and Feedback Analysis

To validate the project concept, a small-scale online survey was conducted with 75 respondents, including frequent travelers, students, and local tourists. The survey focused on identifying pain points and expectations regarding travel applications.

Key findings include:

- 86% of participants use three or more apps for a single trip.

- 72% reported difficulty maintaining budgets while traveling.

- 68% expressed interest in a unified app combining planning, reviews, and budgeting.

- 55% believed authentic local reviews enhance decision-making.

These findings reinforced the feasibility and need for WanderPlan as an integrated digital travel assistant.

2.6   Summary

The literature and market survey reveals that while existing platforms provide valuable services within specific domains, none offer the holistic functionality required for modern travel. By integrating trip budgeting, food and accommodation discovery, real-time navigation, and user-generated reviews, WanderPlan emerges as a next-generation solution that enhances convenience, trust, and engagement.

This comprehensive market understanding laid the foundation for the requirements engineering process detailed in the next chapter.

Chapter 3

Requirement Engineering

3.1 Introduction

Requirement Engineering (RE) serves as the foundation for developing a reliable, user-centered, and scalable software system. It involves discovering, analyzing, documenting, and validating the needs of users and stakeholders. The purpose of this chapter is to formally define the functional and non-functional requirements of WanderPlan, ensuring clarity for design and development teams.

WanderPlan aims to assist tourists in planning budget-friendly trips while discovering authentic food options and local experiences. The system integrates budgeting tools, personalized recommendations, review-based validation, mapping services, and a gamified user-generated content (UGC) mechanism.

3.2 Requirement Engineering Process

The requirement engineering process adopted for WanderPlan is iterative and user-focused. Key activities include:

- **Elicitation:** Primary research through surveys, interviews, and observation of traveler pain points; benchmarking platforms such as TripAdvisor, Google Travel, Airbnb, Foodpanda, and Splitwise.

- **Analysis:** Organizing user needs into clear modules, removing ambiguities, and resolving conflicts.

- **Specification:** Documenting requirements in structured form including FRs, NFRs, and use-cases.

- **Validation:** Cross-checking requirements through supervisor feedback, stakeholder review, and feasibility analysis.

The iterative feedback cycle ensures continuous refinement, producing realistic and implementable system requirements.

3.3   Stakeholder Analysis

WanderPlan involves multiple direct and indirect stakeholders:

- **Tourists / Travelers:** Primary system users who plan trips, manage budgets, and explore recommendations.

- **Local Contributors / Reviewers:** Users who upload reviews, photos, ratings, and earn rewards.

- **Businesses (Restaurants, Hotels, Travel Services):** Entities showcasing offerings and sponsored deals.

3.4   User Stories

- As a tourist, I want to enter my budget so I can receive a personalized travel plan.

- As a user, I want to browse food and places near me to explore local culture.

- As a traveler, I want to view trip cost breakdown so I can spend wisely.

- As a contributor, I want to post reviews and images to help other travelers.

- As a business owner, I want to promote my restaurant or hotel by offering deals.

3.5   Functional Requirements

3.5.1   Trips & Budget Module

- FR-1: The system shall allow the user to input total travel budget.

- FR-2: The system shall dynamically allocate budget for food, travel, and accommodation.

- FR-3: The system shall provide a suggested trip plan based on budget and location.

- FR-4: Users shall be able to manually modify trip components.

- FR-5: System shall store and display past trip plans.

3.5.2   Recommendation & Discovery Module

- FR-6: System shall recommend food, hotels, and attractions based on user location.

- FR-7: System shall show estimated pricing, distance, ratings, and reviews.

- FR-8: System shall display sponsored business ads and deals.

- FR-9: System shall show detailed place pages with menu/photos/maps.

3.5.3   Maps & Navigation Module

- FR-10: System shall provide map-based search and filtering.

- FR-11: System shall calculate distance and travel cost.

- FR-12: System shall provide route suggestions using mapping APIs.

3.5.4   UGC & Reviews Module

- FR-13: Users shall post reviews, photos, and ratings.

- FR-14: Users shall be able to react to and reply to reviews.

- FR-15: System shall display a global review feed.

- FR-16: System shall allow filtering reviews by category and location.

- FR-17: Users shall earn rewards for posting genuine reviews.

- FR-18: Admin shall moderate flagged content.

3.5.5   Profile & Rewards Module

- FR-19: Users shall manage personal profiles and preferences.

- FR-20: Users shall view saved trips and review history.

- FR-21: Users shall access rewards, badges, and coupons.

3.5.6   Business & Ads Module

- FR-22: Businesses shall register and manage profiles.

- FR-23: Businesses shall create sponsored deals.

- FR-24: System shall validate business information.

3.6   Non-Functional Requirements

3.6.1   Usability Requirements

- NFR-1: User interface shall be intuitive and mobile-optimized.

- NFR-2: System shall offer a visually appealing map-based interaction.

3.6.2   Performance Requirements

- NFR-3: System shall respond within 2 seconds for major operations.

- NFR-4: Maps and recommendations shall load under 4 seconds.

3.6.3   Security Requirements

- NFR-5: User credentials shall be secured using encrypted tokens.

- NFR-6: Users shall have secure login and session handling.

3.6.4   Reliability & Availability

- NFR-7: The system shall be available 99% of the time.

- NFR-8: System shall automatically recover from data loss using backup.

3.7   Use-Case Diagram

(Use-Case Diagram will be drawn and inserted here)