SE-200: Software Engineering

Software Requirements Specification

(SRS) Document

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1. Introduction

1.1. Introduction

In the bustling environment of the National University of Sciences and Technology (NUST) in Islamabad, Pakistan, students grapple with a significant challenge – navigating the campus. Daily commutes pose difficulties, being both intricate and costly, with adverse environmental implications. This not only disrupts students' daily routines but also has potential repercussions on their academic pursuits.

To address these challenges, NUST has introduced a carpooling initiative, transcending mere technological innovation to offer a pragmatic solution to transportation issues. The initiative aims to enhance academic life, alleviate transportation problems, and promote environmental sustainability, all while maintaining cost-effectiveness and efficiency.

The existing university transportation system, colloquially known as "Baig Transport," exemplifies the struggles faced by students, including inconvenient routes and high costs. The carpooling system represents a novel approach to daily travel management, surpassing the confines of a mere technological remedy.

Carpooling emerges as a revolutionary solution for students navigating the vast campus, providing a remedy to challenges posed by the current transportation system and expensive private commuting options. This initiative aspires to transform the daily journey into an integral part of the overall university experience, transcending its practical utility.

At its core, the carpooling system is founded on the principle of connectedness, fostering relationships between drivers and passengers, aligning ambitions with possibilities, and harmonizing sustainability with efficiency. Ridesharing is envisioned as a catalyst for building a robust academic community that extends beyond the boundaries of transportation.

More than a mobility solution, the carpooling system represents a fusion of technological innovation and real-world student challenges. It envisions a future where students can concentrate on their studies, forge meaningful relationships, minimize their environmental impact, and embrace a community-driven ethos.

The journey of the carpooling system unfolds in the dynamic setting of a university campus where student interactions and academic life intertwine. Stemming from the acknowledgment that traditional university transportation may not cater to the diverse needs of students, the carpooling system goes beyond being a practical solution; it is an earnest endeavor to redefine university life.

Challenges with campus transportation, viewed through the lens of the carpooling system, become opportunities for creativity and community development. Shared rides facilitate student bonding over experiences that extend beyond the utilitarian aspects of commuting.

The commitment to promoting sustainability is at the heart of the carpooling system's creation. Its design seeks to diminish the carbon footprint of individual commutes, aligning with the university's dedication to environmentally friendly practices. The system epitomizes the intersection of convenience, community, and environmental responsibility.

Beyond interfaces and algorithms, the technological foundation of the system emphasizes efficiency and connectivity. Notably, the integration with the Google Maps API streamlines route planning, showcasing a sophisticated application of technology to real-world issues, attuned to the needs of the student body.

The carpooling system transcends being a mere transportation method; it embodies a lifestyle for students. It harmonizes commuters' needs with the vision of a more meaningful, sustainable, and enjoyable university experience. As the carpooling system integrates into the daily lives of NUST students, it signals a future where each rideshare contributes to shared goals and group success.

1.2. Scope

The purpose of this Software Requirements Specification (SRS) document is to give a thorough overview and in-depth insights into the development and operation of the carpooling system, a revolutionary solution to the transportation problems faced by university students in Islamabad's sectors H11 and H12. Serving the students of the International Islamic University of Islamabad

(IIUI), FAST (Foundation for Advancement of Science and Technology), and NUST (National University of Sciences and Technology) is the main goal of this system.

The carpooling system aims to establish a close-knit community of users who share daily commute routes and common academic pursuits by targeting students from NUST, FAST, and IIUI. Its reach extends beyond sharing rides between students on these schools, encouraging a community of cooperation and connectedness that goes beyond the confines of specific university campuses.

The system's application goes beyond the traditional conception of transportation solutions and touches on resource optimization and community development. The scale of the carpooling system becomes a testament to the possibilities for collaborative efforts that can survive within the localized ecosystem of educational institutions by connecting students from multiple colleges within Sectors H11 and H12.

The carpooling system's intended scope is in line with the unique difficulties that students in these fields encounter. Understanding that college life is more than just classes, the system meets the various needs of students juggling their daily commutes in addition to their academic obligations. The breadth captures the subtleties of timetables, common experiences, and university culture, resulting in a platform that speaks to the particular rhythms of student life in this region.

In practical terms, the carpooling system aims to create a network of shared transportation that effectively links students from IIUI, FAST, and NUST according to their commuter routes, schedules, and preferences. This localized strategy minimizes the negative effects on the environment and maximizes the advantages of shared mobility within the designated sectors by enabling a more focused and efficient use of resources.

The attitude of cooperation that permeates the carpooling system also extends to possible extensions in the future. Although Sectors H11 and H12's NUST, FAST, and IIUI will receive the majority of attention initially, the system is built to be scalable. As community involvement and adoption increase, there's a chance to expand the system to more universities, which might have a cascading effect and turn the carpooling scheme into a comprehensive answer for Islamabad's larger educational landscape.

1.3. Overview

A new approach to tackling the transportation problems that students in Islamabad, Pakistan's Sectors H11 and H12 face is the carpooling system, which primarily benefits NUST (National University of Sciences and Technology), FAST (Foundation for Advancement of Science and Technology), and IIUI (International Islamic University Islamabad). This creative solution is more than just a ride-sharing service; it's a dynamic ecosystem made to improve community cooperation, resource efficiency, and environmentally friendly transportation habits, all of which contribute to a better overall student experience.

The carpooling system is essentially a mobile application that links drivers and passengers within the designated sectors in an easy to use manner. With the help of this software, students may easily and affordably navigate the busy academic terrain by connecting them to a network of shared rides. Through the use of technology, the system introduces a community-centric approach that meshes well with the distinct rhythms of university life, going beyond conventional transportation models.

Precise and up-to-date route planning is made possible by a complex interface between the system and the Google Maps API. By guaranteeing that drivers and passengers can precisely navigate the city's road network, this integration improves shared ride efficiency overall and maximizes trip times. The user-centric design of the mobile application interface provides students with an easy-to-use platform for coordinating transportation, managing preferences, and communicating in real-time.

Sustainability is a key component of the design of the carpooling system. In Sectors H11 and H12, the system seeks to tangibly lower carbon emissions by promoting shared trips and lowering the amount of single vehicles on the road. This environmental conscience presents the carpooling system as a progressive solution that has a good effect on the local environment and is in line with the global drive to adopt eco-friendly practices.

The system's collaborative aspect goes beyond the immediate advantages of financial savings and environmental protection. Through the carpooling system, students from IIUI, FAST, and NUST are connected, which acts as a catalyst for community formation. Shared rides turn into

more than simply a way to get around; they become a platform for deep conversations, friendships, and connections to be made between students pursuing similar academic goals.

In practical terms, the overview of the carpooling system encompasses the following key features:

- User-friendly mobile application: The hub of the system, offering a user-friendly interface via which users can effortlessly register, schedule rides, communicate, and plan.
- Google Maps API Integration: This improves the effectiveness of shared rides by guaranteeing precise route planning for ideal travel times.
- Sustainability Focus: Promoting shared rides as a way to cut carbon emissions and encourage environmentally friendly transportation practices.
- Community Cooperation: Establishing a network that enables students from IIUI, FAST, and NUST to cooperatively manage their everyday journeys in order to foster a feeling of community within the designated sectors.
- Scalability: Planned with the possibility of future growth to incorporate other colleges and universities into the larger Islamabad educational system.

With its creative methodology, the carpooling system shows itself to be an all-encompassing solution that goes beyond the confines of conventional transportation. It provides evidence of how technology may be used to improve community connectivity, solve real-world problems, and create a more dynamic and sustainable student life experience in Sectors H11 and H12.

1.4. Business Context

Within the context of the carpooling system, the business perspective aligns with the overarching goal of providing a sustainable and efficient transportation solution for students in Sectors H11 and H12, focusing on NUST , FAST , and IIUI . While the carpooling system operates with a primary emphasis on social and environmental impact, it is essential to consider the underlying business aspects that enable its sustained operation and growth.

1. **Social Impact and Student Well-being:**

   The main goal of the carpooling system is to improve students' well-being by resolving their transportation-related issues. Through shared trips, the system creates a sense of

community, which in turn promotes collaboration and lessens the stress that comes with everyday journeys.

2. **Environmental Sustainability:**

   The environmental aspect is also included in the corporate context, with a focus on lowering personal carbon footprints. Through the promotion of carpooling and route optimization, the carpooling system is in line with sustainability objectives and helps to create a more environmentally friendly transportation model in the designated sectors.

3. **User-Centric Experience:**

   Fundamentally, the corporate environment prioritizes the development of a user-centered experience. The mobile app acts as a hub, providing students with an easy-to-use interface via which they can interact, schedule rides, and have productive conversations. The carpooling system's effectiveness and long-term acceptance depend heavily on the user-centric approach.

4. **Collaborative Community Building:**

   The business context of the system goes beyond providing a simple transportation service and into the field of community development. It establishes a collaborative network that encourages social interactions, shared experiences, and the possibility of enduring relationships by bringing together students from various universities. The carpooling system's total value proposition is improved by this community-centric strategy.

5. **Financial Viability and Future Expansion:**

   The carpooling system's long-term success depends on its financial sustainability, even though its main goals are social and environmental. The system might look into joint ventures, sponsorships, or partnerships with nearby companies or organizations that want to fund student-centered and environmentally friendly projects. For the system to continue operating, to be improved, and possibly to grow to include more colleges or industries, funding is an essential component.

6. **Stakeholder Engagement:**

   Involving stakeholders, such as local companies, academic institutions, and possibly government agencies, is another aspect of the business environment. Working together can result in a stronger network of support, opening doors for reciprocal advantages and bolstering the carpooling system's overall viability.

The carpooling system's business context is complex and includes social effect, sustainability of the environment, user-centric experiences, community building, financial viability, and stakeholder engagement. In addition to meeting students' urgent mobility needs, the system seeks to establish itself as a workable and significant project within the designated sectors of Islamabad by carefully balancing these factors.

2. General Description

2.1. Product Functions

The UniRide System is a comprehensive and user-centric platform designed to revolutionize commuting within the university community, streamlining ride-sharing and transportation for students, faculty, and staff. The product boasts a range of robust functions to enhance convenience, accessibility, and efficiency.

2.1.1. Registration and Profile Management:

The system facilitates easy onboarding for users through a seamless registration process. Users can create and manage their profiles, providing essential details for a personalized experience. This includes information such as name, university ID, and preferred commuting preferences.

2.1.2. Ride Booking and Scheduling:

UniRide allows users to book rides effortlessly, providing a user-friendly interface to schedule rides based on their preferences. The system optimizes routes for efficient pick-ups and drop-offs, minimizing travel time and enhancing the overall commuting experience.

2.1.3. Real-Time Tracking:

A key feature of UniRide is its real-time tracking capability. Users can track the location of their ride in real-time, enhancing transparency and allowing for better time management. This feature is enabled through GPS integration for accurate and dynamic location tracking.

2.1.4. Cost-effective Carpooling:

UniRide encourages cost-effective commuting by promoting carpooling among users. The system employs a flexible pricing model, accommodating both car owners and passengers. The financial model may include options like fixed costs or variable costs based on the number of passengers.

2.1.5. Security and Privacy Features:

Ensuring user safety and data privacy is a top priority. UniRide incorporates robust security measures, including user authentication, encryption technologies, and a feedback system to enhance the overall security and reliability of the platform.

2.1.6. Feedback and Rating System:

To maintain a high-quality service, UniRide features a feedback and rating system. Users can provide feedback on their commuting experience, allowing for continuous improvement. Drivers and passengers can rate each other, contributing to a community-driven quality control mechanism.

2.1.7. Collaboration with University Management:

UniRide establishes collaboration with university management for endorsement and promotion. The system integrates into official communication channels, ensuring widespread awareness and adoption within the university community.

2.1.8. Cost Monitoring and Analytics:

Users can monitor their monthly expenditure on commuting through the platform. UniRide provides analytics on cost savings, travel patterns, and other relevant data, empowering users to make informed decisions about their commuting habits.

2.1.9. Incentive Programs:

The platform may incorporate incentive programs in collaboration with the university. Incentives could include rewards for consistent carpooling, adherence to schedules, and active participation in promoting sustainable commuting practices.

2.2. Similar System Information

Examining the terrain of current carpooling services that are similar to ours, the multinational behemoth BlaBlaCar stands out as a major participant. BlaBlaCar, which has gained international recognition for its innovative approach to long-distance carpooling, has united passengers for intercity travel with success, revolutionizing shared mobility. But a critical assessment highlights something that is conspicuously absent from the Pakistani situation. Platforms like as BlaBlaCar, although having a global presence, are not solidified in Pakistan. This absence accentuates a significant gap in addressing the nuanced transportation needs specific to the vibrant student community.

Drawbacks of Global Carpooling Systems in Pakistan:

- **Localization Challenges:**

Adapting international carpooling platforms for Pakistani university students involves more than just making minor linguistic and monetary changes. The algorithms, although carefully crafted for global application, might not be able to adapt to the complexities of Pakistani academic calendars. Due to the dynamic character of these schedules—which are impacted by exams, semester holidays, and other academic events—a sophisticated strategy that recognizes and accommodates the particular beat of Pakistani university life is needed.

An additional layer of complexity is introduced by the social dynamics and cultural preferences typical of the Pakistani environment. Globally popular carpooling networks may not naturally understand Pakistani social norms regarding shared transportation. In this location, where carpooling frequently leads to friendships and collaboration, the communal aspect of carpooling necessitates an algorithmic sophistication that extends beyond a simple spatial overlay. Any system hoping to serve the university student population must acknowledge and adjust to the cultural quirks around the usage of shared transportation.

In addition, the transportation needs of Pakistani students are influenced by factors such as gender dynamics, security concerns, and the availability of safe routes. Global systems may not have inherent features that address these specific considerations, potentially leading to a disconnect between the intended functionality of the platform and the real-world requirements of Pakistani users. Hence, localization not only involves adapting to the academic calendar but also understanding and addressing the multifaceted nature of transportation dynamics within the Pakistani cultural and societal context.

- **Geographical Constraints:**

The promise of efficient, sustainable transportation offered by global carpooling platforms is undeniable. However, in the diverse tapestry of Pakistan's geography, these platforms face a unique set of challenges that extend beyond the limitations of their standard operation. The transportation landscape varies significantly between major cities, and global systems might not possess the fine-tuned regional optimization needed to navigate the distinctive traffic patterns, road conditions, and urban planning of Islamabad. This lack of regional specificity could impact the efficiency of the service, making it crucial to design a carpooling system that not only aligns with global best practices but also intricately understands and adapts to the unique geographical challenges within Pakistan.

- **Cultural Sensitivity:**

Carpooling is not just about shared rides; it's a social experience deeply intertwined with cultural norms. For a global carpooling system to seamlessly integrate into the Pakistani context, it must grapple with the intricacies of cultural dynamics. Designed with a broader international audience in mind, these platforms may inadvertently overlook the subtle cultural nuances that define shared transportation experiences in Pakistan. From customary greetings during rides to the unwritten rules about conversation topics, every cultural aspect plays a role in shaping the carpooling experience. Additionally, social standards are essential to a carpooling service's success. Careful thought must be given to things like respecting one's personal space, according to local customs, and taking into account people from different social backgrounds. Ignoring these issues when designing a carpooling system puts users at danger of alienation and undermines the potential for community building. Thus, cultural sensitivity encompasses more than just language localization; it also entails a deep comprehension of the social structure that

influences Pakistani students' everyday interactions.Pakistani preferences, like respecting gender roles and taking cultural variety into account, also need to be carefully incorporated into the platform's design. Features that improve security and foster user trust are essential due to safety concerns, particularly for female users. Our carpooling system prioritizes cultural sensitivity in order to foster an inclusive and culturally congruent atmosphere. This way, shared rides serve as a means of transportation while also reflecting the rich fabric of social relationships in Pakistan.

The success of a carpooling service transcends mere functionality; it hinges on its profound resonance with the cultural tapestry of the region it serves. In the case of Pakistan, where societal norms, traditions, and interpersonal relationships are deeply ingrained, the importance of aligning the platform with these cultural facets cannot be overstated. Our carpooling system aspires not just to accommodate local customs but to actively embrace and celebrate them. Our application aims to redefine carpooling by facilitating cross-cultural interactions inside a shared vehicle. It turns into a place where students from all backgrounds come together and create relationships that go beyond the car. The experiences that are shared among riders become strands that are woven into the greater fabric of university life, fostering a lively and cohesive community. Furthermore, the cultural bridge that our platform aims to build is not one-way. Every user, regardless of background, adds to the mosaic of shared experiences in this dynamic interaction. Our carpooling system, which embraces diversity and inclusivity, takes on the depth and variety that characterize Pakistani culture and becomes a microcosm of the larger cultural landscape.

In the end, the plan encompasses more than just effective transportation. It's about making an area where people congregate as members of a community as well as travelers and drivers. Our platform aims to reinvent carpooling by incorporating cultural elements into the core of the experience, so transforming it into a force for interpersonal connections, cultural understanding, and a sense of unity among the diverse student body.

Uber and Careem:

Although Uber and Careem have clearly established themselves as essential elements of Pakistan's transportation scene, their popularity in point-to-point travel does not translate to the more specialized world of carpooling services. Both Uber and Careem currently use ride-sharing models that are based on individual rides and largely serve consumers' one-time, urgent

transportation requirements. Although these models work well for lone travelers, they are not community-driven enough to meet the regular shared transportation demands of college students.

The absence of a dedicated carpooling service on these widely adopted platforms leaves a distinct void. The current offerings from Uber and Careem, while efficient for direct point-to-point travel, fall short when it comes to fostering a sense of community, collaboration, and shared experiences—elements that are paramount in the lives of university students.

Seeing this obvious discrepancy, our carpooling system is positioned to not only close but also exceed the current gap. Our dedication extends beyond providing a simple transportation service; rather, it entails supplying a customized, sustainable, and community-focused solution made especially to address the particular requirements of Pakistani university students. Our platform aims to change the transportation experience from a transactional service to a dynamic community-building project by tackling the communal side of traveling.

Unlike the individual-focused business models of Careem and Uber, our carpooling system values the community spirit of college life. It incorporates tools for community-building, communication channels, and shared route planning, which encourages students with similar schedules and destinations to bond. Our platform recognizes the social aspect of commuting, and its goal is to close the gap in transportation while simultaneously improving the academic experience by turning every shared journey into a chance for community development, connection, and cooperation.

Reusing Baseline Software:

We strategically acknowledge the advantages of implementing effective international carpooling systems while traversing the complex terrain of carpooling system development, giving special recognition to market leaders such as BlaBlaCar. The wisdom of learning from successful models, distilling insights into efficient algorithms, honing user interfaces, and comprehending the crucial subtleties of system scalability is the foundation for the decision to reuse the baseline software design. This strategy gives us a basis based on the tried and true, guaranteeing a strong beginning point for our development activities.

It is crucial to stress, though, that our approach to development goes well beyond simple reproduction. We methodically create a solution that is specifically suited to meet the unique

demands of Pakistani students, building upon the strong basis provided by the reuse of baseline software. We take a more sophisticated approach to innovation and customisation in our development process, instead of simply copying the designs of popular products.

Optimizing algorithms is a key component of our methodology. Although global systems have demonstrated efficacy within their respective domains, the fluid character of academic life in Islamabad necessitates algorithms that align with the distinct timetables, inclinations, and sociocultural elements particular to Pakistani students. Our development staff carefully modifies and improves these algorithms to guarantee the best possible matching, effective route planning, and a smooth user experience that fits in with the surrounding environment.

Our development efforts also center on optimizing user interfaces. We acknowledge the need for interfaces that are user-friendly, culturally aware, and align with their tastes while taking inspiration from successful models. Because of the careful personalization that goes into our user interface design, every encounter with our platform is not only effective but also perfectly aligned with the expectations and experiences of students in Islamabad.

Furthermore, feature integration is a dynamic process that goes beyond functional replication. Understanding the value of real-time location sharing and other cutting-edge features that improve user experience, we purposefully make use of some of Uber's core software. We can now give users access to real-time information thanks to this integration, enhancing the efficiency and safety of shared rides.

Our objective is, in essence, not just to follow a successful model but also to come up with a unique solution that fits in perfectly with Islamabad's academic environment. Reusing baseline software serves as a platform for innovation, enabling us to bring together a thorough grasp of local nuances and worldwide best practices. With this strategy, our carpooling program hopes to not only close the current transportation gap but also establish a new benchmark by providing an innovative solution that is specifically tailored to the requirements of Pakistani university students.

2.3. User Characteristics

The majority of users in our carpooling system are college students, mostly from NUST, FAST, and IIUI, which are located in sectors H11 and H12 of Islamabad, Pakistan. These users exhibit specific characteristics that influence their interaction with the platform:

- **Academic Engagement:**

In the vibrant learning environment of our user base, students from universities such as NUST, FAST, and IIUI actively participate in a wide range of academic activities, weaving together a tapestry of engagements. This dynamic involvement takes many forms, from demanding academic schedules to the demands of test periods and enriching extracurricular activities. Exam seasons bring about a noticeable change in the academic environment, including longer study sessions and modified scheduling. The platform anticipates and adapts to these times of heightened academic concentration, giving users flexibility during test weeks and making sure that shared rides enhance rather than interfere with our users' rigorous academic commitments. Each student follows a schedule that is specific to the subjects they have chosen. Because of the flexibility of these schedules, our platform makes sure that the carpooling system can easily adjust to the ups and downs of the school day and fit in with the many time slots that make up the academic day. Our users engage in a wide range of extracurricular activities outside of the classroom, such as clubs and sports as well as volunteer work. The platform recognizes the significance of these interactions and is made to fit in smoothly with the various facets of each user's educational experience, enabling effective commuting even in the middle of extracurricular activities. The academic calendar includes vacation time when there may be variations in the demand for transportation. In order to keep the carpooling system dynamic and flexible and meet the changing demands of users during breaks, holidays, and other academic recesses, our technology adjusts to these variations. When our carpooling system acknowledges and welcomes the subtleties of academic engagement, students find it to be a dependable partner in their everyday life. Our dynamic user base's various and constantly changing academic schedules are seamlessly synced with the platform, which is optimized to meet their needs whether it's during exam season or during busy extracurricular weeks.

- **Geographical Specificity:**

Nestled within the vibrant sectors of H11 and H12 in Islamabad, our users are situated in a distinct geographic area, with every inch bearing its own distinct topography and transit requirements. The carpooling platform is highly sensitive to the unique characteristics of this particular region, providing customized solutions that address the unique transportation issues that these industries face on a daily basis. The intricate network of roads, avenues, and landmarks within sectors H11 and H12 presents unique navigation challenges. Our platform comprehensively addresses these localized intricacies, providing users with efficient routes that navigate through the specific geography, minimizing travel time and optimizing the shared commuting experience. Convenience being of the utmost importance, the platform locates and marks sector-specific pickup stations that are thoughtfully positioned throughout H11 and H12. By taking great care to guarantee that customers may easily utilize the carpooling service, significant detours are avoided, and both drivers and riders enjoy a hassle-free experience. The geography of H11 and H12 demands a dynamic approach to route planning. Our platform employs intelligent algorithms that dynamically adapt to the local traffic patterns, ensuring that routes are not only efficient but also responsive to the ever-changing conditions of Islamabad's specific roadways. The daily activities of the community have a specific rhythm that shapes traffic patterns within these sectors. In order to anticipate and maneuver through these localized patterns, the platform integrates real-time traffic data. This allows customers to benefit from a dependable and effective transportation solution that smoothly accommodates the ebb and flow of sector-specific traffic. Islamabad's climate, with its seasonal variations, requires a platform that considers weather conditions in its operations. The carpooling system, attuned to the geographical specificity of these sectors, adapts its services to varying weather scenarios, ensuring a safe and comfortable commuting experience for users.

- **Technological Savviness:**

Within the contemporary landscape of digital connectivity, our users stand as exemplars of technological proficiency, seamlessly navigating the intricacies of the digital realm. This generation, deeply accustomed to the integration of technology into their daily lives, sets the stage for a carpooling platform that not only meets but anticipates their technological expectations. The user interface is meticulously crafted to align with the demands and

preferences of this tech-savvy cohort, ensuring an intuitive and enjoyable user experience. Our platform's user interface is an example of its simplicity and intuitiveness. Clarity, responsiveness, and ease of use are given top priority in the design because we recognize our users' inherent technological proficiency. The application becomes intuitive to use, enabling users to quickly and easily access all of the platform's capabilities. Considering how commonplace smartphones are in our consumers' lives, the platform has been designed with a mobile-first focus. Users who use the app on iOS or Android smartphones find a unified and responsive design that optimizes the capabilities of their portable gadgets, offering a seamless and effective carpooling experience while on the road. The platform provides real-time updates on ride statuses, live location sharing, and other important elements in line with users' expectations for instantaneous information. Customers can depend on the information to be current and accurate, which makes carpooling easy and productive. The user population is tech-savvy and values immediate communication. Because of this, our platform has strong in-app communication tools that let users arrange and communicate within the app with ease. Users' sense of community and cooperation are fostered by this real-time contact, which improves the carpooling experience as a whole. Our platform keeps up with the latest technical developments by investigating and incorporating cutting-edge technologies that improve user experience overall. Our dedication to technical innovation makes sure that the platform changes along with the rapidly evolving tech scene, whether it's through the use of augmented reality for interactive features or the application of artificial intelligence for improved route planning. Although the platform values technological competence, it also recognizes users with different degrees of tech experience. Because the learning curve is easy to navigate and offers assistance and direction to users who are unfamiliar with carpooling apps, everyone may take use of the platform's advantages. our carpooling platform transforms into more than a service; it becomes a seamlessly integrated aspect of their digital lives. The user experience extends beyond mere functionality, creating a symbiotic relationship between technology and the daily commute, fostering a community-driven and tech-enhanced transportation solution.

- **Environmental Consciousness:**

In line with the worldwide environmental movement, a significant portion of our user base is pro-sustainability. This group of people cares greatly about the environment, and they actively look for ways to reduce their carbon footprint and use eco-friendly transportation. For these users, our carpooling system acts as a lighthouse, connecting with their dedication to sustainability through its focus on shared rides, lowering personal carbon footprints, and encouraging the use of more environmentally friendly forms of transportation. The encouragement of shared trips is the main component of our carpooling program. Through matching users with comparable commute routes, the platform actively lowers the total number of cars on the road. This cooperative strategy not only increases transportation efficiency but also dramatically reduces the environmental impact of individual commuting. Our platform actively works to reduce individual carbon footprints since we understand the environmental impact of individualized transportation. Because rides are shared, there are less cars on the road, which reduces emissions and lessens the environmental effect of using more conventional, non-shared modes of transportation. Carpooling is a transportation option that is environmentally friendly and provides a viable substitute for traditional driving. Through the provision of a platform that actively promotes and facilitates carpooling, users help to create a transportation solution that is more environmentally friendly and sustainable. Beyond its functional features, the platform hosts educational campaigns to inform users about the advantages carpooling has for the environment. By taking the initiative, this method helps users make sustainable decisions by fostering a community-driven understanding of the benefits that each shared journey has to offer the environment. We are dedicated to raising users' awareness of environmental issues and to giving them information on the beneficial environmental effects that they can all contribute to together. The platform integrates measures that demonstrate the decrease in carbon emissions, enabling users to observe the concrete impact they have on fostering a more environmentally conscious and sustainable transportation ecology. Acknowledging the mutual dedication to sustainability, the platform actively engages users in setting and achieving group sustainability objectives. The carpooling system acts as a catalyst for a community-driven shift towards a more sustainable and environmentally friendly form of transportation by encouraging a sense of shared responsibility.

- **Financial Prudence:**

In a landscape where budgetary considerations significantly shape the decisions of university students, our carpooling platform stands as a beacon of financial prudence. This commitment to recognizing and addressing the budget constraints commonly faced by students underscores our dedication to providing a transportation solution that goes beyond mere convenience, ensuring affordability is at the forefront of the user experience. The supply of an affordable transportation option is the central tenet of our agenda. The platform optimizes the cost each ride by utilizing the shared economy concept, which makes it substantially more cost-effective than customary individualized commuting techniques. The affordability of this aligns well with the financial circumstances faced by college students. Transparent pricing structures that provide consumers a clear idea of the costs connected with their shared journeys promote financial responsibility. Transparency prevents any unanticipated financial surprises by fostering confidence and enabling consumers to make well-informed decisions that are in line with their budgetary considerations. Given that a large number of students might decide to become drivers in the community of carpoolers, the platform offers financial incentives. As a result of their assistance in enabling shared trips, drivers are fairly compensated, and the system benefits both parties by providing consumers with affordable transportation and drivers with just remuneration for their services. Our carpooling platform goes beyond just providing transportation by prioritizing financial prudence. It turns into a tactical partner for college students, providing not just transportation but also a full package that honors and accommodates their financial limitations. As a result, the platform not only meets but beyond the financial expectations of its users, bringing in a new era of student transportation that is both affordable and sustainable.

2.4. User Problem Statement

The UniRide System addresses several challenges faced by members of the university community in their daily commuting experiences. The user problem statement identifies key pain points and inconveniences that UniRide aims to mitigate:

2.4.1. Inefficient Transportation Options:

Many users experience frustration due to the inefficiency of existing transportation options within the university. This includes unreliable public transport, long waiting times, and delays that impact students, faculty, and staff trying to reach the university on time.

2.4.2. Lack of Cost-Effective Solutions:

A significant portion of the university community faces financial strain due to the lack of cost-effective transportation solutions. Traditional modes of commuting, such as private cars or ride-hailing services, can be expensive and contribute to the financial burden on students and staff.

2.4.3. Time-Consuming Commutes:

Daily commutes to and from the university often result in substantial time wastage for users. Long travel durations, especially for those residing at a distance from the university, lead to decreased productivity and limited time for other academic and personal activities.

2.4.4. Limited Visibility and Transparency:

Users currently lack real-time visibility into the availability and location of shared rides. This lack of transparency contributes to uncertainties, making it challenging for users to plan their journeys efficiently and causing potential delays.

2.4.5. Safety Concerns:

Existing transportation options may not adequately address safety concerns for users, particularly during late hours or in less secure areas. Students, in particular, may face safety challenges when commuting, and there is a need for a solution that prioritizes user safety.

2.4.6. Uncoordinated Carpooling:

While carpooling is a potential solution, the lack of a dedicated platform results in uncoordinated efforts. Users struggle to find suitable carpooling partners, and the absence of a streamlined system hinders the widespread adoption of this eco-friendly commuting option.

2.4.7. Limited University Endorsement:

The absence of official endorsement and promotion by the university management contributes to low awareness and adoption of potential transportation solutions. Users may not be fully aware of available options, and there is a need for university-backed initiatives to promote sustainable commuting practices.

2.5. User Objectives

In response to the identified challenges and user problem statement, the carpooling platform aims to fulfill a set of comprehensive user objectives tailored for university students in sectors H11 and H12 of Islamabad. These objectives are designed to address specific aspects of the transportation challenges faced by this demographic.

- **Effortless Commuting Experience:**

  Objective: Ensure a seamless and effortless commuting experience for users.

  Strategy: Develop an intuitive platform that simplifies the process from ride request to confirmation, emphasizing speed and user-friendly interactions.

- **Affordable Transportation Solutions:**

  Objective: Provide cost-effective transportation options aligned with students' budgetary constraints.

  Strategy: Implement transparent pricing structures, affordable subscription models, and financial incentives for drivers to ensure affordability without compromising service quality.

- **Community-Centric Interaction:**

  Objective: Encourage shared experiences, community contact, and engagement.

  Strategy: Incorporate features that encourage user interaction and collaborative route planning, fostering meaningful connections within the academic circles of students.

2.6. General Constraints

The UniRide System operates within specific constraints to ensure its effectiveness and relevance to the targeted user community. These constraints encompass various aspects, including technological, geographical, and operational considerations.

2.6.1. Technological Constraints:

- **Device Compatibility:**

  UniRide relies on mobile applications for user interaction. A constraint arises from the necessity for users to possess smartphones with compatible operating systems (iOS, Android) for seamless access to the platform.

- **Internet Connectivity:**

  The system's functionality depends on internet connectivity. Users need a stable internet connection for real-time updates, ride sharing, and other essential features, posing a constraint in areas with limited network coverage.

- **GPS Reliance:**

  UniRide heavily utilizes GPS technology for location tracking and route planning. While this enhances the user experience, areas with poor GPS signal reception may experience limitations in accurate location tracking.

2.6.2. Geographical Constraints:

- **Limited Service Area:**

  Initially, UniRide focuses on serving the H-11 and H-12 sectors. This geographical constraint is imposed to streamline operations, optimize resource allocation, and create a concentrated user base within a defined region.

- **Future Expansion:**

  While the current focus is on specific sectors, there's a constraint related to future expansion. The system's scalability to cover additional geographical areas requires careful planning, coordination, and integration with local infrastructure.

2.6.3. Operational Constraints:

- **Peak Hour Demand:**

  UniRide may face operational challenges during peak hours when there is a surge in demand for rides. Balancing the supply of available rides with high demand periods is crucial to avoid service disruptions.

- **Resource Availability:**

  The effectiveness of the system relies on the availability of drivers willing to participate in the carpooling initiative. A constraint arises in maintaining a sufficient number of active participants to meet user demand.

2.6.4. User Adoption and Acceptance:

- **Awareness and Perception:**

  UniRide encounters constraints related to user awareness and perception. Convincing potential users to adopt the platform may be challenging, requiring strategic marketing and communication efforts.

- **Technological Resistance:**

  Some users may face challenges adapting to new technologies, particularly those unfamiliar with mobile applications. Overcoming this technological resistance is crucial for the widespread adoption of UniRide.

3. Functional Requirements

3.1. User Registration And Authentication

User registration and authentication are the cornerstones of the dynamic carpooling platform, providing users with a safe and easy way to start exploring sectors H11 and H12 in Islamabad. This fundamental function includes the skillful account creation facilitation, coordinating a user-friendly experience for users as they create their profiles. The simplified login processes lower barriers to entry and increase accessibility, which further enhances the effectiveness of the user experience. Simultaneously, strong user profile defense, marked by strict security and

privacy guidelines, becomes critical to building confidence and dependability. By means of these finely crafted procedures, the platform hopes to become a dependable partner, meeting the mobility requirements of Islamabad's thriving university community. The platform's accessibility is enhanced by the streamlined login processes, which acknowledge the diversity of its user base and make it simple for users to interact with the carpooling community. The platform's goal of giving the academic community in Islamabad a hassle-free and effective transit option is in line with its emphasis on user-friendly authentication. As the platform aspires to become a dependable mobility partner for Islamabad's thriving university community, the significance of user registration and authentication cannot be overstated. These finely crafted procedures not only lay the groundwork for a secure and user-friendly environment but also contribute to the overarching goal of creating a carpooling community that users can trust and rely on for their daily commuting needs.

3.1.1. User Registration:

Description:

Users begin the account creation process by inputting the required information, such as their name, university affiliation, contact details, and a strong password.

Validation:

The system validates user inputs to ensure accuracy and completeness during the registration process.

3.1.2: Email Verification:

Description:

After registering, users are sent a verification email to verify the email address they entered.

Validation:

Access to the platform is exclusively granted following the successful verification of the user's email, ensuring a safe and verified onboarding procedure.

3.1.3: Social Media Integration:

Description:

Users are provided with the choice to register or log in using their social media accounts, including platforms like Facebook or Google.

Validation:

Robust authentication protocols guarantee the authenticity of user accounts connected to their corresponding social media profiles, promoting a safe and efficient integration.

3.1.4: Password Security:

Description:

The platform is mandated to implement a comprehensive password management protocol that specifies a number of requirements, such as the minimum character count, the use of only alphanumeric characters, and the frequency of password updates.

Validation:

Real-time feedback mechanisms will be in place to evaluate and share the strength of passwords created by users, guaranteeing a reliable and secure authentication process.

3.1.5: Two Factor Authentication:

Description:

Users have the option to enable two-factor authentication, a security mechanism that involves the generation and transmission of a secondary verification code to their registered mobile number.

Validation:

Adding two-factor authentication is optional, although it is strongly advised to strengthen security measures. This additional layer of verification enhances the overall security posture of the platform.

3.1.6: Profile Management:

Description:

Users engage in the administration and modification of their profiles, changing personal information, university affiliations, and profile pictures.

Validation:

Changes made to sensitive data can call for additional verification procedures, which would reduce the possibility of unauthorized changes and strengthen the security of user profiles.

3.1.7: Account Recovery:

Description:

The system utilizes a secure account recovery protocol that is intended for users who have forgotten their password or are having trouble logging in.

Validation:

Individuals going through the account recovery process have to go through a multi-phase verification process. Before access restoration is allowed, this stringent validation verifies the identity of the authorized account owner.

3.1.8: User Consent:

Description:

Users actively grant explicit consent prior to the processing of their information within the platform.

Validation:

The system systematically logs and preserves user consents, meticulously adhering to privacy regulations and ensuring regulatory compliance.

3.2. Ride Posting

Within the carpooling platform, the "Ride Posting" feature is a useful tool that allows users to easily generate and publish ride offers. The purpose of this feature is to facilitate the process of

sharing a vehicle and create a dynamic environment where users can easily connect for shared trips. Users may enter important information like the date, time, and available seats, as well as the departure and destination points, thanks to the user interface's easy design. The departure and destination point input boxes help with exact route planning by letting users specify the specifics of their travel. Users are able to precisely synchronize their travel arrangements by inputting the ride's date and time. Incorporating seat availability data not only facilitates effective ride matching but also raises the platform's overall openness, empowering users to make well-informed choices regarding their shared travel. This feature is consistent with the platform's dedication to accessibility and ease of use. Active participation and engagement are encouraged by the "Ride Posting" function, which offers users an easy-to-use interface. The procedure is easy for users to use, guaranteeing that ride listings are accurate and represent their schedules and preferences. The capacity of this functionality to connect drivers with open seats and passengers looking for convenient transit options highlights its collaborative character. It turns the platform into an active shared mobility marketplace where users can effectively connect, organize, and set out on shared travels that suit their own requirements.

3.2.1 Ride Posting:

Description:

The "Ride Posting" functionality empowers users to create and publish ride listings, offering a streamlined process for sharing transportation. Users input essential details, including departure and destination points, date, time, and available seats, allowing users to create a smooth and intuitive experience on the carpooling website.

Validation:

To guarantee the quality and dependability of provided ride listings, this feature is put through a thorough validation process. The system makes sure that platform rules are followed, that route data is accurate and verifying the availability of sufficient details. This thorough vetting procedure helps create a reliable and effective ride-sharing community.

3.2.2 Notification Systems:

Description:

Users can post rides on the platform and receive quick updates on the progress of their listings thanks to a strong notification system for riders. Users may keep informed and efficiently manage their ride-sharing activities with the help of these notifications, which include requests from prospective passengers and pertinent information.

Validation:

Users can receive fast updates on the progress of their listings because of the platform's robust notification system for ride postings. This keeps users informed and enables them to efficiently manage their ride-sharing activities. It also contains notifications for requests from prospective passengers as well as important updates.

3.3. Ride Tracking

The carpooling platform's "Ride Tracking" feature presents an advanced and reliable system that is precisely built to track and monitor the real-time progress of shared journeys. With a range of live tracking features, this tool gives users taking part in a shared travel unmatched visibility into crucial aspects of the ride, such as the current location, the projected time of arrival, and the dynamic route progress. At its core, this functionality represents a pivotal advancement that transcends traditional transportation experiences. By seamlessly integrating cutting-edge technologies, including proven algorithms such as those utilized by Google Maps, the system delivers a level of transparency that significantly elevates the security and overall user experience during shared rides. When on a shared journey, users can easily access a comprehensive live map display that shows a visual depiction of the current route. This improves openness and makes it easier for people to coordinate and organize in an effective manner. The incorporation of live tracking functionalities tackles significant safety and security issues, enabling users to remain updated about the status of their journey and predict when they will arrive.

The "Ride Tracking" feature is a fundamental component of the platform's user-centric design, despite its advanced technical capabilities. It gives users confidence and a sense of control over

their travel by transforming shared transportation into a smooth, transparent, and secure experience. This cutting-edge functionality, which combines cutting-edge technologies, intuitive user interfaces, and tested algorithms, essentially goes beyond traditional tracking systems. It is evidence of the platform's commitment to improving the shared mobility experience and establishing new benchmarks for user pleasure, security, and transparency in each and every shared ride.

3.3.1 Real Time Location Accuracy:

Description:

Using GPS technology, the system precisely tracks the shared vehicle's whereabouts in real time. Users are able to see the current location on the map, which encourages openness and gives them access to real-time updates on the ride's status.

Validation:

Conduct thorough testing in a range of settings, such as cities and suburbs, to ensure that the GPS tracking device reliably delivers precise and current position data. Verify that the vehicle's actual position and the live location displayed on the map match.

3.3.2 Estimated Time of Arrival:

Description:

The platform leverages advanced algorithms, including those utilized by Google Maps, to calculate and display the estimated time of arrival based on the real-time location and route progress. This functionality is essential for helping users schedule and organize their time during shared journeys.

Validation:

Undertake extensive testing to confirm the accuracy of ETA calculations, utilizing the algorithms integrated, including the Google Maps baseline. Assess the system's capacity to adjust to dynamic factors like traffic conditions, route modifications, and unanticipated delays, guaranteeing that the displayed ETA maintains accuracy and dependability throughout the trip.

Reusing tested algorithms improves the overall accuracy and dependability of the ETA calculation, giving users a reliable time management tool.

3.3.3 Emergency Response Integration:

Description:

In critical situations, the ride tracking function works in unison with emergency response services, drawing on strong algorithms—like those used by Google Maps—to deliver accurate position data. The purpose of this integration is to enable prompt and effective help in times of need. The platform also has an emergency response tool that enables users to get in touch with local authorities or police immediately.

Validation:

Test the emergency response integration thoroughly, making sure to test the component that allows you to get in touch with local authorities directly. Make sure that location data is accurately sent to emergency agencies by using the system's built-in, tested algorithms. To ensure a quick and secure response in an emergency, make sure the emergency response function meets and surpasses established safety and privacy criteria. A direct contact option adds another level of proactive emergency communication, which improves user safety.

3.3.4: User Interface Integration:

Description:

The user interface and live monitoring data combine flawlessly to create a user-friendly and intuitive experience. The tracking tools are easily accessible for users, which promotes usability and engagement.

Validation:

Evaluating how effectively the ride tracking capabilities are integrated into the user interface, verifying that the tracking data is provided in a comprehensible and clear manner. Evaluating how easy it is for users to access and utilize live tracking while sharing rides.

3.4. Payment and Billing

A key component of the carpooling platform is the "Payment and Billing" feature, which gives users an easy-to-use and reliable way to handle the money-related transactions involved in shared rides. This essential component is made to make it easier for drivers and passengers to exchange money in a smooth and equitable manner, which benefits all parties participating in the shared mobility experience. The platform goes beyond basic functioning by realizing the need of providing customers with a variety of payment options, taking into account the ever-changing landscape of modern payment preferences. Several payment alternatives are provided as an example of this commitment to user convenience. Customers are free to select between more modern digital options like Easypaisa and JazzCash and more conventional ones like bank transfers. The wide variety of payment options is carefully incorporated to meet each of the different and unique requirements of the user population. Traditional banking channels are included to ensure accessibility for consumers who prefer traditional ways; on the other hand, modern digital platforms such as Easypaisa and JazzCash are included to correspond with the emerging trends in digital finance and provide a tech-savvy and seamless payment experience. This careful consideration of different payment options improves accessibility and convenience for users, which adds to a pleasant and user-centered experience on the carpooling platform as a whole.

3.4.1: Transaction Flow Management:

Description:

The coordination of the payment process between drivers and passengers is covered under the title "Transaction Flow Management". It includes precise billing computation, smooth payment gateway integration, and thorough testing to guarantee the dependability of the whole transactional environment.

Validation:

In this context, validation consists of thorough testing to ensure the dependability and effectiveness of the transactional flow management process, as well as rigorous testing to validate the correctness of billing computations and the smooth integration of payment gateways.

3.4.2: Security and Compliance:

Description:

In "Security and Compliance," the emphasis is on making sure that payments are processed securely and that financial rules and data security guidelines are followed. This entails putting strong security measures in place to protect financial data and keeping up with applicable regulations.

Validation:

Strict testing to guarantee safe payment processing, a close look at the integration with payment gateways to protect financial data, and regular compliance with data security and financial legislation are all part of the validation process for security and compliance. By doing this, user transaction security and privacy are guaranteed.

In addition to ensuring the effectiveness and security of financial transactions, this all-inclusive approach to "Payment and Billing" also recognizes the variety of user needs by providing a selection of payment methods for increased accessibility and convenience.

3.5. Rating And Feedback System

The "Rating and Feedback System" is a crucial component of the carpooling platform that allows users to actively influence how the community experiences rides together. This feature, which is an essential tool for assessing and exchanging views on shared rides, is purposefully crafted to promote openness, build confidence, and initiate an ongoing cycle of improvements that raise the standard of shared rides as a whole. The Rating and Feedback System is a responsive feedback loop that amplifies user voices and contributes to a shared understanding of ride dynamics in the complex web of shared transportation. Users provide a more comprehensive perspective that goes beyond simple metrics by engaging in a nuanced discourse through both numerical ratings and qualitative input. This helps in assessing personal experiences as well. The fundamental objective is to create an environment of accountability where all participants—drivers or other passengers—take an active part in preserving and improving the shared transport environment. The platform not only recognizes users' agency within the community, but also their position as co-creators of an ever-evolving, user-centric carpooling ecosystem by encouraging them to provide intelligent and constructive feedback. With the help of this technology, trust transcends

from being a catchphrase to a real asset that consumers may depend on when choosing possible ride companions. The provision of real-time ratings visibility guarantees that users possess up-to-date insights, hence promoting informed decision-making and strengthening the sense of accountability among community members.

Moreover, the Rating and Feedback System acts as a compass for the future as well as a tool for retrospective review. User feedback is transformed into meaningful data through the integration of performance analytics, providing a comprehensive perspective of trends, areas of excellence, and areas for improvement. The platform is being continuously improved and brought into line with the changing demands and expectations of the carpooling community thanks in large part to this data-driven approach. Essentially, the Rating and Feedback System is more than just a feature—it's a dedication to collaboratively building a carpooling community in which every shared ride serves as a chance for development, enhancement, and the building of a journey laced with trust for all involved.

3.5.1 Rating Process Management:

Description:

Users can evaluate other passengers and drivers according to their entire experience. Users can easily submit feedback using a smooth interface used in the rating process. Users can also leave a comment about the ride providing more details as a feedback.

Validation:

Testing the accuracy of the rating submission, making sure there are no technical difficulties for users to submit their ratings, and verifying that the data gathered adds significantly to the total user ratings are all part of the validation process.

3.4.2 Feedback Submission:

Description:

In addition to numerical ratings, users can submit detailed feedback to provide specific insights into their ride experience. This qualitative feedback allows users to express their thoughts, suggestions, and concerns.

Validation:

Verifying that users can submit comprehensive feedback without running into any problems is the process of validating feedback submission. In order to analyze and enhance the system in the future, qualitative input should be efficiently captured and stored.

3.4.3 Real Time Rating Visibility:

Description:

The platform ensures real-time visibility of ratings for both co-passengers and drivers. This transparency allows users to make informed decisions when selecting potential ride partners.

Validation:

Testing the system's quickness in quickly updating ratings is part of validating real-time rating visibility. It should be instantaneous for users to access the most recent ratings for drivers and fellow passengers.

4. Interface Requirements

4.1 User Interfaces:

The carpooling system's user interfaces are carefully crafted in a mobile application that runs on the iOS and Android operating systems. For the benefit of both drivers and passengers, this feature-rich application smoothly combines a number of functions to offer a simple, practical, and user-focused ride-sharing experience.

Users are welcomed by an easy-to-use registration process that is integrated into the mobile app UI when they first access the system. By gathering the necessary information for verification, our onboarding process guarantees a safe and easy introduction to the carpooling community.

The system's primary function is dynamic ride planning, which is easily accessed via the user-friendly mobile app interface. It's easy for users to plan, adjust, and join rides in real time. Through the UI, customers may explore available alternatives, set preferences, and input ride data, giving them a flexible and personalized way to organize their trips.

The mobile app's user profile management gives the experience an extra degree of customization. Users can evaluate their ride history, change their personal information, and modify their preferences with ease. Every user will be able to customize their experience with the carpooling system thanks to this central hub for profile management.

Within the smartphone app, a consolidated notification center facilitates real-time communication. Consumers are kept informed throughout their ride-sharing experience by receiving system announcements, ride requests, and updates in a timely manner. The real-time feature gives the UI a more dynamic and transparent feel.

The application integrates geolocation services by utilizing the capabilities of mobile devices. This function improves the accuracy of route planning by guaranteeing drivers and passengers of exact pick-up and drop-off locations. The entire effectiveness of the ride-sharing process is enhanced by the smooth integration of geolocation services.

The mobile app interface's integrated secure payment processing capability is essential to the user experience. Users can initiate and finish financial transactions directly within the app thanks to the seamless integration of the application with a secure payment gateway. This function guarantees the security of ride-sharing transactions while also streamlining the payment procedure.

An in-app messaging system helps to further facilitate communication within the platform. This function improves overall communication efficiency by enabling smooth coordination between drivers and passengers. The in-app messaging system gives consumers an easy and integrated channel for communicating about changes, arranging pick-up locations, or debating ride details.

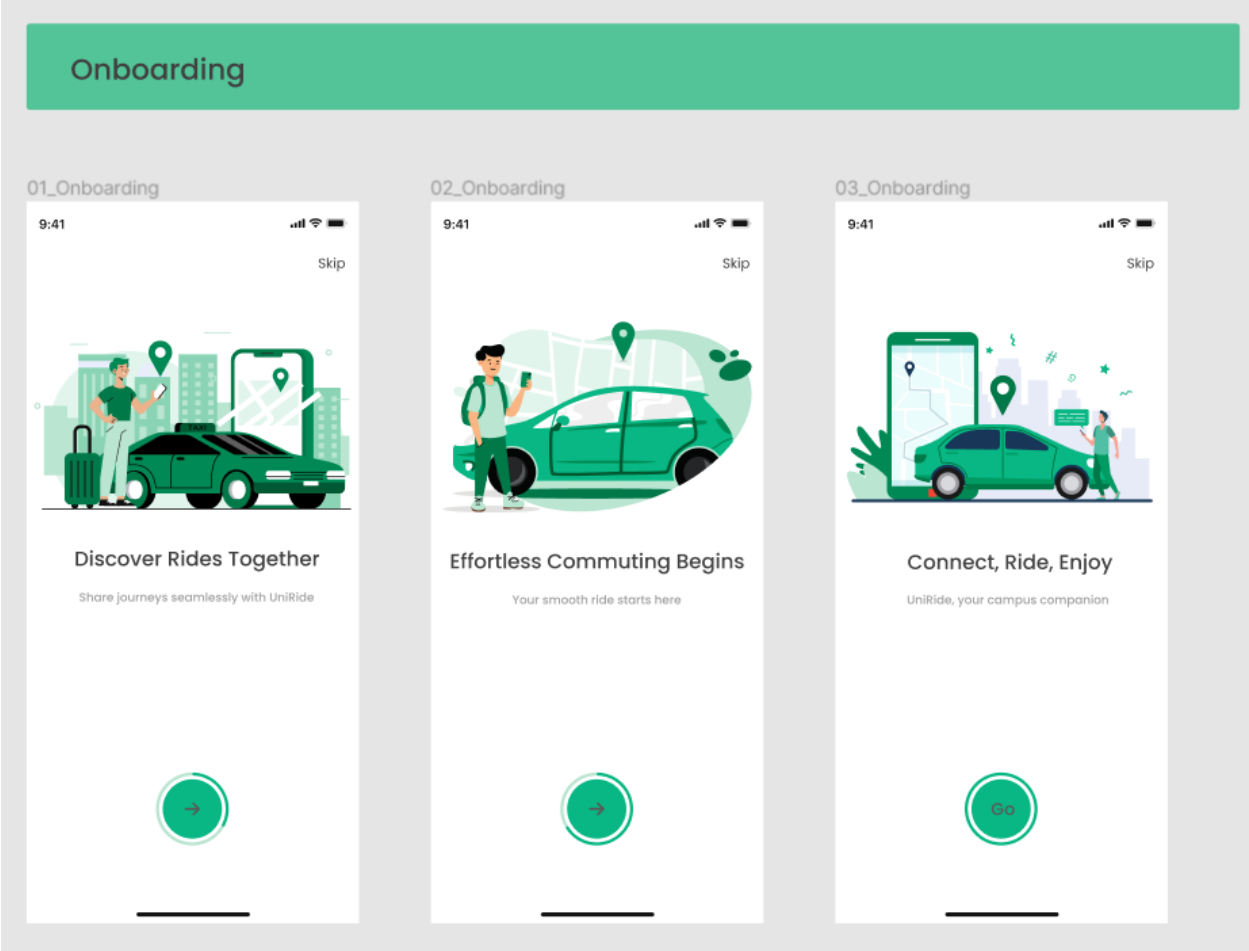
4.1.1 GUI:

The Graphical User Interface (GUI) serves as the central interaction point for the majority of users within the carpooling platform, providing an immersive and visually engaging experience. With the help of a thoughtfully considered design philosophy, the GUI makes it possible for users to create, manage, and customize ride listings with maximum simplicity by empowering them to explore the platform's capabilities with ease.

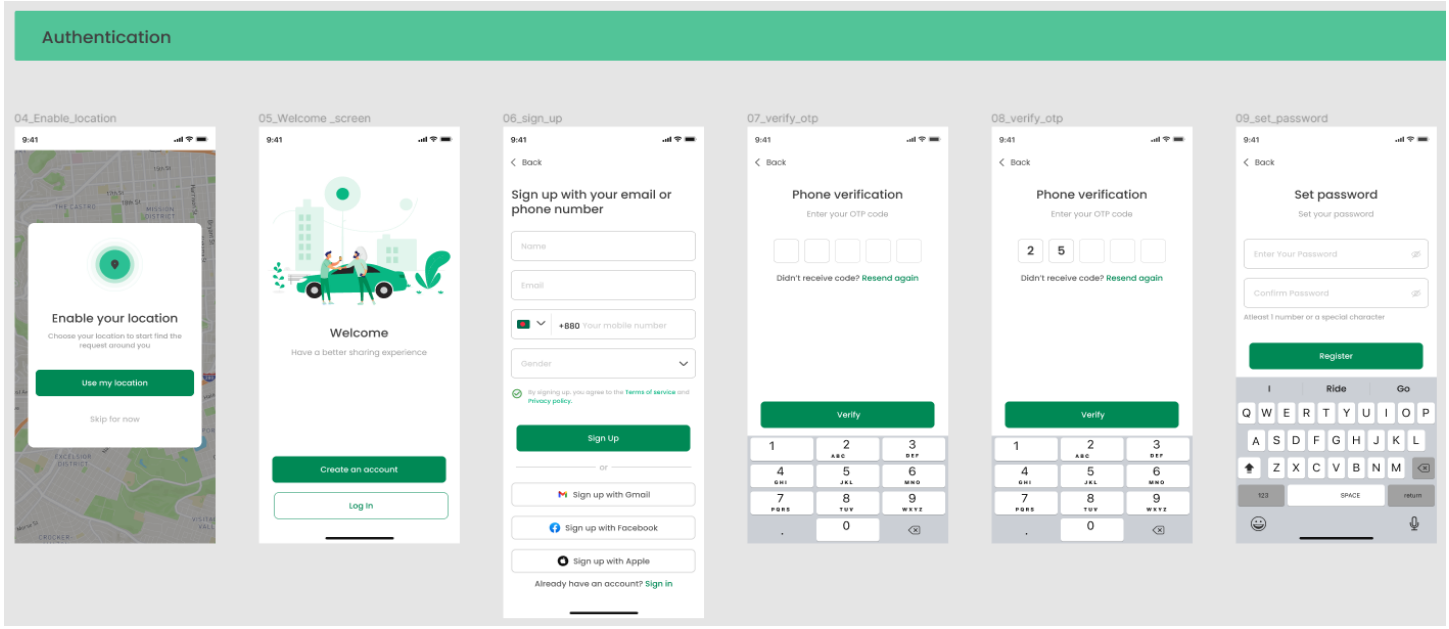
Beyond just being functional, this interface provides users with an easy-to-use experience while allowing them to track shared journeys in real-time. The real-time tracking function of the GUI is more than simply a visual help; it's a dynamic tool that increases the user's awareness and sense of control throughout their shared journeys, encouraging increased trust and openness among the carpooling community. Along with journey tracking, the GUI makes feedback flow more easily, giving users a forum to share their experiences and help the carpooling ecosystem get better all the time. The GUI's design principles place a high priority on user-centricity, making it easy for students of different technological proficiency levels to interact with the platform.

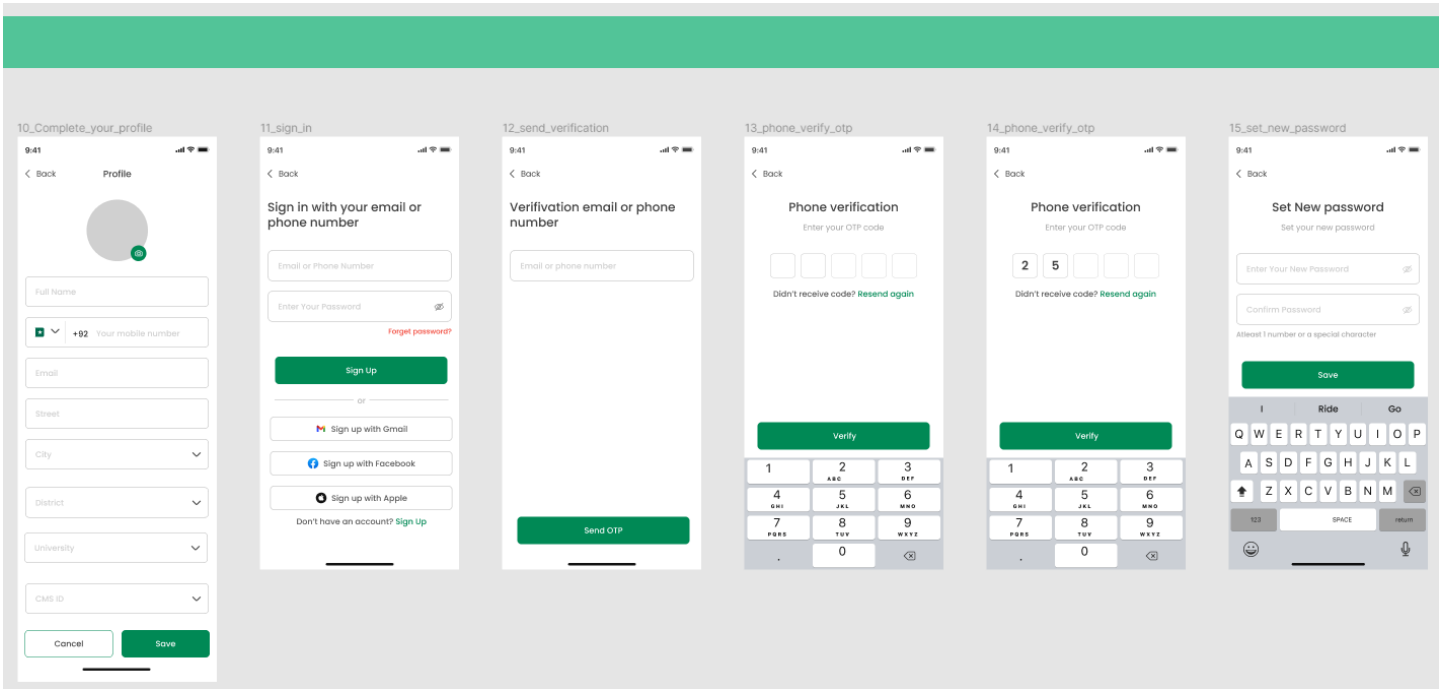
UI/UX Designs Created in Figma:

- **Onboarding**

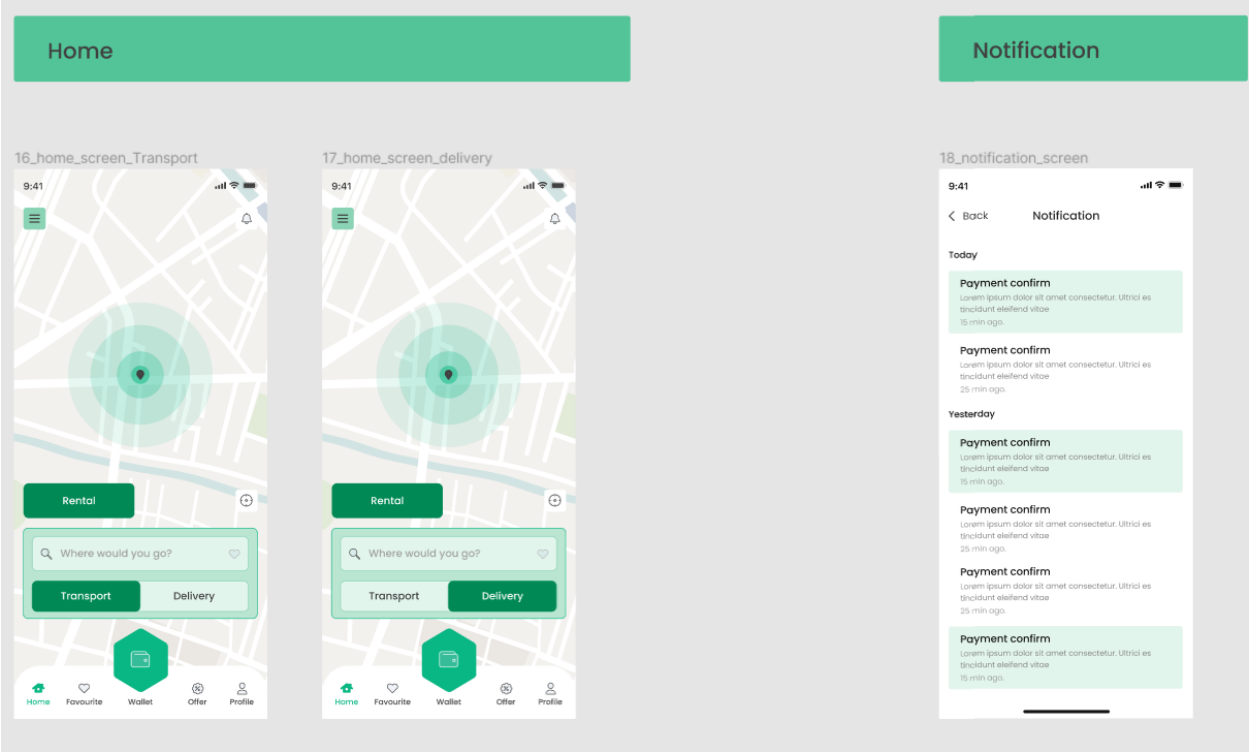


- **Authentication**

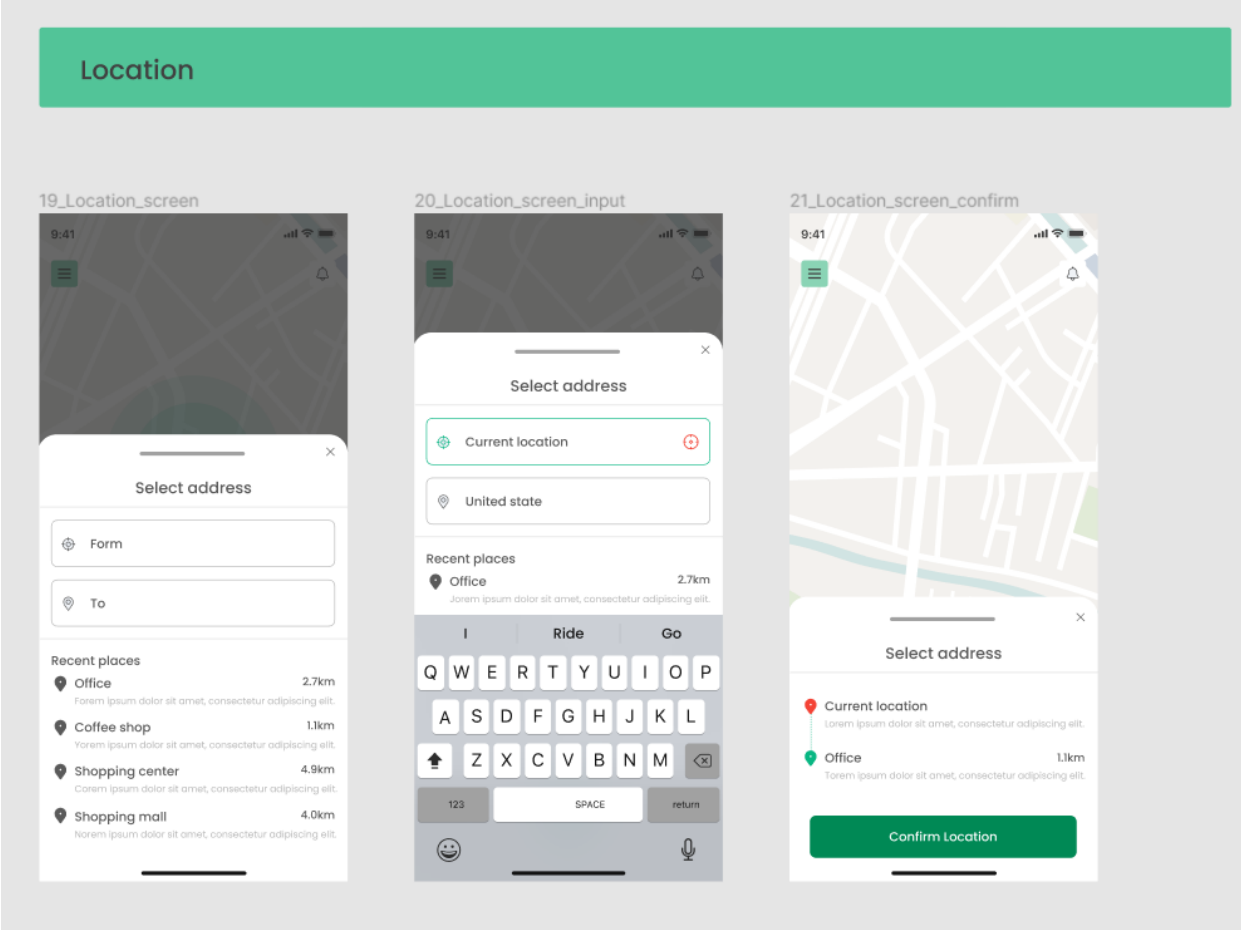




- **Home,Notification**



- **Location**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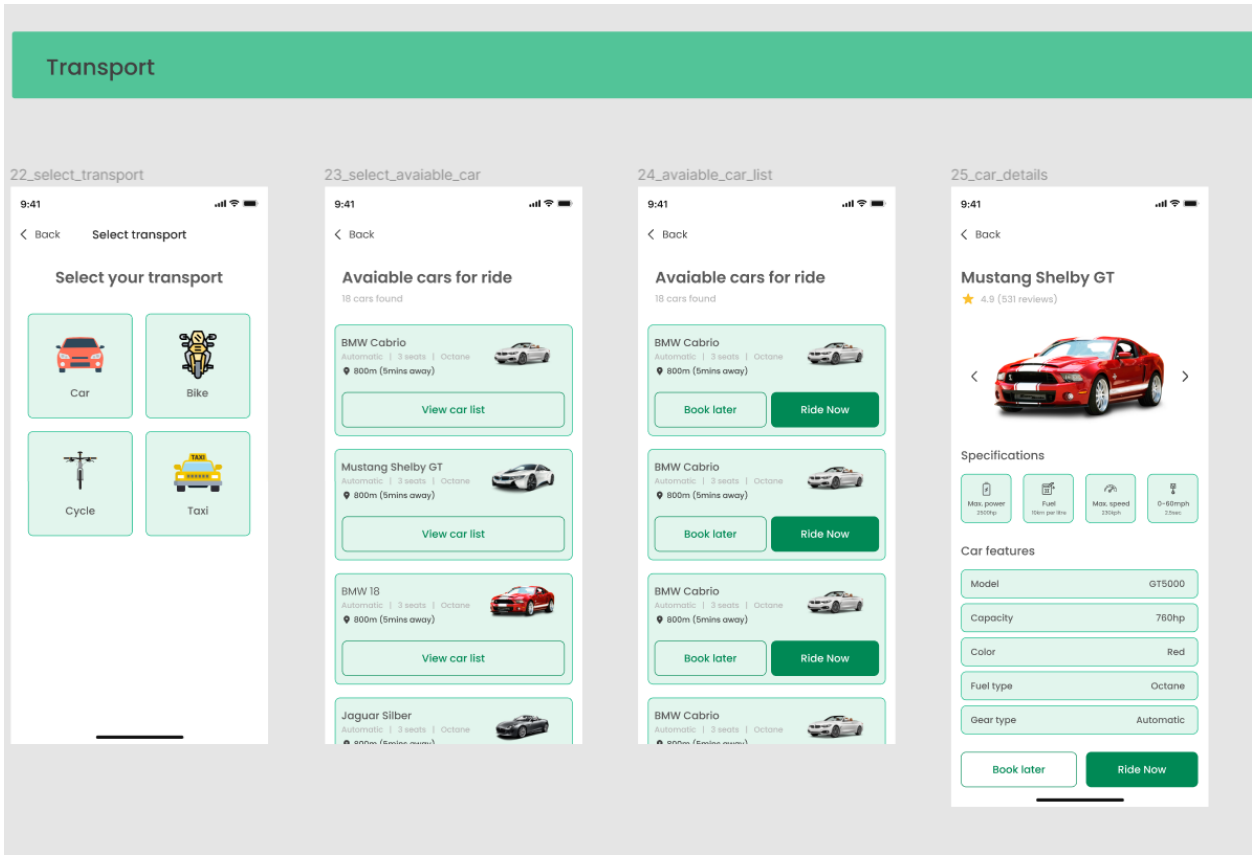
Confirm Location

- **Transport**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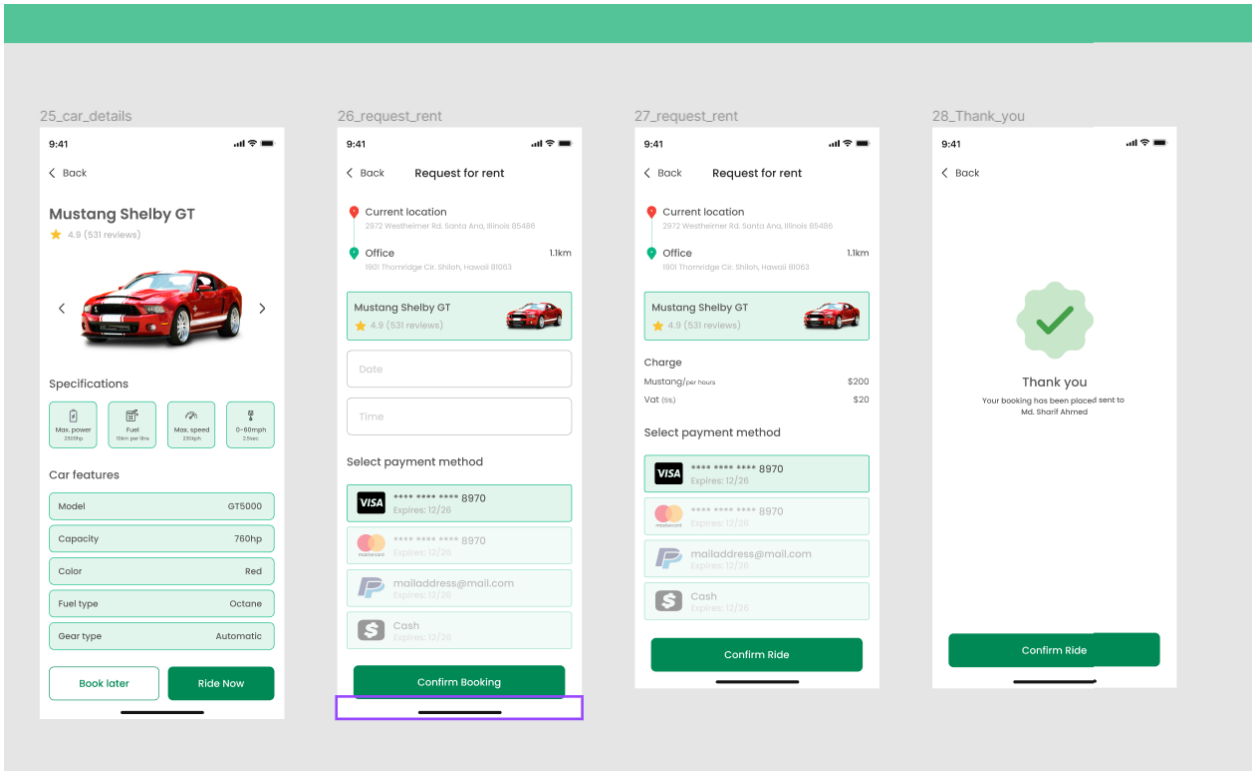
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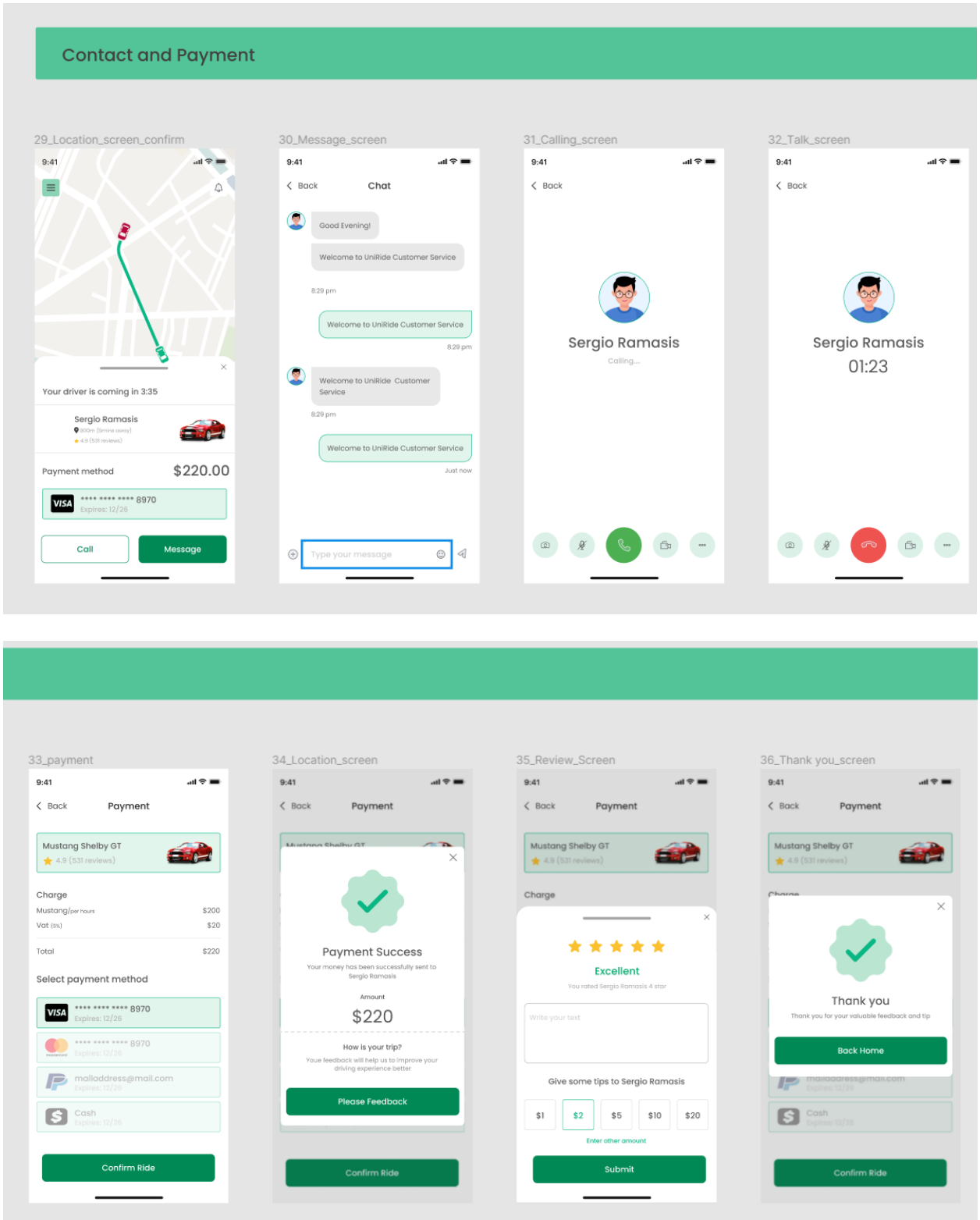
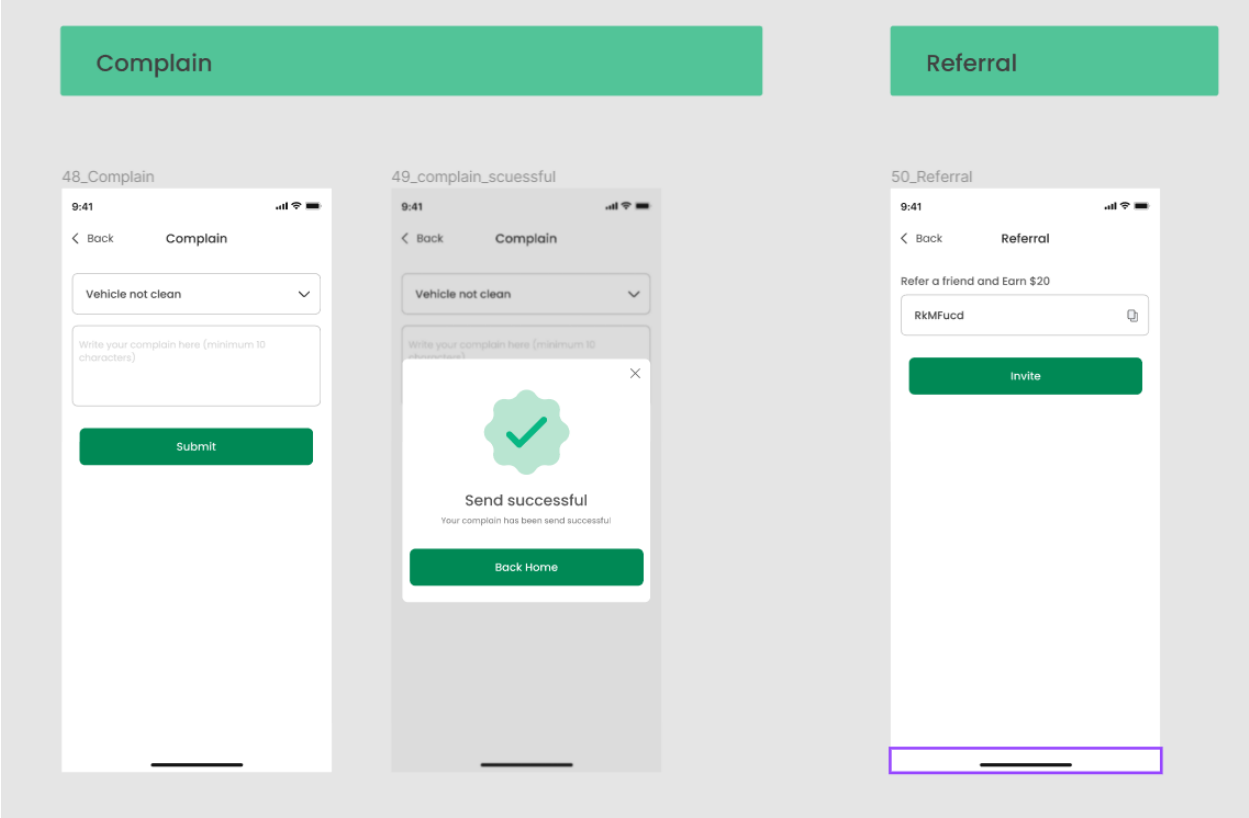
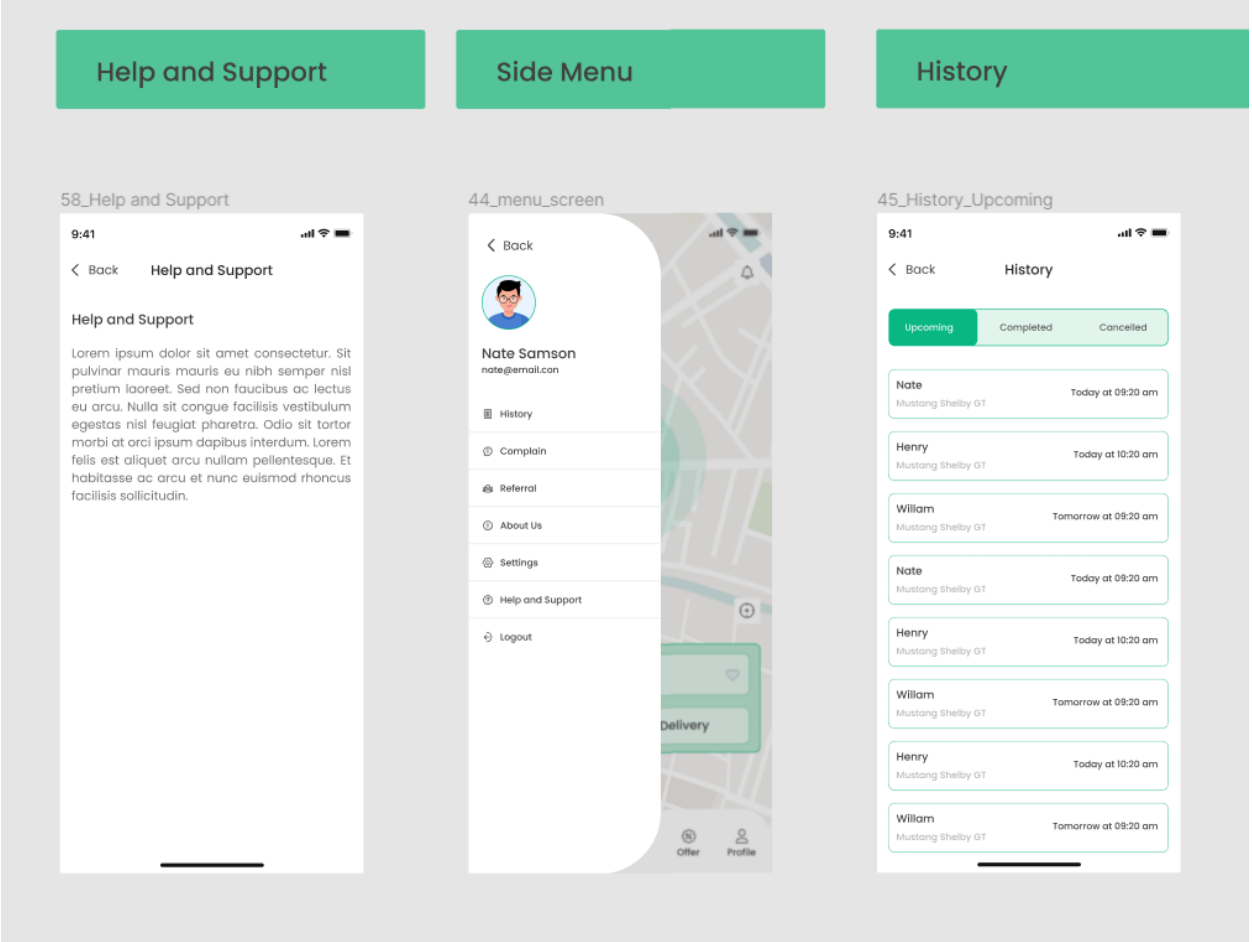
- **Contact and Payment**



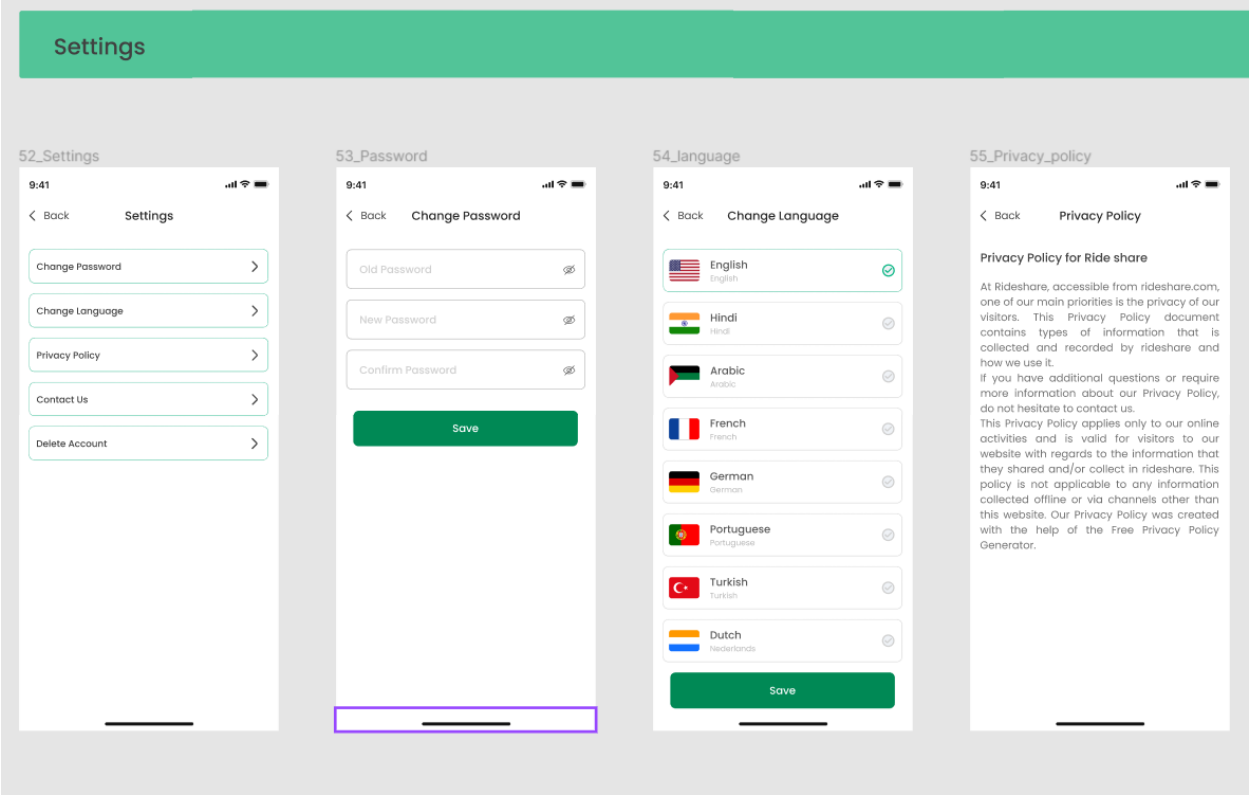
- **Complain and Referrel:**



- **Side Menu,Help and Support ,History:**



- **Settings:**



4.1.2 API:

By adding dynamic mapping functionality, the carpooling platform's subsystem that integrates the Google Maps API significantly elevates user experience. Fundamentally, the Google Maps API provides a strong framework by providing an online interface that deftly integrates places and roads into the platform's architecture. Users are able to interact with the system with ease due to this smooth integration, which opens up a range of useful features. Planning a route becomes simple and straightforward as users may navigate through an easy-to-use map interface to find the best travel routes for group rides. The Google Maps API-powered real-time tracking function improves convenience and dependability by providing users with up-to-date information on the location and status of their shared excursions. Moreover, the Google Maps API provides location-based services that go beyond simple navigation. While commuting, users can explore and find pertinent areas of interest, which helps them make well-informed decisions. By using a complete approach, the carpooling platform is elevated from a simple ride-sharing service to a full-fledged solution that incorporates location-based information, mapping, and navigation.

4.1.3 Diagnostics or ROM:

Within the carpooling platform, the Diagnostics or Read-Only Memory (ROM) interface serves as a reliable toolset for diagnostic and system-level functions. This interface, designed specifically for system administrators and developers, explores the nuances of the platform's performance, system health, and diagnostic data. Fundamentally, the Diagnostics or ROM interface acts as a central command post for individuals in charge of the platform's smooth operation. Through the use of this interface, system administrators and developers may ensure optimal operation and acquire deep insights into the platform's performance indicators, perhaps detecting bottlenecks. Real-time monitoring is part of the diagnostic capabilities, providing an instantaneous view of the platform's condition.

4.2 Hardware Interfaces:

The carpooling platform facilitates user interaction and seamless functionality by interacting with several hardware interfaces. Among these hardware interfaces are:

4.2.1 Mobile Devices:

Because the carpooling platform was purposefully designed to be a mobile application, the main hardware interface for users is the widespread use of mobile devices, particularly smartphones. By making this calculated decision, customers may use and access the full range of platform capabilities right from their portable devices. The smartphone software responds to users' changing demands by allowing them to post rides and actively follow shared trips in real time.

This mobile-centric approach is further refined by optimizing the application to run efficiently across a diverse range of mobile devices. Regardless of whether customers own the newest or more affordable devices, the platform is designed to provide a dependable, simple, and easy-to-use experience. The carpooling platform's emphasis on mobile interfaces not only conforms to modern user behavior but also guarantees accessibility for a wide range of users, promoting ease and inclusion within the mobile ecosystem.

4.2.2 GPS:

The carpooling platform relies on the GPS (Global Positioning System) functionality integrated into users' mobile devices for location tracking. Additionally, the platform enhances the

location-based services and real-time mapping features through the utilization of the Google Maps API. This combination allows for precise and dynamic location tracking, ensuring accurate route planning, live updates, and an overall efficient navigation experience for users. The powerful real-time tracking feature of the carpooling platform is based on Global Positioning System (GPS) technology. By utilizing the built-in GPS capabilities of mobile devices, the platform guarantees accurate and dependable location tracking throughout the duration of shared journeys. This physical interface plays a crucial role in enabling users to easily track the course of their journey. An interactive and responsive navigation experience is made possible by the incorporation of GPS technology. The capability to track one's whereabouts in real-time is beneficial to users, whether they are drivers or passengers. By giving passengers the freedom to choose their own routes, this not only improves the transparency of shared rides but also maximizes their travel experience. The carpooling platform complies with contemporary navigation standards by utilizing GPS capabilities, which enhances and optimizes the mobility option for users. The platform's usage of GPS technology demonstrates its dedication to offering a state-of-the-art and user-focused experience in the shared transportation space.

4.3 Communication Interfaces:

The "Communication Interfaces" of the carpooling platform form a vital framework that facilitates interactions and exchanges of information among users. These interfaces encompass various channels to ensure effective communication, enhancing the overall user experience.

4.3.1 Push Notifications:

The carpooling platform's main mode of real-time communication is through push notifications. Instant updates on ride confirmations and other pertinent information are sent to users. By delivering timely and customized notifications, this interface makes use of the platform's mobile application features to keep consumers informed and interested.

Users are promptly notified of ride confirmations, providing them with immediate assurance and clarity about their upcoming shared journeys. This real-time communication is vital for users to plan and prepare for their rides, contributing to a sense of reliability and convenience. Push notifications provide consumers with timely updates on many topics, such as pick-up and

drop-off locations and ride status changes. Proactive communication builds user confidence and facilitates a seamless, well-organized experience on the ridesharing platform.

4.3.2 In-App Messaging:

Within the carpooling platform, the In-App Messaging feature is a specialized and secure area intended to promote smooth communication between drivers and riders. Through this interactive interface, users may arrange pick-up locations, talk over important ride details, and discuss any special needs or preferences they may have.

The texting tool allows drivers and passengers to work together to arrange logistics, such confirming pick-up and drop-off locations or talking about preferred routes. Users can agree on important details of their trip because of this direct channel of contact, which improves the collaborative component of shared rides. When it comes to their shared journeys, users could have certain needs or preferences. With the help of the In-App Messaging feature, people can easily talk about and take care of these details in a convenient setting that is driven by their needs. This allows people to interact freely and customize their shared experiences to suit their needs. User-friendliness and security are given top priority in the in-app messaging system. The interface is easily navigable and has a straightforward design, protecting user privacy in all communication. This dedication to customer experience and security fosters a constructive and trust-building communication environment. Through the provision of a specialized conversation area, the in-app messaging function improves user collaboration. It promotes candid communication, enabling riders and drivers to cooperate to guarantee a seamless and pleasurable shared trip experience. The In-App Messaging feature is a crucial component of the carpooling platform that facilitates coordination, customisation, and collaboration within the shared mobility ecosystem. It goes beyond simple communication features.

4.3.3 System Alerts and Announcements:

System announcements act as a broadcast communication interface, delivering important updates, new feature announcements, or general information to all users simultaneously. This ensures that users are kept abreast of platform-wide developments and improvements. The System Announcements interface serves as a dependable means of quickly communicating important information. This channel makes sure that users are informed as soon as there are any

major platform enhancements, new features are introduced, or general upgrades occur. A community of informed users benefits from the announcements being sent out in a methodical manner. Keeping people informed about enhancements and new features makes a big difference in their overall experience. System announcements are essential for increasing user satisfaction since they let users know about the most recent developments and help them make the most of the carpooling platform. A more involved and contented user community results from empowered and informed users.

4.4 Software Interfaces:

Software Interfaces are essential to the complex architecture of the ridesharing platform because they enable smooth communication between many subsystems and outside parties. These interfaces serve as the platform's digital spine, facilitating effective data interchange, communication, and collaboration amongst different software modules.

4.4.1 Google Maps API Integration:

The foundation of the carpooling platform is Google Maps API Integration, which forms a strong software interface that harmoniously and meticulously integrates many functionalities. This interface is a powerful subsystem that connects to the Google Maps API, which is a crucial component that provides real-time location services, dynamic mapping features, and route optimization capabilities. The platform and API work together to optimize routes in a way that goes beyond simple mapping. Users will benefit from improved navigation, carefully designed routes, and a consistently accurate and exact location-based experience thanks to this advanced integration. The Google Maps API and the carpooling platform have a significant technological synergy. The platform dynamically retrieves mapping data, reads real-time location inputs, and optimizes routes depending on a variety of parameters through a sequence of carefully prepared API calls and responses. Through the use of secure protocols, this interaction improves user navigation and adds to the platform's overall effectiveness in offering dependable and precise location-based services.

4.4.2 The Database Management System:

The foundation of the data ecosystem of the carpooling platform is the Database Management System (DBMS), which offers a crucial software interface for coordinating the management,

retrieval, and storing of important data. Fundamentally, the DBMS serves as an important conduit for the storing of various data types, such as user profiles, ride details, and other vital data, by connecting the platform to the underlying database architecture. By creating guidelines for safe and reliable storage, this interface acts as a guardian of data integrity. Through careful management of the dependencies and relationships inside the database, the DBMS makes sure that ride details are arranged methodically, user profiles stay correct, and all pertinent data is available when needed. Retrieval of data must be as efficient as possible, and the DBMS optimizes this process, contributing to a fluid and uninterrupted user experience. The DBMS lets the ridesharing platform to communicate with the database and retrieve and update data in real-time using a set of structured instructions and queries. This interface's resilience is essential to the platform's daily functioning as well as serving as a solid basis for scalability, which guarantees that the platform can easily handle growing data volumes and user interactions.

4.4.3 Payment Gateway Integration:

The Payment Gateway Integration plays a crucial role as a software interface within the carpooling platform, ensuring secure and efficient financial transactions. This interface acts as a vital link between the platform and external payment systems, allowing for a smooth exchange of funds between passengers and drivers. In essence, the Payment Gateway Integration is made to easily integrate with different financial institutions, allowing the platform to communicate with outside payment systems without any issues. Making or receiving payments is made easier for users because to this connectivity, which enables transactions to be processed quickly and accurately.

Real-time payment validation, which creates a safe conduit for transaction verification, is one of its main purposes. This procedure guarantees that financial transactions are legal and adhere to the necessary security requirements. Preventing fraudulent activity, boosting user confidence, and upholding the general integrity of the platform's financial ecosystem all depend on this validation. In addition, the Payment Gateway Integration safely captures and maintains financial data, generating an audit trail of each transaction that is transparent and traceable. This feature reassures customers of the platform's dedication to privacy and data protection by providing a thorough view of financial transactions within it while upholding strict security protocols. Essentially, the Payment Gateway Integration arranges safe transactions on the

ridesharing platform as its financial conductor. This software interface guarantees the dependability and integrity of the financial transactions that support the platform's operations through its smooth interaction with external payment systems, real-time validation processes, and secure record-keeping capabilities.

4.4.4 Communication Protocols (HTTPS, API Protocols):

In the realm of the carpooling platform's digital architecture, Communication Protocols act as the fundamental language governing interactions between diverse components of the system and external entities. The implementation of robust protocols, including HTTPS, plays a pivotal role in ensuring secure and encrypted data transmission. This encryption not only safeguards sensitive user information during transit but also upholds the overall integrity of communication channels. HTTPS, or Hypertext Transfer Protocol Secure, establishes a secure and encrypted connection between the platform and its users. This security protocol employs cryptographic techniques to protect data from unauthorized access, mitigating the risk of interception or tampering during the communication process. By adhering to HTTPS standards, the carpooling platform prioritizes user privacy and data security, creating a foundation of trust between users and the digital infrastructure. Additionally, API Protocols contribute to the seamless functioning of the platform by defining the rules and conventions that govern communication with external services. These protocols serve as a standardized framework, facilitating interoperability between the carpooling platform and other software components. Through adherence to established API protocols, the platform ensures smooth and efficient communication, promoting compatibility with external services, applications, and data sources. In summary, Communication Protocols, including the secure HTTPS and API protocols, form the backbone of the carpooling platform's digital communication infrastructure. These protocols collectively contribute to the platform's commitment to user data security, privacy, and interoperability, fostering a robust and reliable system for users navigating the transportation landscape in sectors H11 and H12 of Islamabad.

4.4.5 Security Frameworks and Encryption Protocols:

Within the intricate web of the carpooling platform's digital infrastructure, the integration with Security Frameworks and Encryption Protocols stands as a paramount imperative. These software interfaces play a pivotal role in fortifying the platform against potential security threats, establishing robust mechanisms for safeguarding data transmission, storage, and user

authentication. Security Frameworks serve as a comprehensive shield, encompassing a suite of tools, policies, and protocols designed to detect, prevent, and respond to security vulnerabilities. By integrating with industry-standard security frameworks, the carpooling platform fortifies itself against a spectrum of potential threats, ranging from unauthorized access attempts to data breaches. This proactive approach ensures a resilient defense mechanism, aligning with contemporary security standards to protect user information. Encryption Protocols, on the other hand, form the bedrock of secure data communication and storage. Through the implementation of encryption algorithms, sensitive user data is transformed into a secure format, rendering it indecipherable to unauthorized entities. This ensures the confidentiality and integrity of user information, both during transmission across the platform and while stored in databases. By adopting robust encryption protocols, the carpooling platform creates a secure environment, bolstering user trust and confidence in the protection of their data.

4.4.6 Social Media Integration:

The Social Media Integration interface facilitates an alternative symphony for users, enabling them to compose their registration or login opus by leveraging the sonorous chords of their social media accounts. Through this integration, users can synchronize their carpooling platform activities with their social media profiles, fostering a harmonious blend of convenience and connectivity. A secure authentication ballet ensures the legitimacy of user accounts conducted through the social media orchestra. The platform validates user credentials with the respective social media platforms, enhancing security and ensuring the seamless integration of user profiles. Social Media Integration serves as more than a mere feature; it transforms user interactions into a collaborative experience. By bridging the gap between the carpooling platform and users' social media ecosystems, this interface enriches the platform's social fabric, encouraging community-building and fostering a sense of shared mobility within the digital landscape.

5. Performance Requirements

5.1 Response Time:

Objective:

The system must respond to user interactions, such as login and ride requests, within 3 seconds to ensure a seamless and responsive user experience.

Rationale:

Quick response times are crucial for engaging users and providing them with a satisfactory experience. This ensures that users can perform actions swiftly without unnecessary delays.

5.2 Database Query Speed:

Objective:

Database queries for ride information, such as available rides and driver details, should return results in less than 5 seconds to facilitate swift access to relevant information.

Rationale:

Efficient database query speed is fundamental for an optimal user experience. Users should be able to quickly retrieve information about potential rides and make informed decisions without delays.

5.3 Concurrent User Handling:

Objective:

The system should support at least 1000 concurrent users without a degradation in performance to ensure smooth operations during peak usage times.

Rationale:

UniRide's success depends on its ability to handle a large number of users simultaneously. This requirement ensures that the platform can accommodate high demand without compromising performance.

5.4 Map Integration Latency:

Objective:

Map integration for ride selection should have a latency of less than 2 seconds to provide users with quick and seamless navigation through available rides.

Rationale:

Quick map response times are essential for users to efficiently choose and confirm rides. This requirement emphasizes the importance of swift map interactions to enhance the overall user experience.

5.5 System Uptime:

Objective:

The system must maintain at least 99.5% uptime, ensuring reliable access to UniRide services for users.

Rationale:

High system availability is critical to prevent service disruptions and maintain user trust. This requirement sets a standard for the platform's reliability, minimizing downtime and ensuring continuous service availability.

5.6 Data Backup Frequency:

Objective:

Regular backups of user data should be performed at least once every 24 hours to minimize the risk of data loss in case of unforeseen events.

Rationale:

Frequent data backups are essential for data security and recovery. This requirement ensures that user data is regularly and reliably backed up, reducing the potential impact of data loss incidents.

5.7 Algorithm Execution Time:

Objective:

The user matching algorithm, responsible for pairing drivers and riders efficiently, should execute within 10 seconds to provide timely and relevant ride-sharing options.

Rationale:

Efficient algorithm execution is critical for successful user matching and overall system performance. This requirement emphasizes the importance of quick algorithmic processing to deliver optimal and timely ride-sharing suggestions.

5.8 Notification Delivery Time:

Objective:

Notifications, such as ride confirmations and updates, should be delivered instantly to keep users promptly informed.

Rationale:

Instant notification delivery is crucial for maintaining transparent communication with users. This requirement ensures that users receive timely updates, enhancing their overall experience with the UniRide platform.

5.9 Payment Processing Time:

Objective:

Payment transactions, including processing and confirmation, should be completed within 5 seconds to ensure a seamless and satisfying user payment experience.

Rationale:

Swift payment processing contributes to the efficiency of the UniRide platform. This requirement emphasizes the importance of quick and reliable payment transactions, enhancing user satisfaction during the payment process.

5.10 Error Handling Response Time:

Objective:

The system should respond to errors and exceptions within 5 seconds, providing clear and informative messages to users to aid in efficient troubleshooting.

Rationale:

Quick error handling response times are essential for a positive user experience. This requirement ensures that users receive timely and helpful information when errors occur, facilitating efficient issue resolution and minimizing disruptions.

6. Non-Functional Requirement

6.1 Security:

Description:

Security is a paramount concern in the Uni Ride-Sharing System to safeguard the integrity and confidentiality of user data, financial transactions, and to create a trustworthy environment for users. The system employs a multi-faceted approach to address various security aspects. Data encryption is implemented throughout the application to protect sensitive user information during transmission and storage. Secure payment processes are integrated, leveraging industry-standard encryption protocols and ensuring compliance with Payment Card Industry Data Security Standard (PCI DSS) requirements. User authentication is a critical component, with robust measures in place to verify user identities securely. This includes multifactor authentication and strict verification procedures for account recovery. The system also prioritizes adherence to data privacy regulations, conducting regular compliance checks to ensure that user data is handled in accordance with applicable standards. Furthermore, an incident response plan is established and rigorously tested to ensure the platform can promptly and effectively address and resolve any security incidents that may occur, minimizing potential impact and maintaining user trust.

Validation:

- **Data Encryption:**

Regular security testing is conducted to assess the effectiveness of encryption protocols in maintaining the confidentiality of user data. This involves evaluating the encryption algorithms, key management processes, and overall data protection mechanisms. The testing process includes simulated attacks and penetration testing to identify and rectify vulnerabilities, ensuring that the encryption measures are robust and up to date with the latest security standards.

- **Payment Security:**

Rigorous testing of payment processes is undertaken to guarantee secure financial transactions and compliance with industry standards such as PCI DSS. This involves assessing the security of payment gateways, transaction handling, and the secure storage of payment-related information. The testing process includes simulated attacks, vulnerability assessments, and adherence checks

to ensure that the payment security measures are resilient against potential threats and aligned with the latest security best practices.

- **User Authentication:**

Thorough testing is conducted to verify the security of user authentication processes. This includes assessing the strength of password policies, the effectiveness of multifactor authentication mechanisms, and the procedures for account recovery. The testing process involves simulated attacks, password cracking attempts, and verification checks to ensure that user authentication is robust, user identities are securely verified, and the system remains resilient against unauthorized access.

- **Data Privacy:**

Compliance checks are regularly performed to validate that the Uni Ride-Sharing System adheres to applicable data privacy standards and regulations. This involves reviewing data handling practices, consent mechanisms, and user data access controls. The compliance testing process includes assessments against global and regional data protection laws, ensuring that user data is processed, stored, and managed in accordance with the highest privacy standards.

- **Incident Response:**

Testing of incident response mechanisms is a critical aspect of ensuring the platform's ability to address and resolve security incidents. This involves conducting simulated incident scenarios, assessing the effectiveness of incident detection and response processes, and evaluating the coordination of response teams. The testing process includes scenario-based drills, communication checks, and continuous improvement assessments to enhance the platform's overall incident response capabilities. Regular updates to the incident response plan are made based on lessons learned from testing and real-world incidents, ensuring a proactive and adaptive approach to security incident management.

6.2 Reliability:

Description:

Reliability stands as a cornerstone in the Uni Ride-Sharing System to guarantee consistent platform operation, mitigate downtime, minimize errors, and prevent disruptions. It encompasses

a comprehensive strategy to maintain high system uptime, robust error handling, regular backup and recovery procedures, and the implementation of redundancy measures. The goal is to provide users with a seamless and dependable experience, ensuring that the platform is available and functional whenever users need it. Reliability is not only about preventing failures but also about responding effectively when unforeseen issues occur, ensuring the system can recover swiftly and maintain a high level of service continuity.

Validation:

- **System Uptime:**

Continuous testing and monitoring are conducted to ensure that the Uni Ride-Sharing System meets or exceeds defined uptime standards. This involves assessing the platform's performance under various loads and conditions to identify potential bottlenecks or points of failure. Real-time monitoring tools are employed to track system performance, and automated alerts are set up to notify administrators of any deviations from the expected uptime levels. The testing process also includes planned downtime simulations to validate the system's ability to gracefully handle scheduled maintenance without impacting the user experience.

- **Error Handling:**

Thorough testing of various scenarios is carried out to validate that the platform can identify, log, and manage errors effectively without compromising the user experience. This includes simulating both common and uncommon error conditions, such as network failures, database errors, or unexpected user inputs. The testing process assesses how well the system reacts to these errors, whether it provides meaningful error messages to users, and if it can gracefully recover from error states without causing data corruption or service disruptions.

- **Backup and Recovery:**

Through rigorous testing, the Uni Ride-Sharing System ensures that data can be restored effectively, and the platform can recover from failures without data loss. Regular backup procedures are validated to confirm that they capture all critical data and that the backup copies are accessible and complete. The recovery process is tested in simulated failure scenarios, assessing the system's ability to restore operations swiftly and reliably. This involves testing data

integrity, verifying the availability of backup resources, and ensuring that the recovery process aligns with predefined recovery time objectives (RTOs).

- **Redundancy:**

Testing failover scenarios is imperative to validate that the platform can seamlessly switch to backup systems in case of server issues. This includes simulating hardware failures, network outages, or other infrastructure-related issues to assess the system's ability to switch to redundant components or backup servers without user impact. The testing process evaluates the effectiveness of redundancy mechanisms, the speed of failover, and the overall resilience of the system architecture. Regular updates to the redundancy testing procedures are made to adapt to changes in the system's infrastructure and technology stack, ensuring ongoing reliability as the platform evolves.

6.3 Maintainability:

Description:

Maintainability is a pivotal aspect of the Uni Ride-Sharing System, focusing on making the platform easy to maintain and enhance over time. This involves fostering a development environment that encourages clean, modular code, effective documentation, robust version control practices, and strategies for continuous improvement. The goal is to empower developers to efficiently manage and update the system, ensuring its longevity, adaptability, and alignment with evolving business requirements.

Validation:

- **Clean Code:**

Regular code reviews and analysis are integral to ensuring that the codebase of the Uni Ride-Sharing System is maintainable and adheres to established coding standards. This involves reviewing coding practices, assessing code complexity, and identifying potential areas for improvement. Automated code analysis tools may be employed to enforce coding standards and identify code smells or anti-patterns. The validation process ensures that the code remains readable, modular, and follows best practices, making it easier for developers to understand, update, and extend.

- **Documentation:**

Documentation undergoes thorough validation to ensure it is clear, comprehensive, and up to date, facilitating easy understanding and updates. This includes technical documentation, API documentation, and user manuals. Regular audits of documentation are conducted to verify that it accurately reflects the current state of the system. The validation process involves testing the comprehensibility of the documentation, assessing its alignment with the actual system behaviour, and ensuring that it provides meaningful guidance for developers, administrators, and end-users.

- **Version Control:**

Utilizing version control systems undergoes validation to track changes efficiently and support collaboration among developers. This involves testing the effectiveness of version control workflows, ensuring that branching and merging strategies are well-defined and followed. The validation process also includes testing the ability to roll back changes, trace the history of code modifications, and collaborate seamlessly among development teams. This ensures that the version control system contributes to a stable and manageable codebase, making it easier to identify, isolate, and rectify issues.

- **Continuous Improvement:**

Testing the effectiveness of strategies for continuous improvement ensures that the Uni Ride-Sharing System evolves in line with changing demands and expectations. This involves evaluating the responsiveness of the development process to user feedback, assessing the efficiency of the feedback loop, and validating the implementation of improvements. The continuous improvement testing process includes assessing the impact of updates on system performance, reliability, and security. It ensures that the platform remains agile, adaptable, and can readily incorporate new features and enhancements to meet evolving user needs and industry standards. Regular retrospectives and post-implementation reviews contribute to refining the continuous improvement strategy, fostering a culture of ongoing enhancement within the development team.

6.4 Portability:

Description:

Portability is a critical consideration in the Uni Ride-Sharing System, ensuring that the platform is optimized for use on various devices, platforms, and network conditions. This encompasses cross-device optimization, network optimization, and thorough testing under different network scenarios. The goal is to provide users within Islamabad's academic community with a consistent and reliable experience, irrespective of the device they use or the network conditions they encounter. Portability is not only about supporting diverse devices but also about accommodating various network environments, considering the varying connectivity situations users may face.

Validation:

- **Cross-Device Optimization:**

Testing on multiple devices and platforms is conducted to validate a seamless user experience regardless of the device used. This involves assessing the responsiveness of the user interface, ensuring that features are consistently available and functional across different screen sizes, resolutions, and operating systems. The testing process also includes compatibility testing to verify that the Uni Ride-Sharing System works seamlessly on popular web browsers and mobile devices. This ensures that users can access and interact with the platform from a wide range of devices without compromising usability or functionality.

- **Network Optimization:**

Testing under different network conditions is imperative to ensure that the platform remains functional and accessible in diverse connectivity scenarios. This involves simulating various network conditions, including low bandwidth, high latency, and intermittent connectivity. The testing process assesses the platform's ability to handle network fluctuations gracefully, optimize data transfer for efficient performance, and provide a reliable experience even in less-than-ideal network conditions. Network optimization also includes testing the platform's offline capabilities, ensuring that users can access essential features even when connectivity is limited or unavailable.

These non-functional attributes collectively contribute to creating a secure, reliable, maintainable, and portable Uni Ride-Sharing System that meets the diverse needs of users in Islamabad's academic community. By prioritizing portability, the platform can accommodate the preferences and circumstances of users, enhancing accessibility and usability across a broad spectrum of devices and network environments.

7. Operational Scenarios

This software product is developed for customers who would be booking rides and drivers for the journey. There would be an app available on google play store and all users of the system will access the system through the user interface which includes multiple pages according to the system functionality for example for login functionality there will be the login page. To access the system, every user has a unique username and password. In addition, there will be a database that stores and manipulates all the data about the users. The app will only be the interface for all the user data stored by the database and the execution of provided functionalities. After the sign-up, user information will be transferred to the database. In the sign-up process, there will be e-mail verification to verify user information. After that point, users can register through the app interface. After log in, the user will be able to log out whenever he or she wants.So for this whole journey, there will be the following operational scenarios:

Scenario A: User Registration and Profile Creation

Description:

- New users download the UniRide mobile app from the App Store or Google Play.
- Upon opening the app, they are prompted to register by providing personal information,including name, email address, phone number, and university affiliation.
- Users verify their email addresses through a confirmation link or a verification code sent via SMS.
- After successful verification, users are prompted to complete their profiles by adding profile pictures, specifying preferences (e.g. specific car model,music preferences,etc), and indicating whether they are willing to drive or only ride.

Expected Outcome:

- Users complete the registration process seamlessly.
- User profiles are populated with accurate and relevant information.
- The app provides a clear and intuitive onboarding experience.

Scenario B: Ride Posting and Searching

Description:

- A user planning to drive(driver) posts a ride by entering details such as departure time, departure location, destination, number of available seats, and any additional preferences (e.g., smoking or non-smoking,gender,etc).
- The system then validates the posted ride information and then it becomes visible to other users within the specified route and time frame.
- A user seeking a ride searches for available rides based on criteria like departure location, destination, and departure time.

Expected Outcome:

- Posted rides are accurately listed in the UniRide system.
- Users can easily search and find rides that match their commuting needs.
- Ride details include all necessary information for users to make informed decisions.

Scenario C: Ride Confirmation and Notification

Description:

- A driver receives ride requests from interested riders and reviews their profiles and any previous ratings.
- The driver confirms a specific rider for the journey, and the system sends a confirmation notification to both the driver and the rider.
- The notification includes details like meeting point, estimated travel time, and any special instructions.

Expected Outcome:

- Confirmed rides are accurately reflected in the UniRide system.
- Notifications are sent promptly and contain all relevant information.
- Users have a clear understanding of the confirmed ride details.

Scenario D: Payment Completion

Description:

After a ride completes. User would get a prompt for payment. He could select payment via cash or online payment mode. For cash mode, a prompt is generated to driver wether the user has paid. The driver checks the option when he gets his cash from the user. For the online payment mode, he is taken to another page where he enters is card details and completes the payment.

Expected Outcome:

Following the successful execution of the payment procedure, users will promptly receive a confirmation of the transaction. UniRide's system will update the ride status to "Paid" and generate an instant in-app receipt for the user's documentation. This seamless payment experience not only ensures user satisfaction but also instills confidence in the reliability of the UniRide carpooling platform.

Scenario E: Promo code Redemption

Description:

A user initiates the process of booking a ride through the carpooling application. During the fare calculation step, the user notices an option to apply a promo code, leading to the entry of a promo code received from a promotional offer or referral.

Expected Outcome:

Promo Code Validation:

- The carpooling application validates the entered promo code in real-time.
- If the promo code is valid and meets the criteria, the system applies the discount to the fare.

Scenario F: Rating and Reviews

Description:

- After completing a ride, both the driver and the rider have the option to rate each other on a scale (e.g., 1 to 5 stars) and leave optional comments.
- The UniRide system aggregates these ratings and reviews to generate an overall user rating for each participant.
- Users can view the ratings and reviews of potential ride partners before confirming a ride.

Expected Outcome:

- Ratings and reviews contribute to a transparent and trustworthy user community.
- Users make informed decisions based on the feedback provided by others.
- The system encourages positive and respectful interactions.

Scenario G: System Maintenance and Updates

Description:

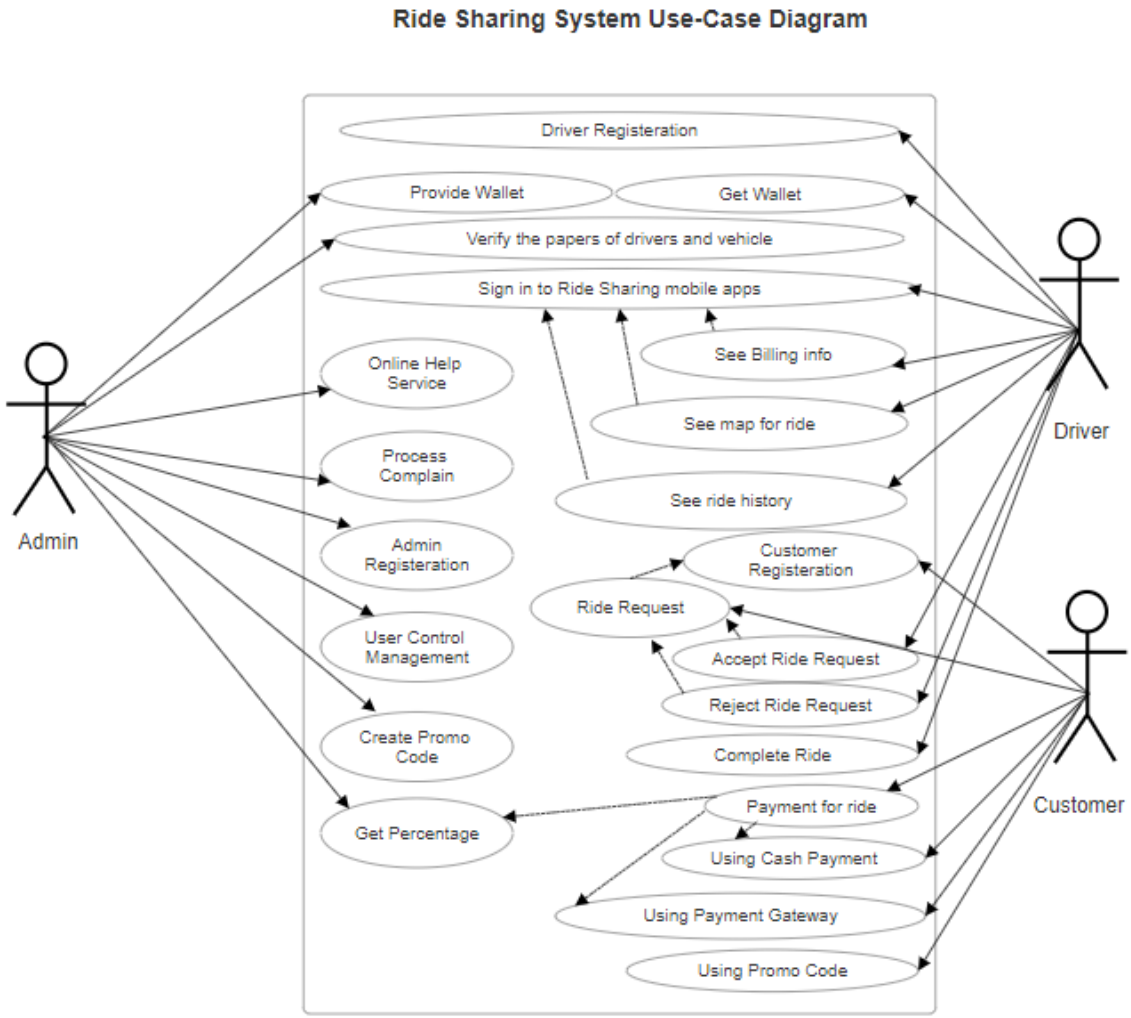
- UniRide administrators perform routine maintenance tasks, including server updates and bug fixes.
- New features or improvements are rolled out through app updates.
- Users are informed about scheduled maintenance, and updates are designed to minimize disruptions.

Expected Outcome:

- System maintenance is conducted smoothly without affecting critical services.
- Users benefit from a continuously improving and evolving UniRide experience.
- Communication about maintenance and updates is clear and proactive.

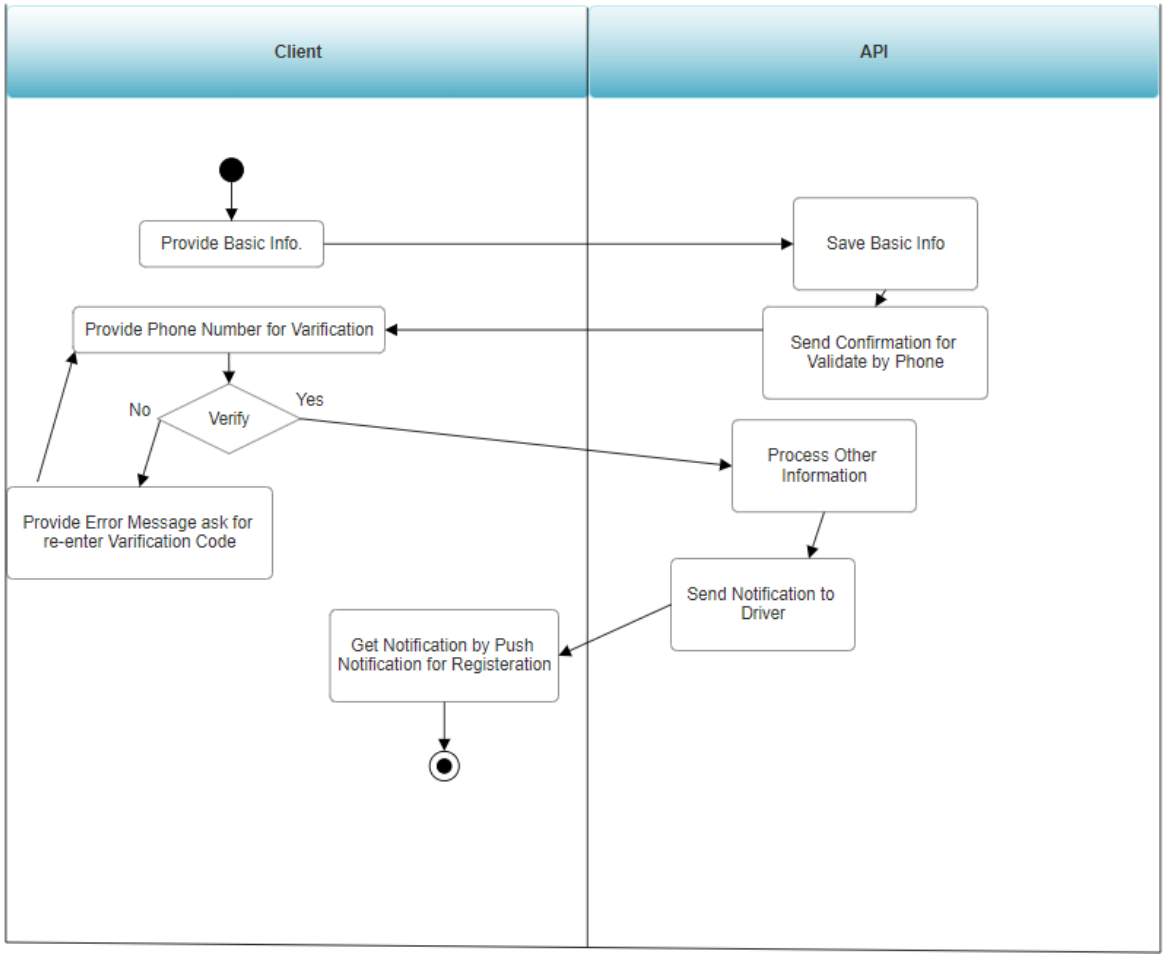
8. Preliminary Use Case Models & Activity,Sequence Diagrams

8.1 Use-Case Diagram



8.2 Activity Diagrams

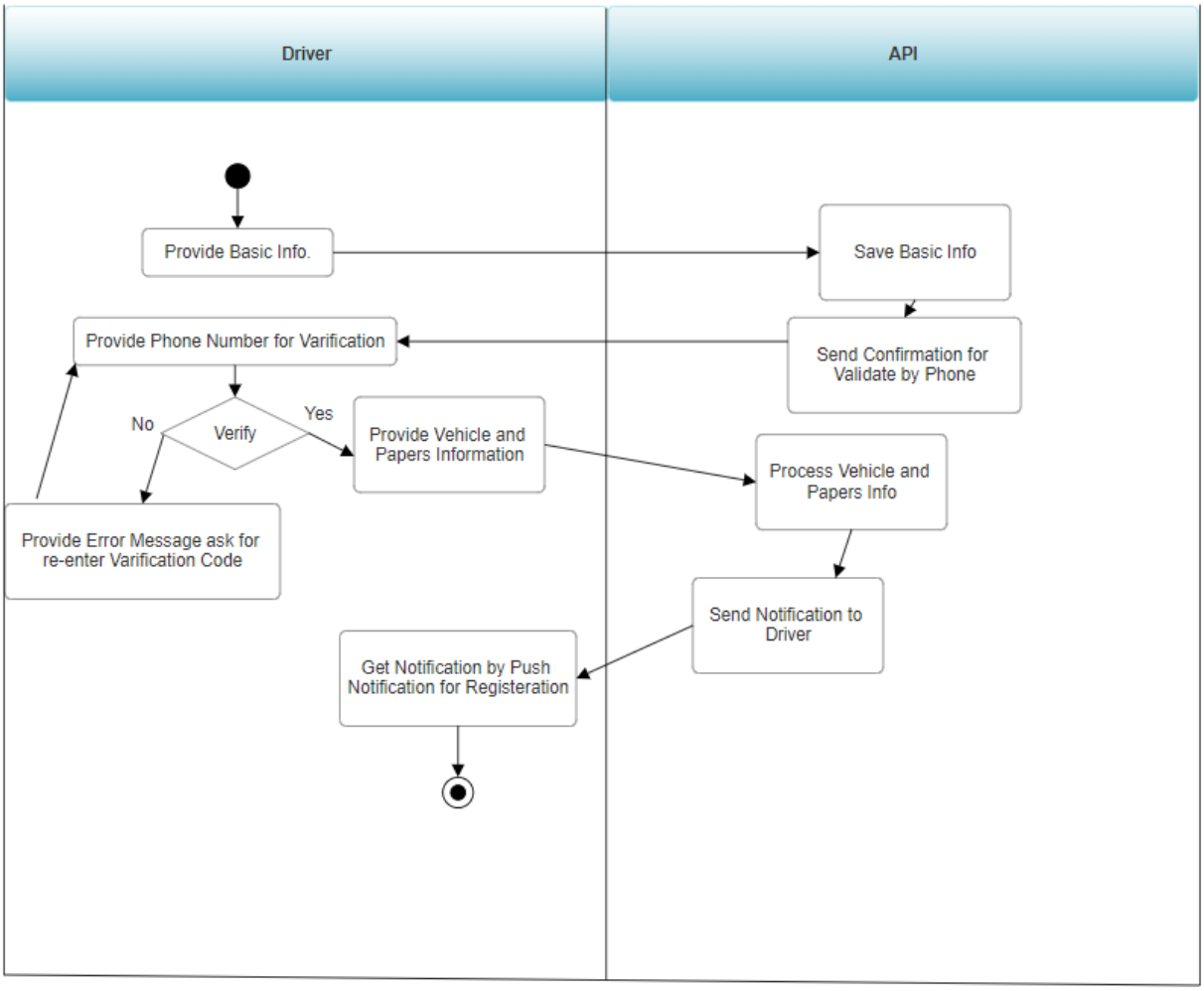
8.2.1 User Registeration:



Actors	User,API
Description	User Initiates the registration process..API Saves basic user information and triggers phone validation.User Receives a confirmation request for phone validation.User Re-enters verification code or provides phone number again if needed.API Processes additional information and sends a notification to the driver.User Receives a push notification for registration and concludes the process.
Data	Basic user information (name, email, password),Confirmation code,Phone number,Additional user information,Push notification.

Stimulus	Client starts the registration process.API processes the registration request.Client provides basic information for registration.API Process Basic Info. Client Provide Phone for Validation.Client Re-enter Verification Code or Provide Phone if needed.API Process Additional Info.Client Receive Notification.
Response	API processes basic info and saves it.API sends Confirmation request for phone validation.If not verified, error message. If verified, proceed to additional information.API sends Notification to the driver.
Comment	The client provides essential details to kickstart the registration process.The API stores user details and prompts phone validation for added security.The client validates the phone number; if unsuccessful, corrects and retries.Additional attempt for phone validation, ensuring accurate information.The API manages additional user details and informs the driver for ride assignment.The client gets notified of successful registration through a push notification, marking the end of the process.

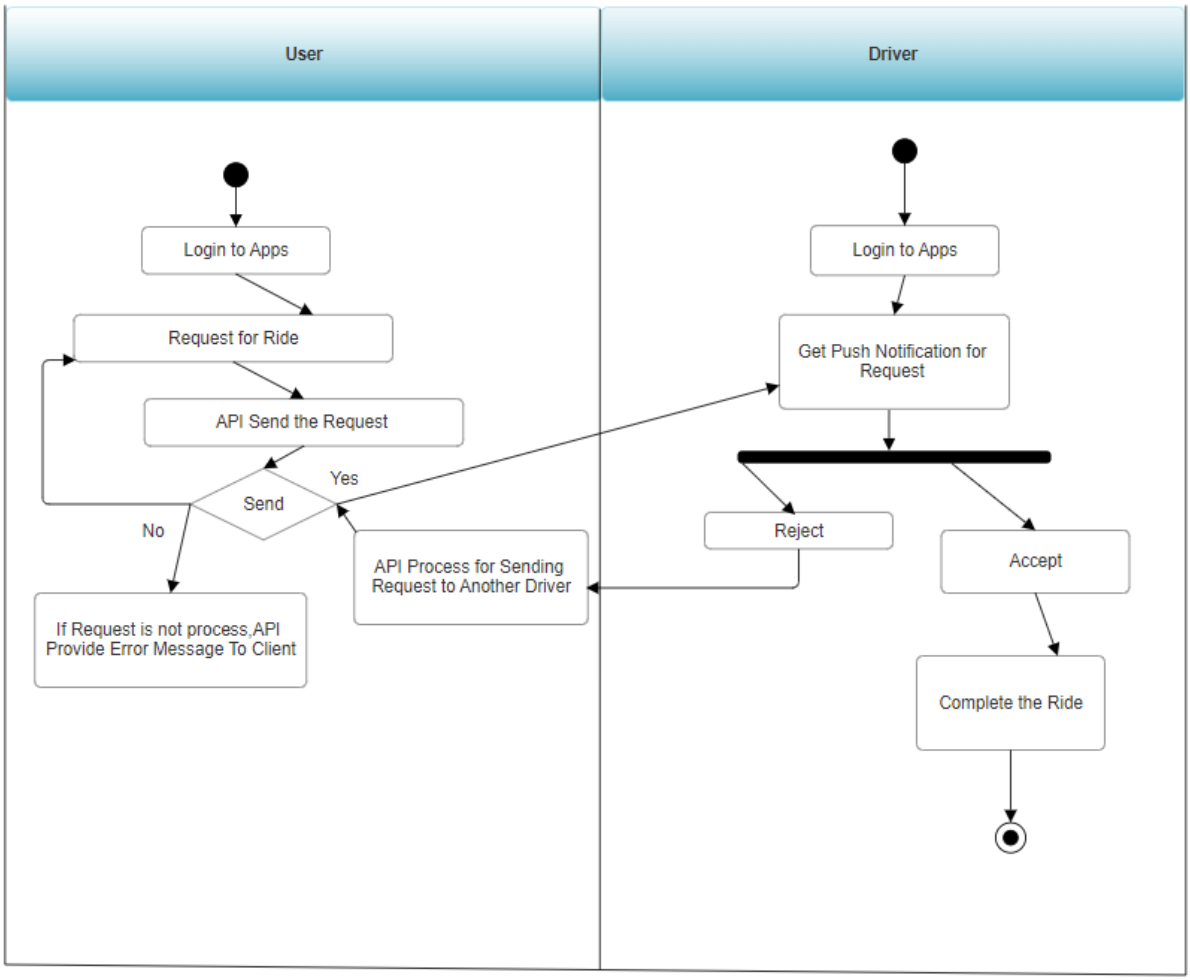
8.2.2 Driver Registeration:



Actors	Driver ,API
Description	Driver Initiates the registration process..API Saves basic driver information and triggers phone validation.Driver Receives a confirmation request for phone validation.Driver Re-enters verification code or provides phone number again if needed.Driver provides vehicle and papers information .API Processes vehicle and paper information.API Processes additional information and sends a notification to the driver.Driver Receives a push notification for registration and concludes the process.

Data	Basic driver information (name, email, vehicle),Confirmation code,Phone number,Vehicle and paper information,Push notification
Stimulus	Driver starts the registration process.API processes the registration request.Driver provides basic information for registration.API Process Basic Info. Driver Provide Phone for Validation.Driver Re-enter Verification Code or Provide Phone if needed.API Process Additional Info.Driver Receive Notification.Driver provides vehicle and paper information.API processes the vehicle and paper information.Driver receives a push notification for registration.
Response	API receives and saves basic driver information.Sends confirmation for validation via phone.API validates and sends phone validation code.API validates and sends a new validation code.If yes, continues with providing vehicle information.Sends notification to the driver.Ends the registration process.
Comment	The Driver provides essential details to kickstart the registration process.The API stores user details and prompts phone validation for added security.The Driver validates the phone number; if unsuccessful, corrects and retries.Additional attempt for phone validation, ensuring accurate information.The API manages additional Driver details and informs the driver for ride assignment.The client gets notified of successful registration through a push notification, marking the end of the process.

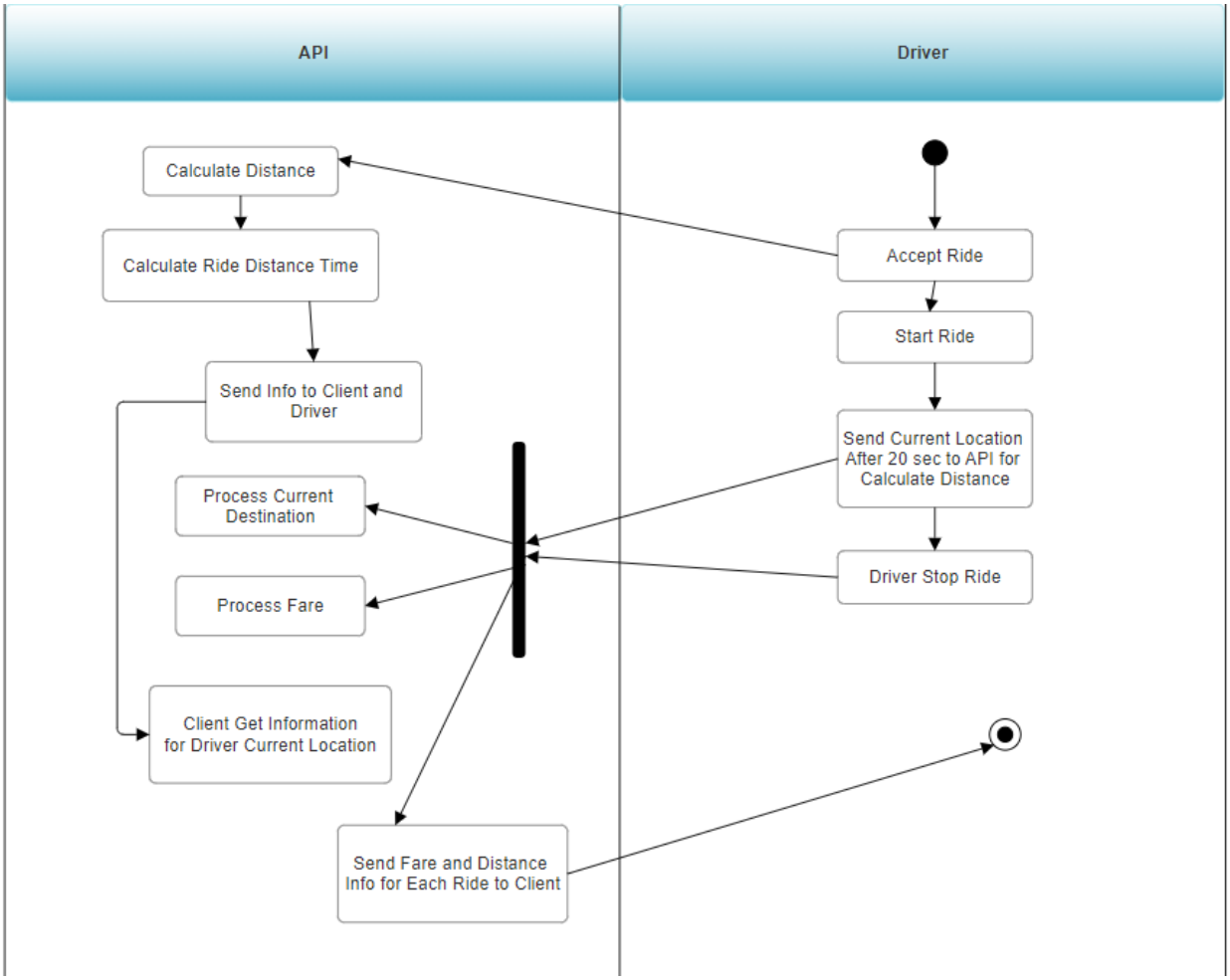
8.2.3 Ride Request Handling:



Actors	User,Driver,API
Description	User Logs into the application.Driver Logs into the application.User Requests a ride.API Sends ride request to a driver.User Requests a ride again if not successful.API Sends ride request to another driver.Driver Receives a push notification for a request.Driver Accepts the ride request.Driver Completes the ride.
Data	User credentials,Driver credentials,Ride details,Push notification,Ride completion details

Stimulus	User logs into the ride-sharing application.Driver logs into the ride-sharing application.User requests a ride through the application.API sends the ride request to an available driver.User requests a ride again if the initial request fails.If the first driver rejects, API sends the request to another driver.Driver receives a push notification for a ride request.Driver accepts the ride request.Driver completes the ride.
Response	API processes the ride request and sends to a driver.Sends a push notification to the driver.API processes the new ride request and sends to a driver.Sends a push notification to the new driver.Driver accepts or rejects the ride request.API processes the accepted request and notifies the user.API updates the ride status and notifies the user.
Comment	The ride request process seamlessly connects users and drivers, offering a robust mechanism for handling initial request failures and dynamically assigning available drivers. The push notification system ensures timely communication between users and drivers, contributing to a smooth ride experience. The detailed API interactions underline the sophistication of the ride-sharing system. The status updates and notifications enhance user engagement and keep participants well-informed throughout the process, fostering a reliable and user-friendly platform.

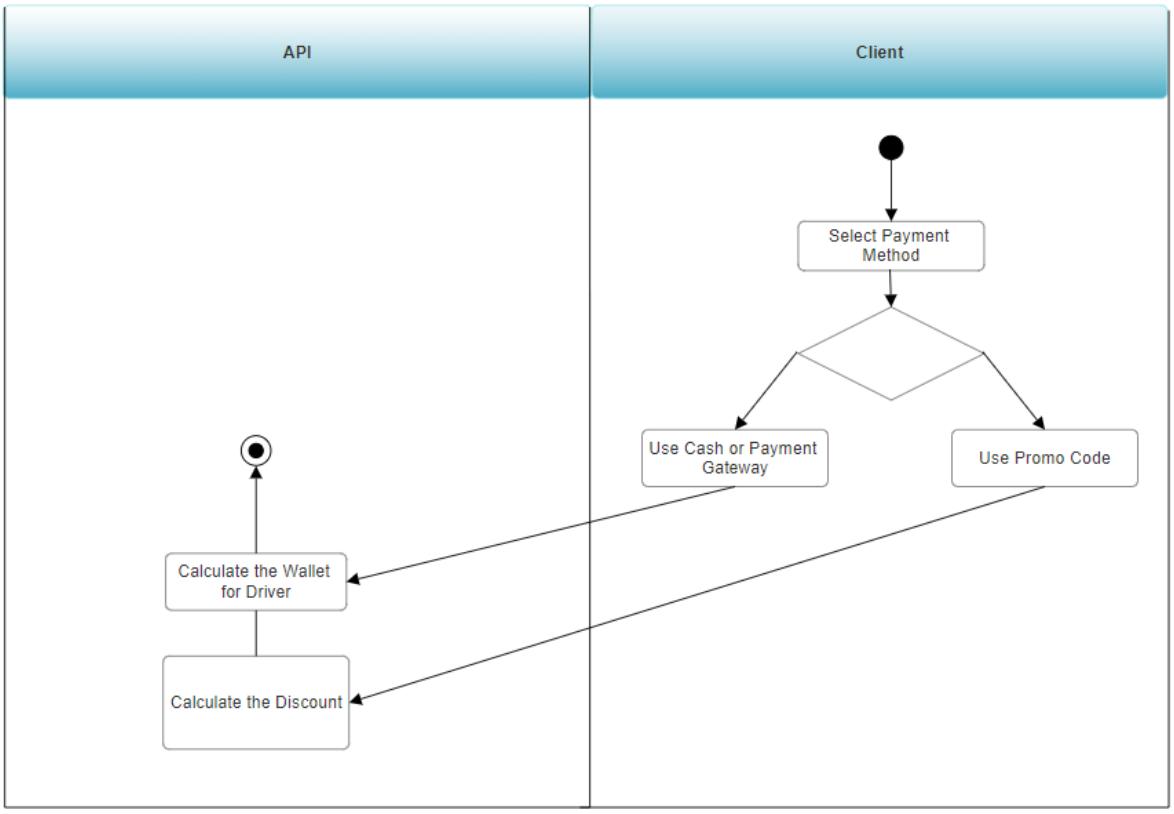
8.2.4 During the Ride



Actors	Driver, Rider, System (API)
Description	The sequence initiates with the driver accepting the ride, prompting the API to calculate the total distance based on initial and current locations. The rider, upon starting the ride, triggers the API's distance tracking process. Periodic location updates from the rider ensure accurate real-time tracking of the distance. Simultaneously, the API continuously calculates the total ride distance, providing real-time distance updates to both the rider and the driver. At the ride's conclusion, the API sends a comprehensive summary, encompassing the final fare and total distance, to both parties.

Data	Initial and current locations, Time intervals for location updates, Distance traveled Fare details
Stimulus	Key stimuli in this scenario include the driver accepting the ride, the rider initiating the ride, the rider sending periodic location updates, and the completion of the ride triggering the API to calculate the final fare and distance.
Response	The API responds by acknowledging the ride acceptance, calculating distance based on location updates, sending real-time distance information to the rider and driver, and providing a fare and distance summary at the end of the ride.
Comment	Throughout the ride, the continuous location updates play a crucial role in ensuring accurate distance tracking. The real-time information exchange between the API, rider, and driver fosters a well-informed experience. The fare and distance summaries, provided at the end of the ride, contribute to a transparent and conclusive ride completion process.

8.2.5 Payment

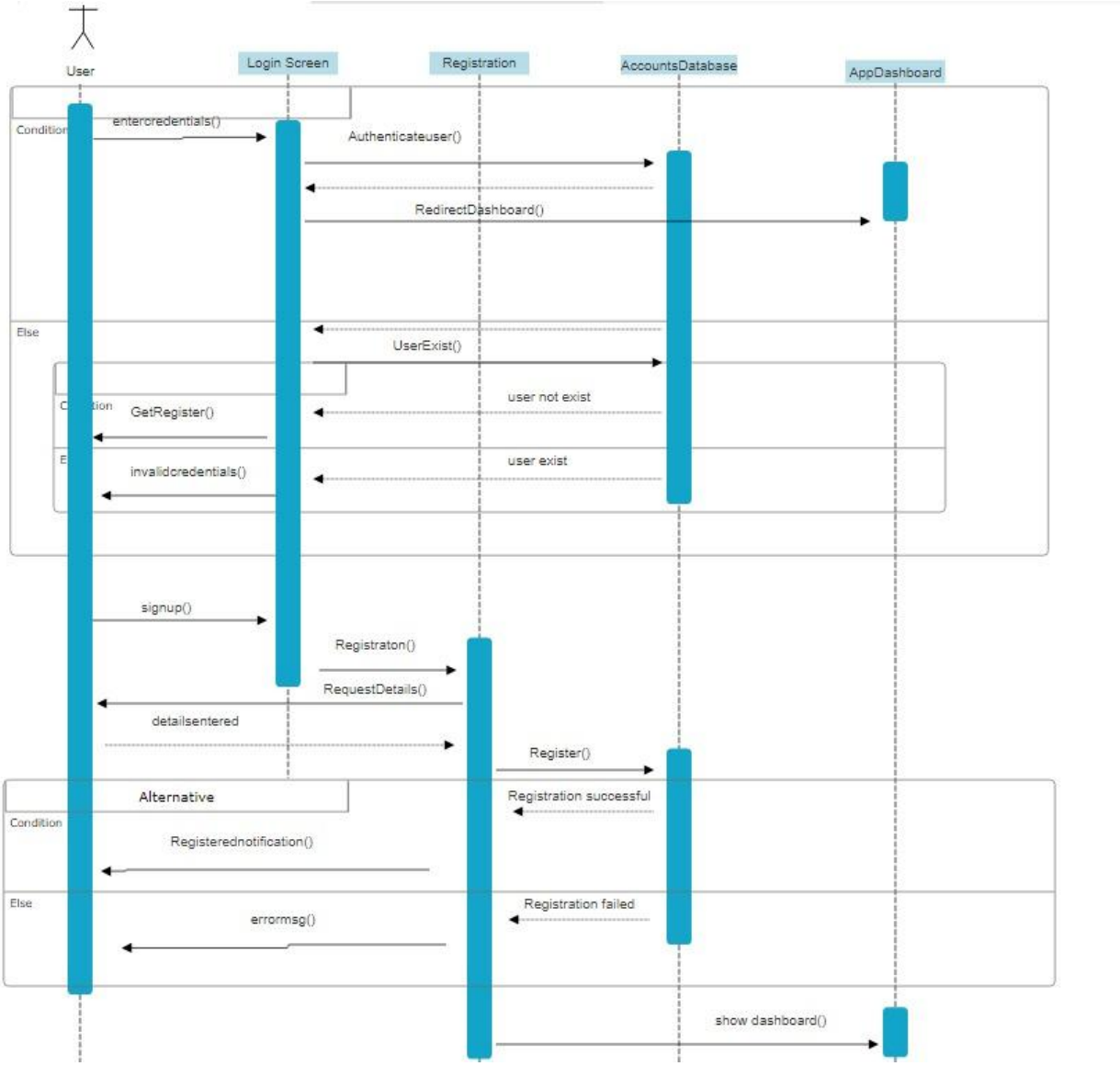


Actors	User(Passenger),Payment Gateway,API,Driver
Description	The payment process begins when the user initiates a payment for a shared ride.The user selects a preferred payment method, either through a Payment Gateway or by applying a Promo Code.The system calculates the wallet amount for the driver.The system calculates the discount based on the chosen payment method.The driver receives a notification about the updated wallet amount.
Data	Transaction details, User payment preferences.
Stimulus	User selects the payment method. System receives the payment choice. System calculates the wallet for the driver. System calculates the discount.

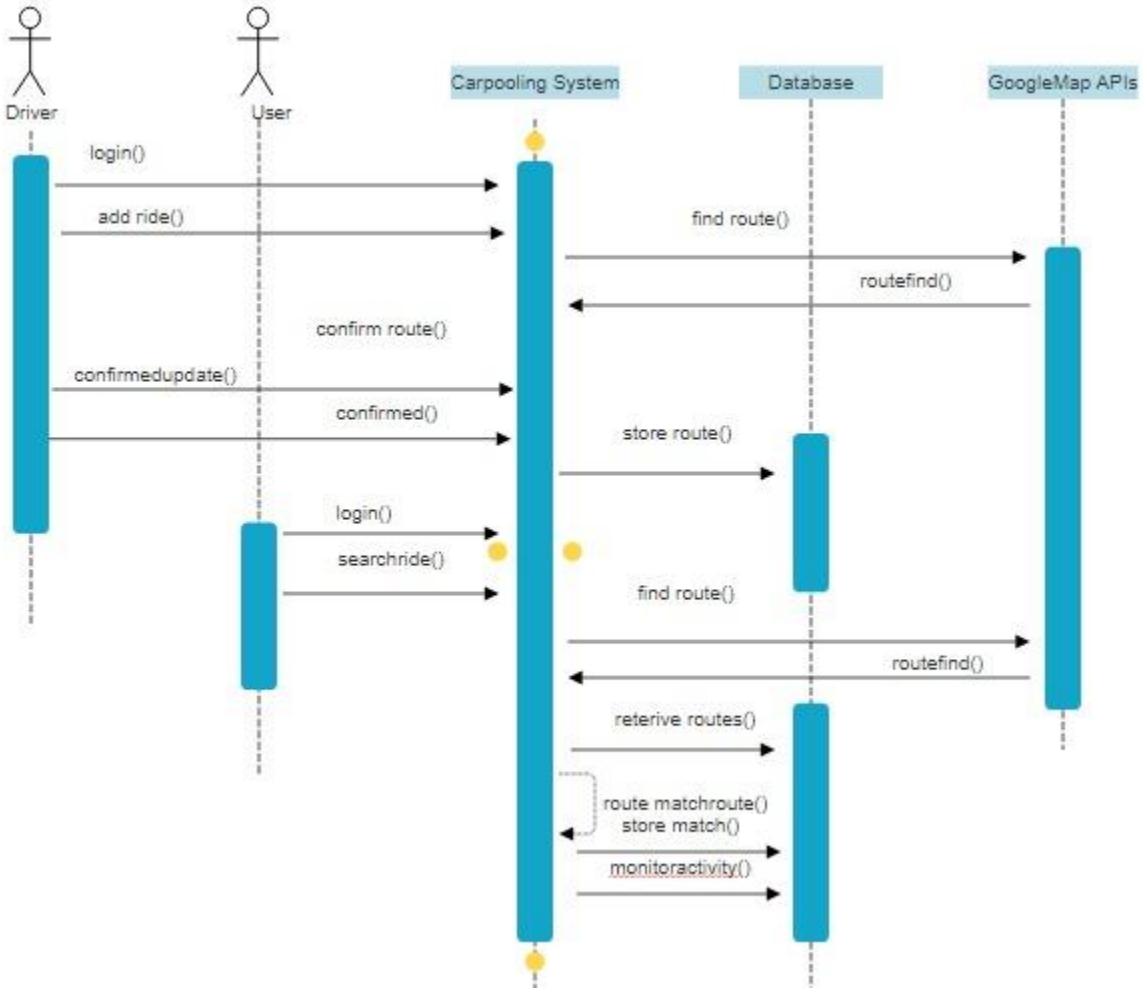
Response	System prompts available payment options. User selects the preferred payment method. System calculates the wallet for the driver. System determines the discount. Driver receives a notification of the updated wallet amount.
Comment	The payment process aims to be seamless and user-friendly. The calculation involves both driver and user interactions. Promo Codes may be applied for discounts.

8.3 Sequence Diagram

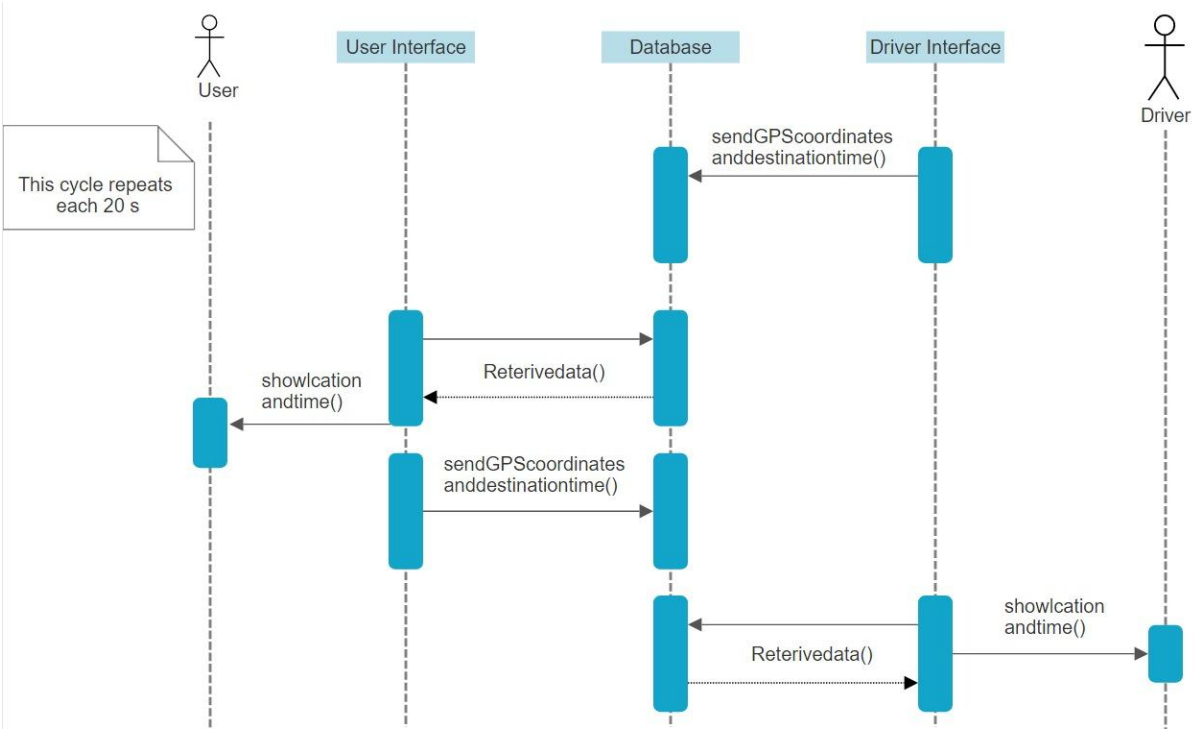
8.3.1 User Registration



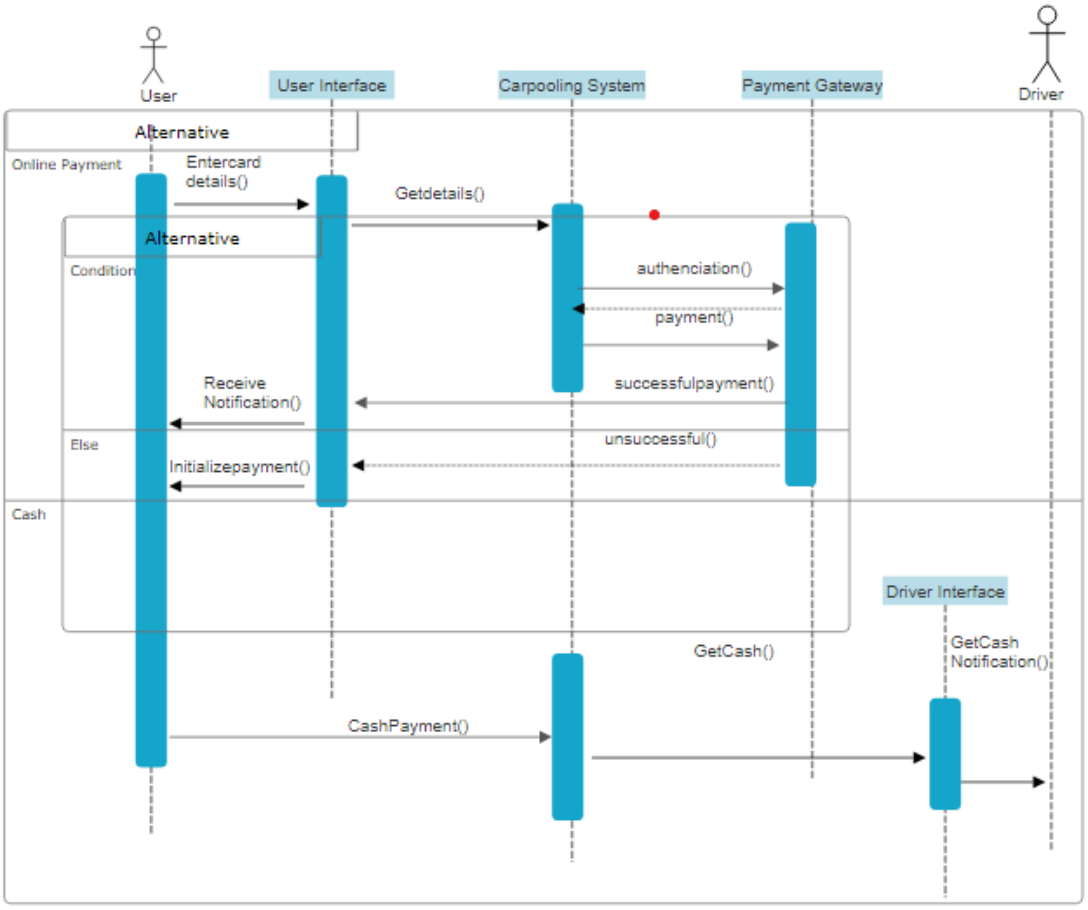
8.3.2 Ride Request Handling



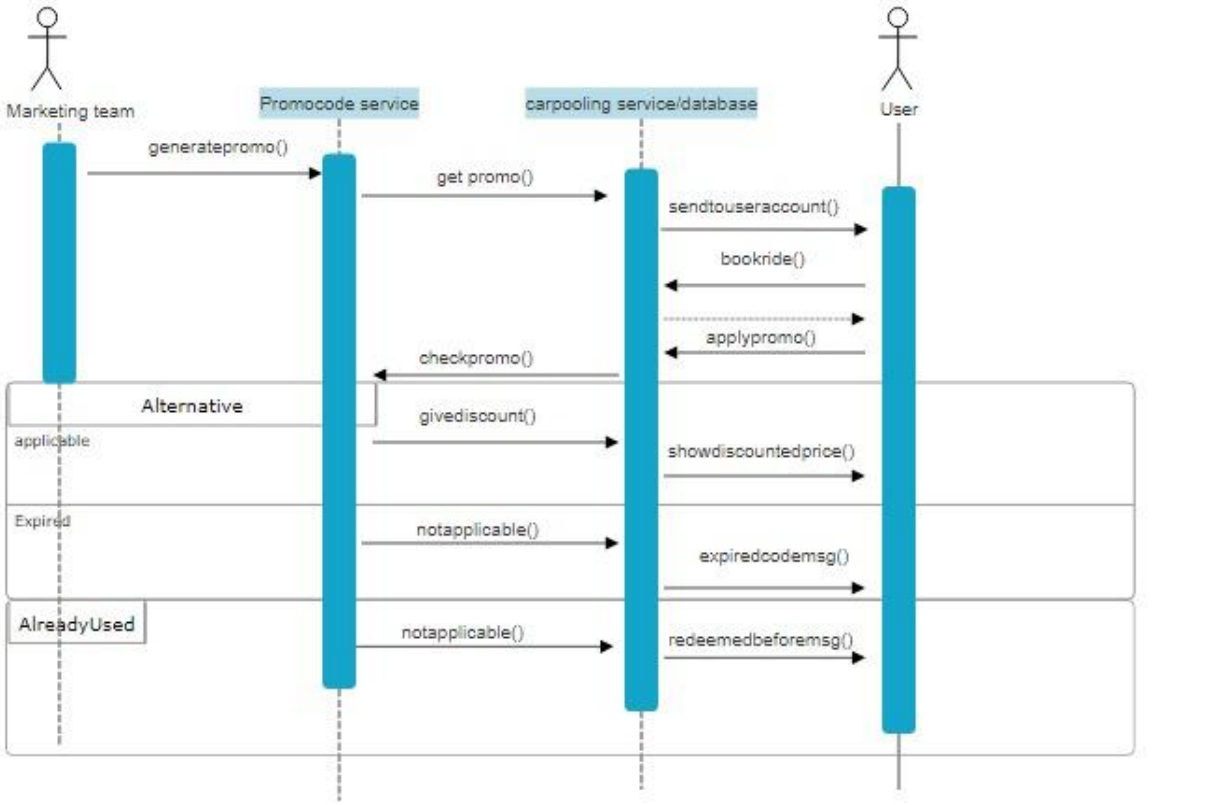
8.3.3 During Ride



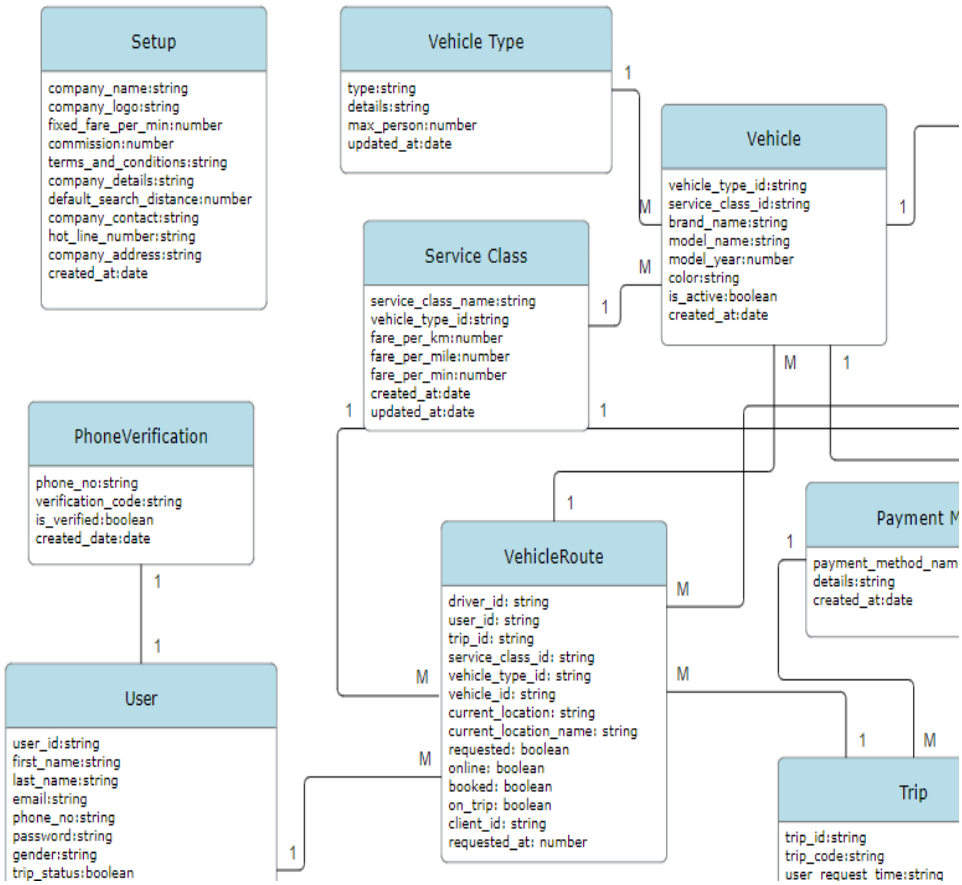
8.3.4 Payment Process

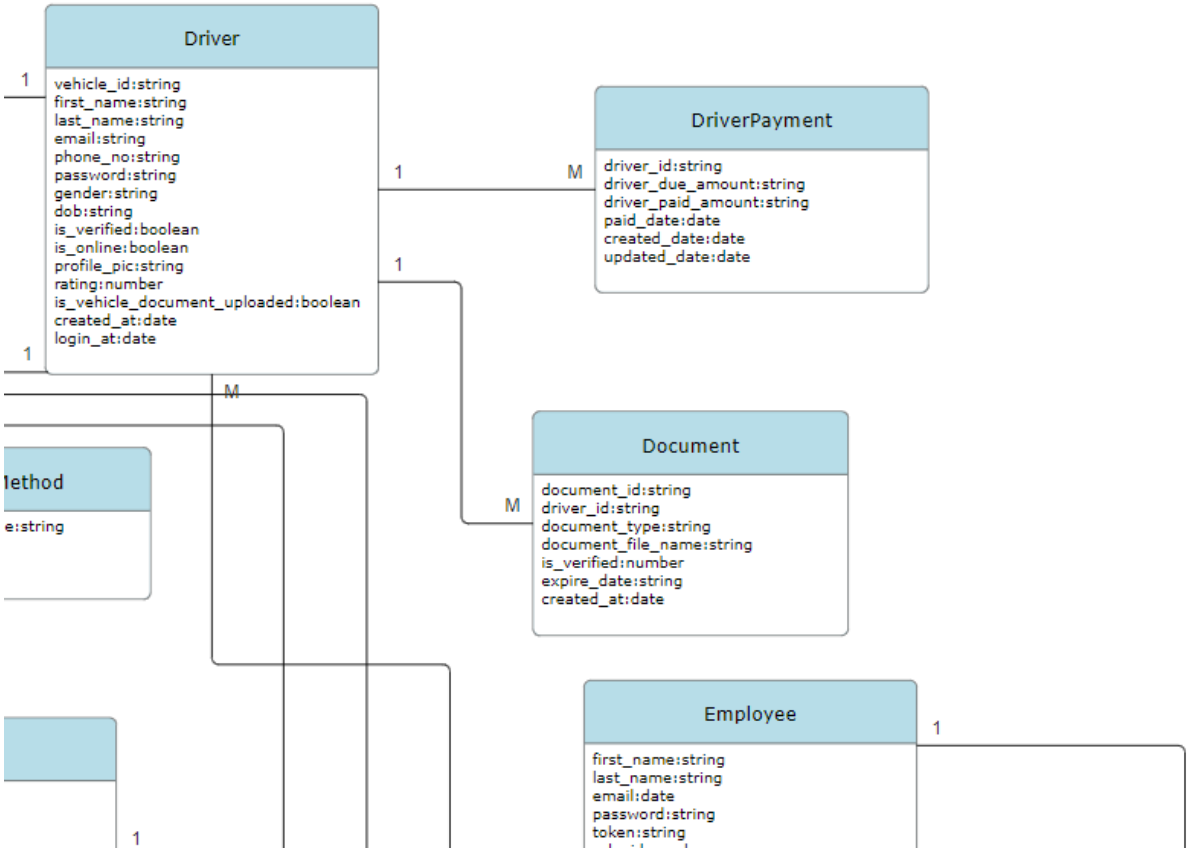


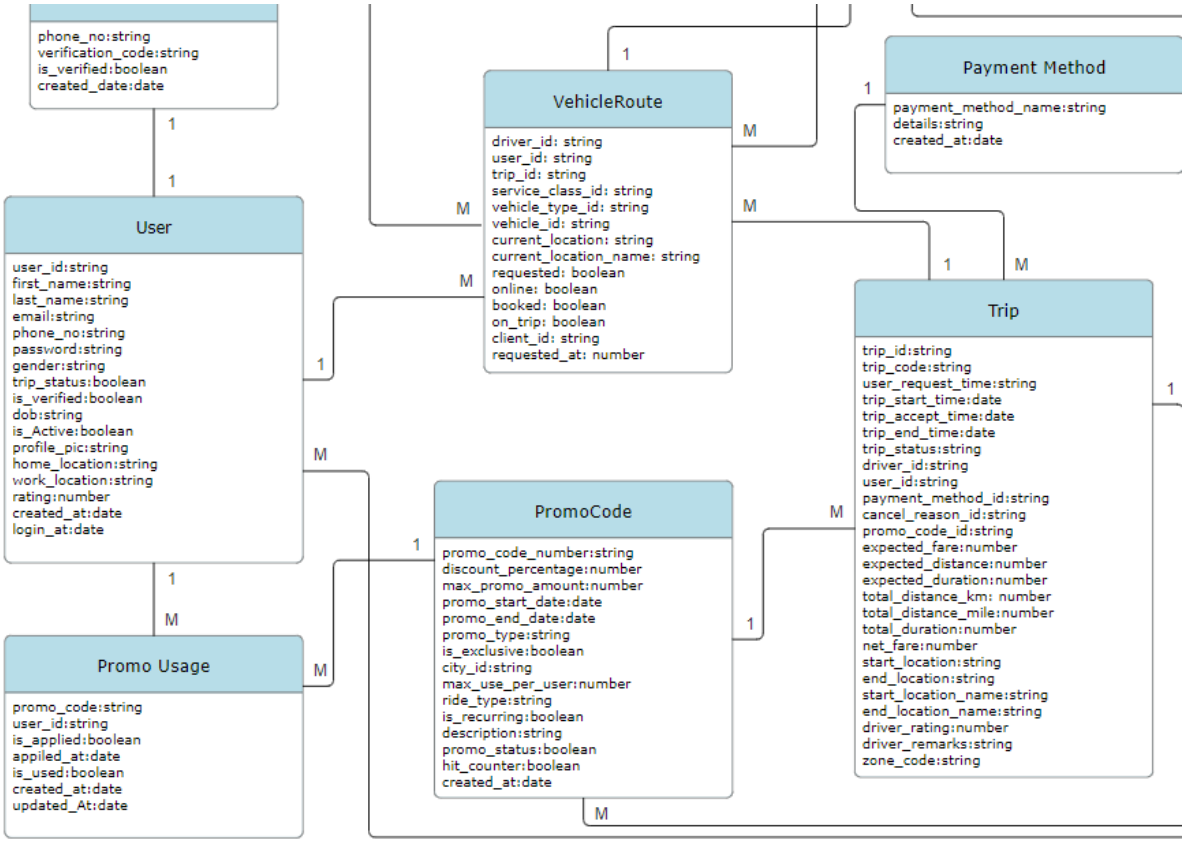
8.3.5 Promo Code Generation and Distribution



8.4 Class Diagram


Setup
company_name:string
company_logo:string
fixed_fare_per_min:number
commission:number
terms_and_conditions:string
company_details:string
default_search_distance:number
company_contact:string
hot_line_number:string
company_address:string
created_at:date
Vehicle Type
type:string
details:string
max_person:number
updated_at:date
Vehicle
vehicle_type_id:string
service_class_id:string
brand_name:string
model_name:string
model_year:number
color:string
is_active:boolean
created_at:date
Service Class
service_class_name:string
vehicle_type_id:string
fare_per_km:number
fare_per_mile:number
fare_per_min:number
created_at:date
updated_at:date
PhoneVerification
phone_no:string
verification_code:string
is_verified:boolean
created_date:date
User
user_id:string
first_name:string
last_name:string
email:string
phone_no:string
password:string
gender:string
trip_status:boolean
VehicleRoute
driver_id: string
user_id: string
trip_id: string
service_class_id: string
vehicle_type_id: string
vehicle_id: string
current_location: string
current_location_name: string
requested: boolean
online: boolean
booked: boolean
on_trip: boolean
client_id: string
requested_at: number
Payment M
payment_method_nam
details:string
created_at:date
Trip
trip_id:string
trip_code:string
user_request_time:string


Driver
vehicle_id:string
first_name:string
last_name:string
email:string
phone_no:string
password:string
gender:string
dob:string
is_verified:boolean
is_online:boolean
profile_pic:string
rating:number
is_vehicle_document_uploaded:boolean
created_at:date
login_at:date
DriverPayment
driver_id:string
driver_due_amount:string
driver_paid_amount:string
paid_date:date
created_date:date
updated_date:date
Document
document_id:string
driver_id:string
document_type:string
document_file_name:string
is_verified:number
expire_date:string
created_at:date
Employee
first_name:string
last_name:string
email:date
password:string
token:string
1
M


phone_no:string
verification_code:string
is_verified:boolean
created_date:date
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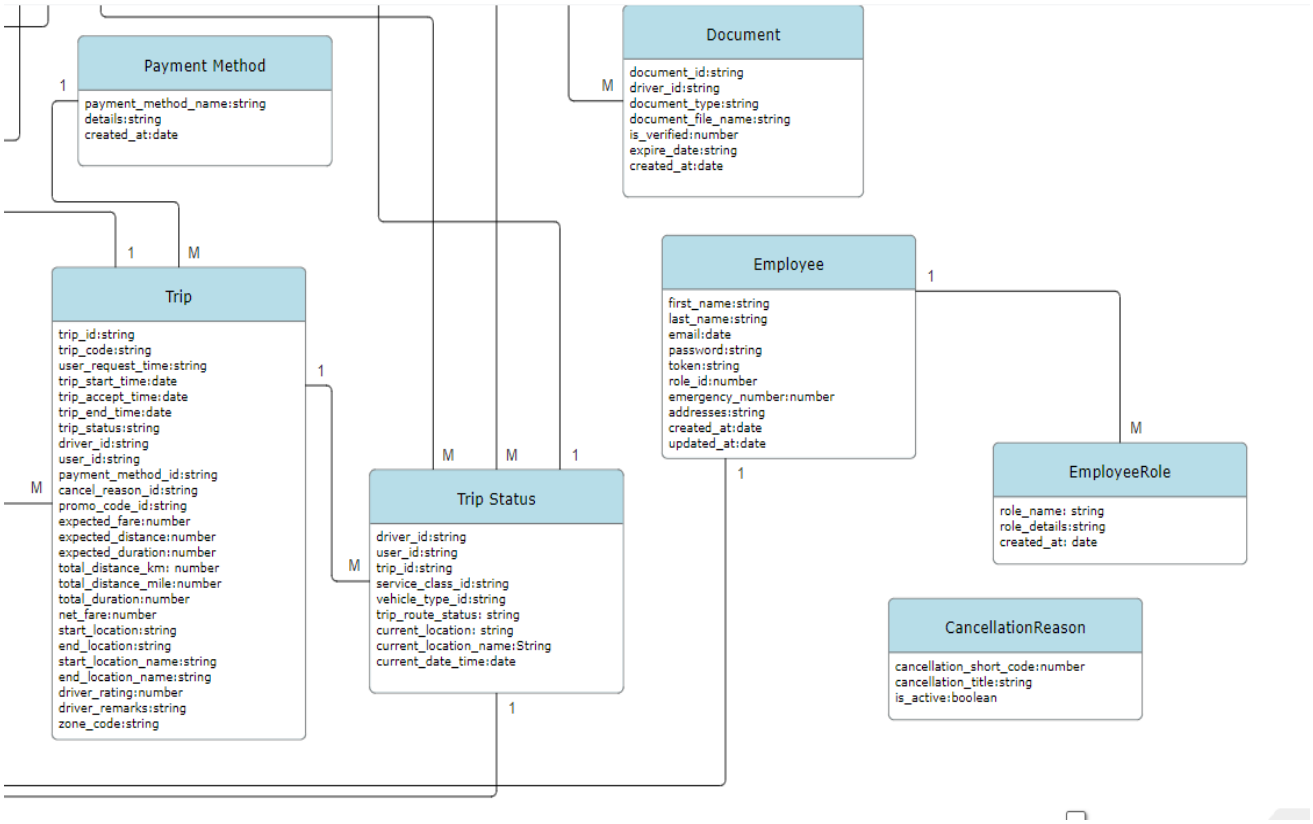
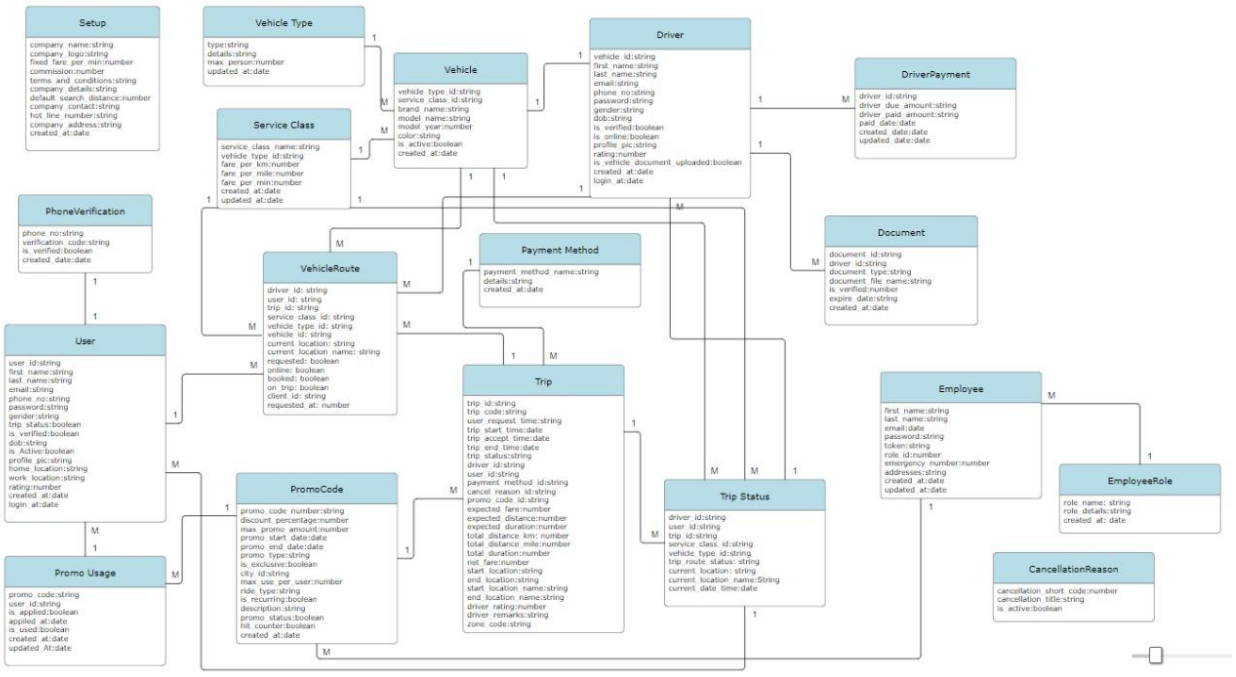
1
User
user_id:string
first_name:string
last_name:string
email:string
phone_no:string
password:string
gender:string
trip_status:boolean
is_verified:boolean
dob:string
is_Active:boolean
profile_pic:string
home_location:string
work_location:string
rating:number
created_at:date
login_at:date
1
M
Promo Usage
promo_code:string
user_id:string
is_applied:boolean
appiled_at:date
is_used:boolean
created_at:date
updated_At:date
M
M
1
VehicleRoute
driver_id: string
user_id: string
trip_id: string
service_class_id: string
vehicle_type_id: string
vehicle_id: string
current_location: string
current_location_name: string
requested: boolean
online: boolean
booked: boolean
on_trip: boolean
client_id: string
requested_at: number
1
M
M
1
PromoCode
promo_code_number:string
discount_percentage:number
max_promo_amount:number
promo_start_date:date
promo_end_date:date
promo_type:string
is_exclusive:boolean
city_id:string
max_use_per_user:number
ride_type:string
is_recurring:boolean
description:string
promo_status:boolean
hit_counter:boolean
created_at:date
M
1
M
Payment Method
payment_method_name:string
details:string
created_at:date
1
M
1
Trip
trip_id:string
trip_code:string
user_request_time:string
trip_start_time:date
trip_accept_time:date
trip_end_time:date
trip_status:string
driver_id:string
user_id:string
payment_method_id:string
cancel_reason_id:string
promo_code_id:string
expected_fare:number
expected_distance:number
expected_duration:number
total_distance_km: number
total_distance_mile:number
total_duration:number
net_fare:number
start_location:string
end_location:string
start_location_name:string
end_location_name:string
driver_rating:number
driver_remarks:string
zone_code:string
1





9. Updated Schedule

Initial Release Phase:

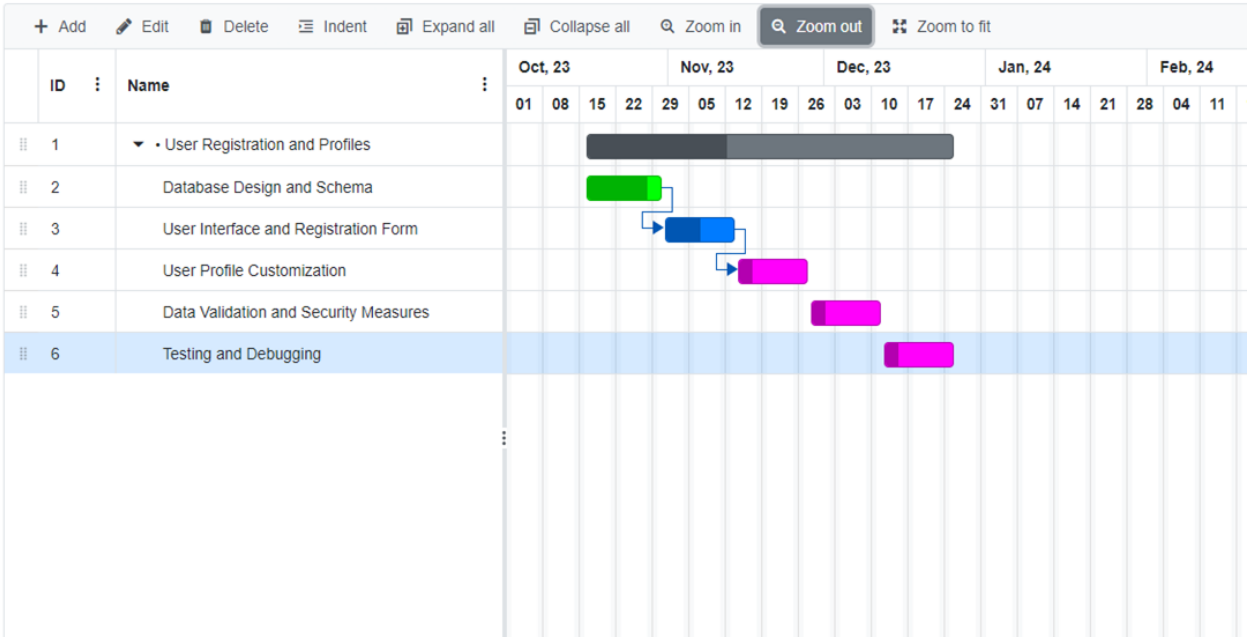
- **User Registration and Profiles:**
    - Step 1: Database Design and Schema
        - Start: October 16, 2023
        - End: October 30, 2023
        - Duration: 11 days Approx. 2 weeks
    - Step 2: User Interface and Registration Form
        - Start: October 31, 2023
        - End: November 13, 2023
        - Duration: 10 days
        - Approx. 2 weeks
    - Step 3: User Profile Customization
        - Start: November 14, 2023
        - End: November 27, 2023
        - Duration: 10 days
        - Approx. 2 weeks
    - Step 4: Data Validation and Security Measures
        - Start: November 28, 2023
        - End: December 11, 2023
        - Duration: 10 days
        - Approx. 2 weeks
    - Step 5: Testing and Debugging

- Start: December 12, 2023
- End: December 25, 2023
- Duration: 10 days
- Approx. 2 weeks

Milestone 1.1 : User Registration and Profile Completion

- Start: October 16, 2023
- End: December 25, 2023
- Duration: 51 days
- Approx.10 weeks

Gantt Chart:



- **Ride Posting and Searching:**
  - Step 1: Ride Posting Form and Database Integration
    - Start: December 27, 2023

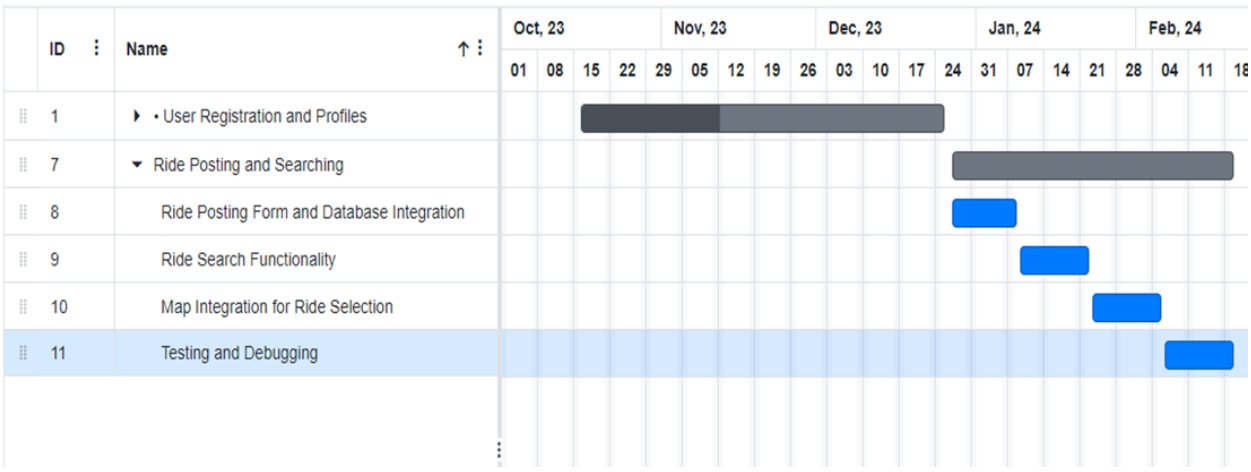
        - End: January 8, 2024
        - Duration: 9 days
        - Approx. 2 weeks
    - Step 2: Ride Search Functionality
        - Start: January 9, 2024
        - End: January 22, 2024
        - Duration: 10 days
        - Approx. 2 weeks
    - Step 3: Map Integration for Ride Selection
        - Start: January 23, 2024
        - End: February 5, 2024
        - Duration: 10 days
        - Approx. 2 weeks
    - Step 4: Testing and Debugging
        - Start: February 6, 2024
        - End: February 19, 2024
        - Duration: 10 days
        - Approx. 2 weeks

Milestone 1.2 :Ride Posting and Searching Completion

- Start: December 27, 2023

- End: February 19, 2024
- Duration: 54 day
- Approx. 7 weeks and 5 days

Gantt Chart:



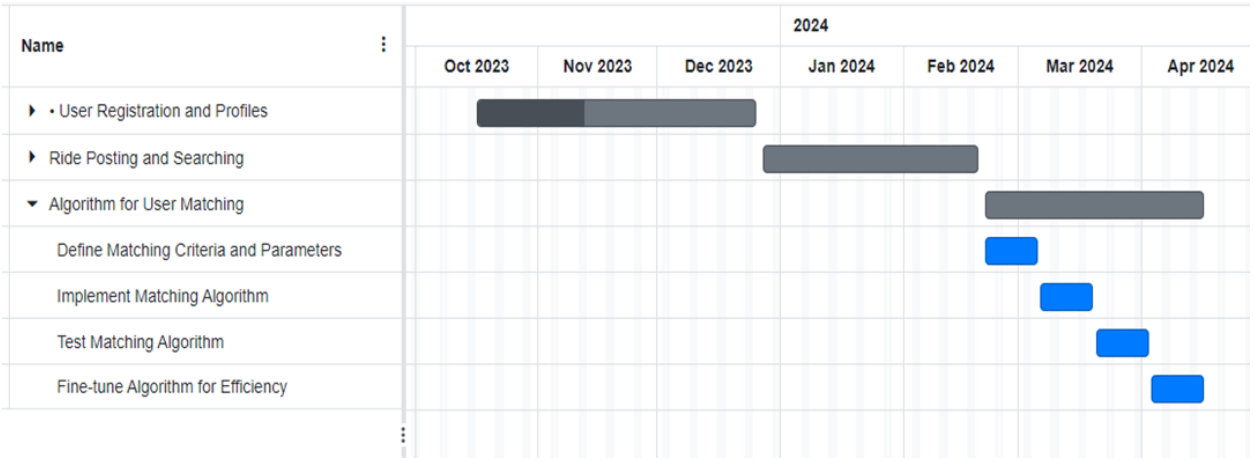
- **Algorithm for User Matching:**
  - Step 1: Define Matching Criteria and Parameters
    - Start: February 21, 2024
    - End: March 5, 2024
    - Duration: 10 days
    - Approx. 2 weeks
  - Step 2: Implement Matching Algorithm
    - Start: March 6, 2024
    - End: March 19, 2024
    - Duration: 10 days

        - Approx. 2 weeks
    - Step 3: Test Matching Algorithm
        - Start: March 20, 2024
        - End: April 2, 2024
        - Duration: 10 days
        - Approx. 2 weeks
    - Step 4: Fine-tune Algorithm for Efficiency
        - Start: April 3, 2024
        - End: April 16, 2024
        - Duration: 10 days
        - Approx. 2 week**s**

Milestone 1.3 : User Matching Algorithm Completion

- Start: February 21, 2024
- End: April 16, 2024
- Duration:56 day
- Approx. 8 weeks

Gantt Chart:



- **Scheduling and Notifications:**
    - Step 1: Develop Scheduling Interface
        - Start: April 18, 2024
        - End: May 1, 2024
        - Duration: 10 days
        - Approx. 2 weeks
    - Step 2: Implement Notification System
        - Start: May 2, 2024
        - End: May 15, 2024
        - Duration: 10 days
        - Approx. 2 weeks
    - Step 3: Integrate Calendar Functionality
        - Start: May 16, 2024
        - End: May 29, 2024

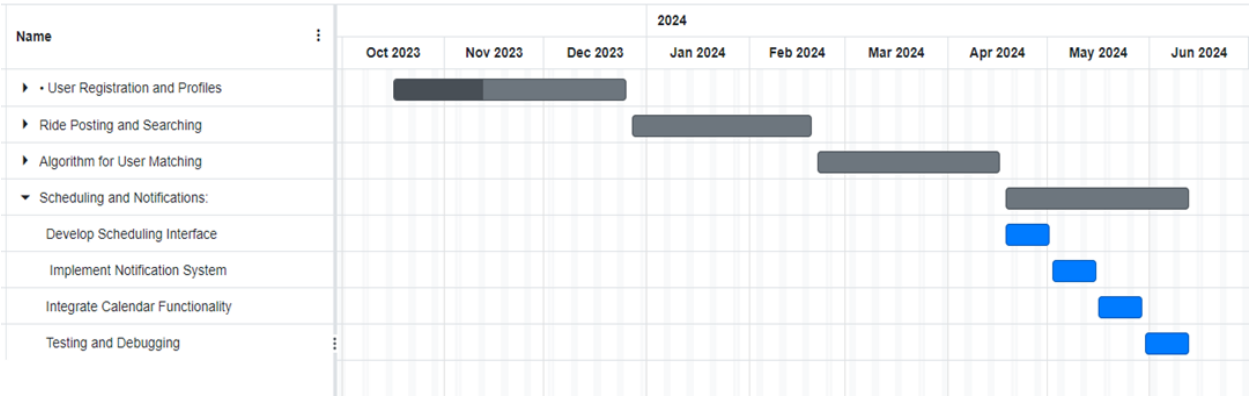
- Duration: 10 days
- Approx. 2 weeks

- Step 4: Testing and Debugging
  - Start: May 30, 2024
  - End: June 12, 2024
  - Duration: 10 days
  - Approx. 2 weeks

Milestone 1.4 :Scheduling and Notifications Completion

- Start: April 18, 2024
- End: June 12, 2024
- Duration: 56 day
- Approx. 8 weeks

Gantt Chart:



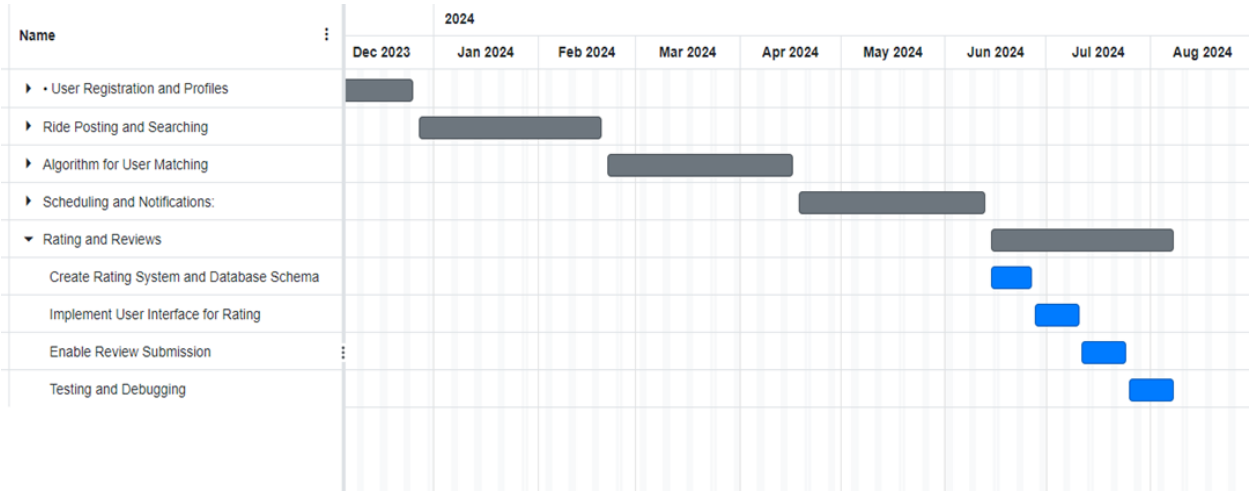
- **Rating and Reviews:**
  - Step 1: Create Rating System and Database Schema

        - Start: June 14, 2024
        - End: June 26, 2024
        - Duration: 10 days
        - Approx. 2 weeks
    - Step 2: Implement User Interface for Rating
        - Start: June 27, 2024
        - End: July 10, 2024
        - Duration: 10 days
        - Approx. 2 weeks
    - Step 3: Enable Review Submission
        - Start: July 11, 2024
        - End: July 24, 2024
        - Duration: 10 days
        - Approx. 2 weeks
    - Step 4: Testing and Debugging
        - Start: July 25, 2024
        - End: August 7, 2024
        - Duration: 10 days
        - Approx. 2 weeks

Milestone 1.5 :Rating and Reviews Completion

- Start: June 14, 2024
- End: August 7, 2024
- Duration:55 day
- Approx. 7 weeks and 6 days

Gantt Chart:



Subsequent Release Phase:

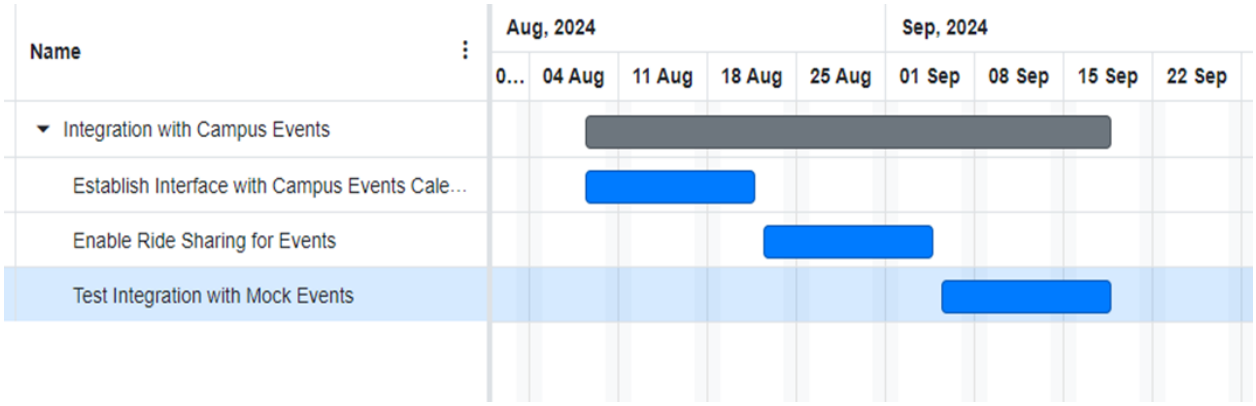
- **Integration with Campus Events**
  - Step 1: Establish Interface with Campus Events Calendar
    - Start: August 8, 2024
    - End: August 21, 2024
    - Duration: 10 days
    - Approx. 1 week and 3 days

- Step 2: Enable Ride Sharing for Events
    - Start: August 22, 2024
    - End: September 4, 2024
    - Duration: 10 days
    - Approx. 1 week and 3 days
- Step 3: Test Integration with Mock Events
    - Start: September 5, 2024
    - End: September 18, 2024
    - Duration: 10 days
    - Approx. 1 week and 3 days

Milestone 2.1 - Integration with Campus Events Completion

- Start: August 8, 2024
- End: September 18, 2024
- Duration: 42 day
- Approx. 6 weeks

Gantt Chart:



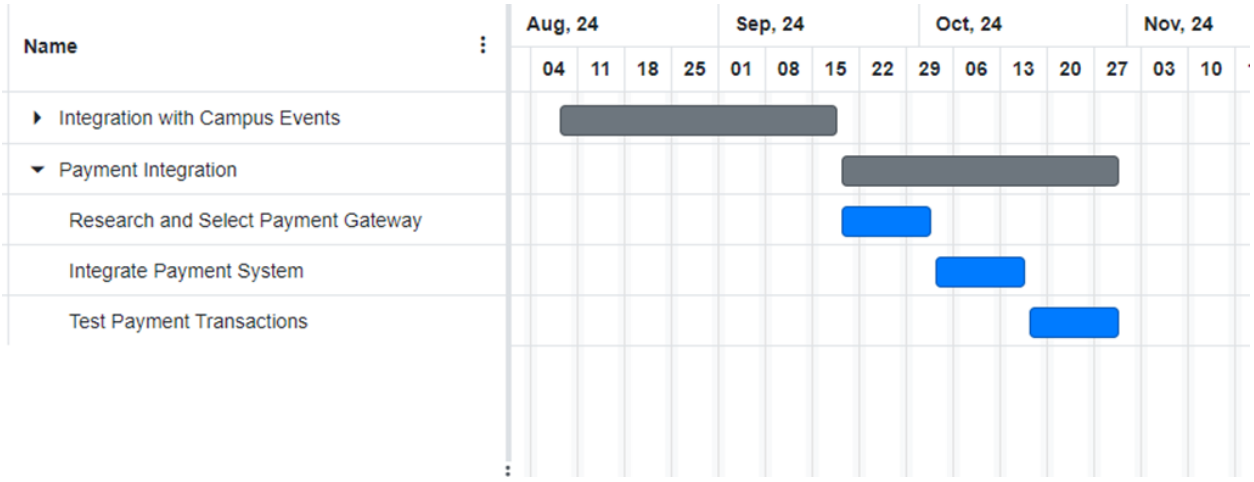
- **Payment Integration**
    - Step 1: Research and Select Payment Gateway
        - Start: September 19, 2024
        - End: October 2, 2024
        - Duration: 10 days
        - Approx. 1 week and 3 days
    - Step 2: Integrate Payment System
        - Start: October 3, 2024
        - End: October 16, 2024
        - Duration: 10 days
        - Approx. 1 week and 3 days
    - Step 3: Test Payment Transactions
        - Start: October 17, 2024
        - End: October 30, 2024
        - Duration: 10 days

- Approx. 1 week and 3 days

Milestone 2.2 - Payment Integration Completion

- Start: September 19, 2024
- End: October 30, 2024
- Duration: 42 day
- Approx. 6 weeks

Gantt Chart:



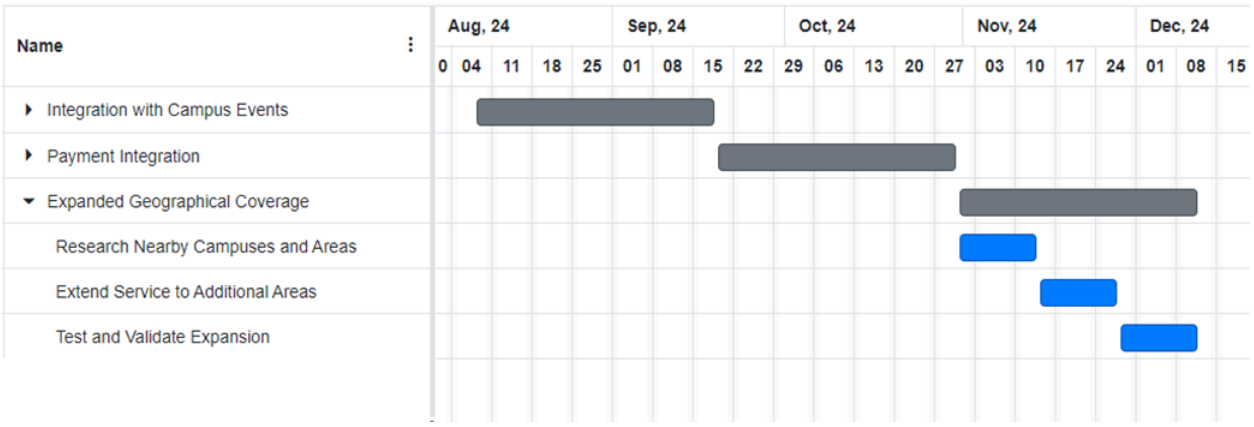
- **Expanded Geographical Coverage**
  - Step 1: Research Nearby Campuses and Areas
    - Start: October 31, 2024
    - End: November 13, 2024
    - Duration: 10 days
    - Approx. 1 week and 3 days
  - Step 2: Extend Service to Additional Areas

        - Start: November 14, 2024
        - End: November 27, 2024
        - Duration: 10 days
        - Approx. 1 week and 3 days
    - Step 3: Test and Validate Expansion
        - Start: November 28, 2024
        - End: December 11, 2024
        - Duration: 10 days
        - Approx. 1 week and 3 days

Milestone 2.3 - Expanded Geographical Coverage Completion

- Start: October 31, 2024
- End: December 11, 2024
- Duration: 41 days
- Approx. 5 weeks and 6 days

Gantt Chart:



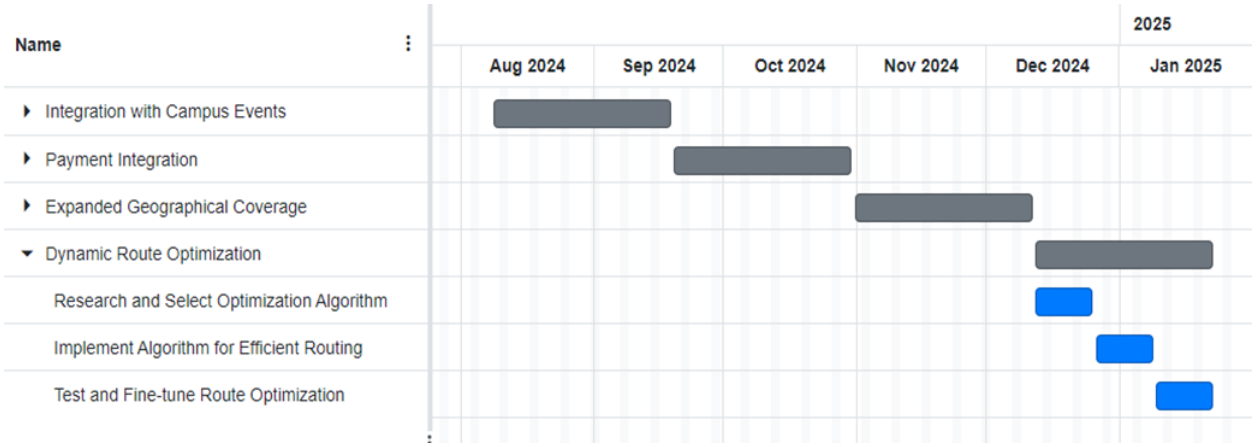
- **Dynamic Route Optimization**
    - Step 1: Research and Select Optimization Algorithm
        - Start: December 12, 2024
        - End: December 25, 2024
        - Duration: 10 days
        - Approx. 1 week and 3 days
    - Step 2: Implement Algorithm for Efficient Routing
        - Start: December 26, 2024
        - End: January 8, 2025
        - Duration: 10 days
        - Approx. 1 week and 3 days
    - Step 3: Test and Fine-tune Route Optimization
        - Start: January 9, 2025
        - End: January 22, 2025

- Duration: 10 days
- Approx. 1 week and 3 days

Milestone 2.4 - Dynamic Route Optimization Completion

- Start: December 12, 2024
- End: January 22, 2025
- Duration: 42 days
- Approx. 6 weeks

Gantt Chart:



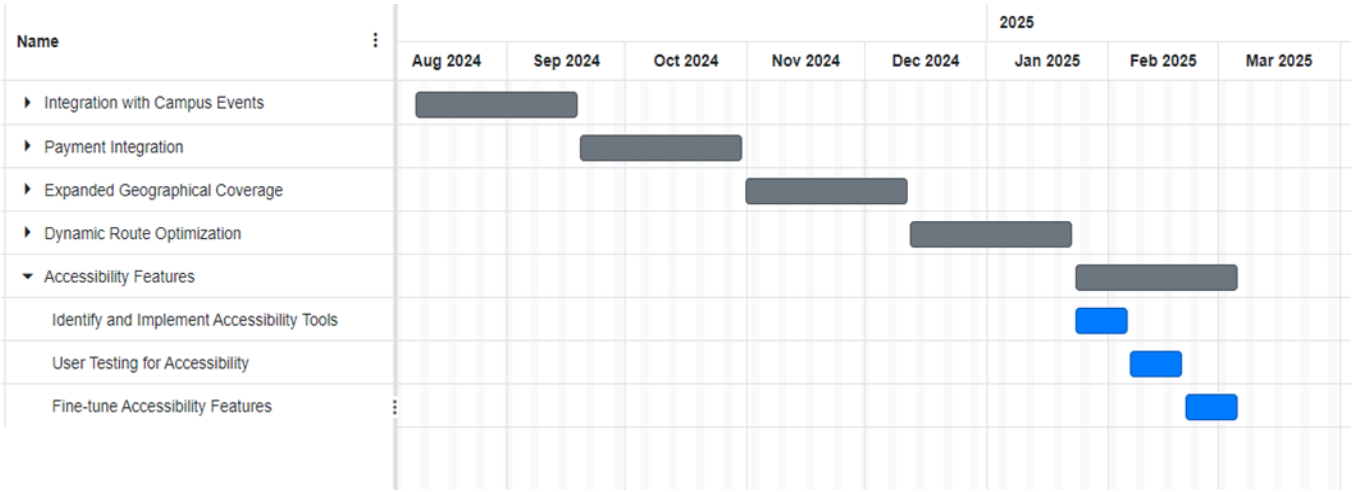
- **Accessibility Features**
  - Step 1: Identify and Implement Accessibility Tools
    - Start: January 23, 2025
    - End: February 5, 2025
    - Duration: 10 days
    - Approx. 1 week and 3 days

- Step 2: User Testing for Accessibility
    - Start: February 6, 2025
    - End: February 19, 2025
    - Duration: 10 days
    - Approx. 1 week and 3 days
- Step 3: Fine-tune Accessibility Features
    - Start: February 20, 2025
    - End: March 5, 2025
    - Duration: 10 days
    - Approx. 1 week and 3 days

Milestone 2.5 - Accessibility Features Completion

- Start: January 23, 2025
- End: March 5, 2025
- Duration: 41 day
- Approx.5 weeks and 6 days

Gantt Chart:



Milestone 3 - Final Release

- Start: October 16,2023
- End: March 5, 2025
- Duration: 502 days
- Approx.5 weeks and 6 days

10. Updated Budget

Development Costs:

- **Software Development:** Rs. 2,000,000
- **Mobile Application Development:** Rs. 1,500,000
- **Web Platform Development:** Rs. 1,000,000
- **Database Setup and Management:** Rs. 500,000

Hardware Interfaces:

- **Mobile Devices Optimization:** Rs. 300,000
- **GPS Integration:** Rs. 200,000

Security Features:

- **User Authentication and Data Security:** Rs. 500,000
- **Encryption Technologies**: Rs. 300,000

User Interface (UI) and User Experience (UX) Design:

- **UI/UX Design Services:** Rs. 800,000

Marketing and Promotion:

- **Advertising Campaigns:** Rs. 1,000,000
- **Promotional Events:** Rs. 200,000

Testing and Quality Assurance:

- **Testing Services:** Rs. 400,000

Stakeholder Engagement:

- **University Management Collaboration:** Rs. 300,000
- **User Training and Support:** Rs. 200,000
- **Contingency Fund (10% of Total Budget):** Rs. 800,000

Total Project Budget: Rs. 8,500,000

11. Appendices

11.1 User Stories

- **User Story 1:**

Aisha Fatima, a computer science student at NUST, faces a daily challenge commuting to and from the university due to the unreliable public transportation in Islamabad. She desires a seamless and efficient carpooling experience that caters to her dynamic schedule. Aisha envisions a feature-rich Uni Ride-Sharing System that allows her to easily find rides from fellow students in her vicinity, ensuring a reliable mode of transportation. She emphasizes the

importance of real-time notifications and updates to stay informed about ride availability and estimated arrival times, reducing uncertainty in her daily commute. Aisha also values a secure and user-friendly payment system integrated into the platform, allowing her to effortlessly contribute her share of expenses without the need for cash transactions. The system must provide a balance between flexibility and structure, allowing Aisha to participate in carpooling arrangements that align with her academic and social commitments at NUST.

- **User Story 2:**

Bilal Ahmed, a computer engineering student at FAST, often faces challenges coordinating transportation for group projects and extracurricular activities with his classmates. He envisions the Uni Ride-Sharing System as a platform that not only facilitates individual rides but also enables the creation of shared routes for group travel. Bilal emphasizes the need for a robust scheduling feature that allows him to plan recurring rides for study sessions or team projects, ensuring timely and efficient travel arrangements for himself and his peers. Additionally, Bilal looks for a system that supports multi-modal transportation, seamlessly integrating carpooling with other modes such as buses or shuttles within the university campus. As a tech-savvy student, Bilal values an intuitive and feature-rich mobile application that streamlines the process of organizing and joining rides, making collaborative travel a hassle-free experience for the FAST community.

- **User Story 3:**

Saba Riaz, a literature student at the International Islamic University, faces the challenge of finding rides that align with her class schedule, which often includes evening lectures and group discussions. She envisions the Uni Ride-Sharing System as a solution that accommodates her specific timing needs. Saba emphasizes the importance of a flexible scheduling system that allows her to find rides during non-peak hours and enables other students with similar schedules to join her rides. She values a rating and feedback system that provides insights into the reliability and punctuality of potential ride partners, contributing to a sense of trust and accountability within the carpooling community. Saba also desires a personalized user experience, with the ability to set preferences for specific drivers or fellow

passengers based on previous positive interactions, enhancing her overall comfort and safety during shared rides.

11.2 Interviews

Open Ended Interview with Zainab (Undergraduate Student at NUST):

1. How frequently do you commute to the university, and what challenges do you currently face with the existing transportation options?

Response: "I travel to the university every day, and it's a bit of a hassle, especially during busy hours. The existing transportation options can be quite unreliable, leading to delays and uncertainty."

2. In your opinion, what features would make a university-focused ride-sharing platform more convenient and user-friendly?

Response: "For me, a ride-sharing app should have real-time tracking so I can know exactly where the ride is. Also, an easy-to-use interface would be great for quick ride requests without any complications."

3. Can you share any specific instances where the existing transportation system within the university caused inconvenience or delays?

Response: "There have been occasions where I've had to endure long waiting times, and it's frustrating when these delays make me late for important classes or appointments."

4. How much time, on average, do you spend commuting to and from the university each day?

Response: "I spend roughly 1 to 2 hours daily commuting, and that's a significant chunk of time that I feel could be better spent on other activities."

5. If a mobile ride-sharing application were introduced for NUST, what factors would influence your decision to use it regularly?

Response: "Affordability is key for me. I'd also look for reliability and a straightforward registration process. If these factors are in place, I'd be more inclined to use it regularly."

6. What type of information or features would you find most useful in a ride-sharing app tailored for university commuters?

Response: "Detailed information on available rides, estimated arrival times, and a reliable feedback system would be really useful. It helps in planning and ensures a smoother experience."

7. Considering your experiences, what security and privacy features would you expect from a university ride-sharing platform?

Response: "Safety during rides is a top concern. The app should also prioritize protecting personal information to ensure a secure and trustworthy experience."

8. How likely are you to utilize a ride-sharing app if it were officially endorsed and promoted by the university management?

Response: "I'd definitely be more likely to use it if the university supports and promotes the service. It adds a level of credibility and assurance."

9. What impact do you think a dedicated ride-sharing app could have on your monthly expenditure for commuting?

Response: "I'm hopeful that it could reduce costs. If the app provides a more cost-effective alternative to my current transportation expenses, that would be a significant benefit."

10. In your ideal scenario, how should the university management support and promote the ride-sharing platform among students and staff?

Response: "They could integrate it into official communication channels, spread awareness about its benefits, and maybe even offer incentives to encourage more students and staff to use it."

Open Ended Interview with Sara Adnan (Undergraduate Student at NUST):

- **How frequently do you commute to the university, and what challenges do you currently face with the existing transportation options?**

Response: "I travel to the university every day using Baig Transport. While the service is generally reliable, there are occasional breakdowns that lead to unexpected delays, and that can be inconvenient."

- **In your opinion, what features would make a university-focused ride-sharing platform more convenient and user-friendly?**

Response: "I believe a ride-sharing app should offer a variety of payment options to cater to everyone. Additionally, a feature that allows users to pre-schedule rides would be incredibly helpful, especially for early morning classes."

- **Can you share any specific instances where the existing transportation system within the university caused inconvenience or delays?**

Response: "There have been instances where the bus I take has been overcrowded, making the journey uncomfortable. It would be great if a ride-sharing app could provide information on seat availability to avoid such situations."

- **How much time, on average, do you spend commuting to and from the university each day?**

Response: "I spend about 45 minutes to an hour commuting each way. It's not too bad, but any reduction in travel time would be appreciated, especially during peak hours."

- **If a mobile ride-sharing application were introduced for NUST, what factors would influence your decision to use it regularly?**

Response: "Affordability is crucial for me. I'd also consider the convenience of the app's interface and the overall reliability of the service. If it aligns with or surpasses my current experience with Baig Transport, I'd switch."

- **What type of information or features would you find most useful in a ride-sharing app tailored for university commuters?**

Response: "Real-time updates on the bus's location and a quick notification system for any changes in the schedule would be highly beneficial. It helps in planning my day effectively."

- **Considering your experiences, what security and privacy features would you expect from a university ride-sharing platform?**

Response: "Safety is a priority. The app should have a robust system to ensure the security of passengers. Also, a feedback mechanism that allows users to report any concerns during the ride would be reassuring."

- **How likely are you to utilize a ride-sharing app if it were officially endorsed and promoted by the university management?**

Response: "If the university supports it, I'd be more inclined to give it a try. Official endorsement adds a layer of trust, and it would be a signal that the service aligns with the university's standards."

- **What impact do you think a dedicated ride-sharing app could have on your monthly expenditure for commuting?**

Response: "I'm hopeful it could be more cost-effective. If the app offers competitive pricing and maybe some student discounts, it could certainly help me save on my monthly commuting expenses."

- **In your ideal scenario, how should the university management support and promote the ride-sharing platform among students and staff?**

Response: "They could integrate it into university communications, perhaps share success stories of students benefiting from the service. Offering promotional deals or partnerships with the app could also encourage more students to use it regularly."

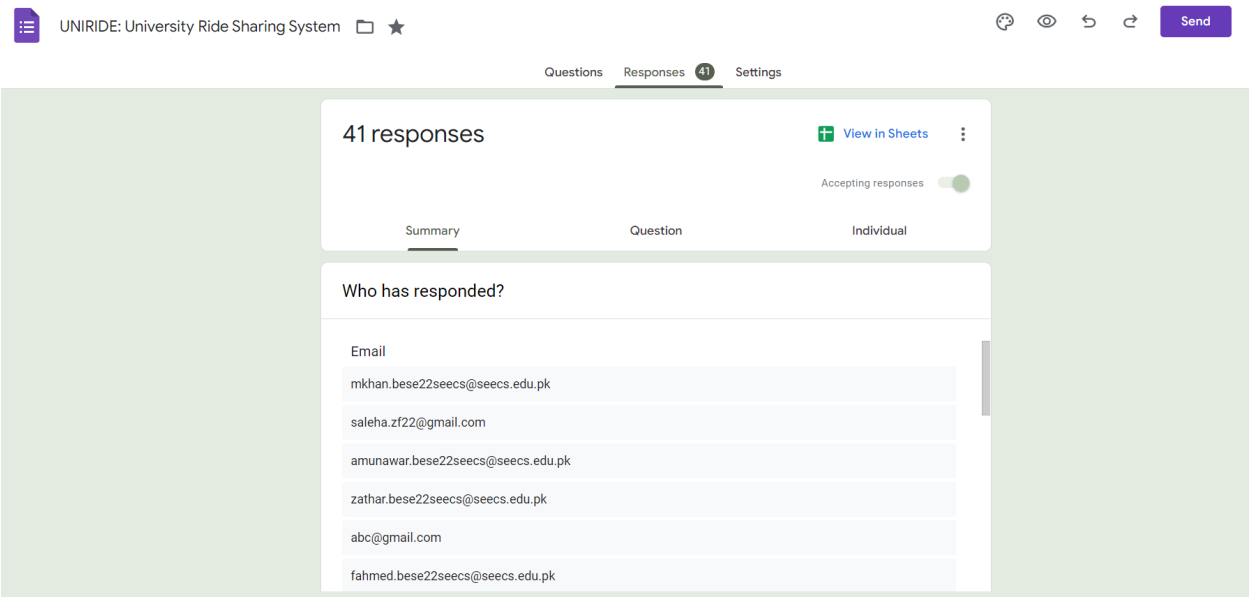
11.3 Online Surveys

Survey Questions:

1. Email
2. What is your role at the University?
3. How frequently do you commute to the University?
4. What is your current mode of transportation?
5. On a scale of 1 to 5, how satisfied are you with your current Transport service?
6. What challenges are you currently facing when using your current mode of transportation?
7. Have you ever participated in a carpooling arrangement before?
8. If yes, please share your experience: • What worked well? • What could be improved?
9. What factors are most important to you when considering carpooling?
10. What are the best time windows for your commuting schedule? (Select all that apply)
11. How far are you willing to deviate from your regular route for carpooling?

12. How important is safety and security to you when considering carpooling options?
13. What features or measures would make you feel more secure when carpooling?
14. How comfortable are you with using mobile applications for coordinating and managing carpooling?
15. What features would you like to see in a carpooling app for the university community?
16. Would you be more likely to participate in a carpooling program if there were incentives or rewards offered?
17. If yes, what kind of incentives would be appealing to you?
18. How important is environmental sustainability in your choice of commuting options?
19. Would you be more likely to participate in carpooling if it had a positive environmental impact?
20. Demographic Information:• Age: _____• Gender: _____• Affiliation with the University: _____
21. Are there any challenges or concerns you foresee in implementing a carpooling system at the university?
22. How do you prefer to provide feedback on the carpooling system, and how frequently?
23. How frequently would you like to provide feedback?

Total Number of Responses: 41



What is your role at the University?

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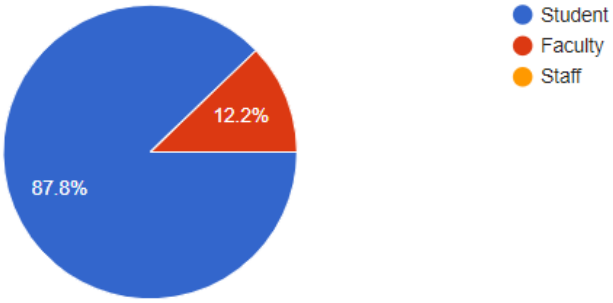
41 responses



How frequently do you commute to the University?

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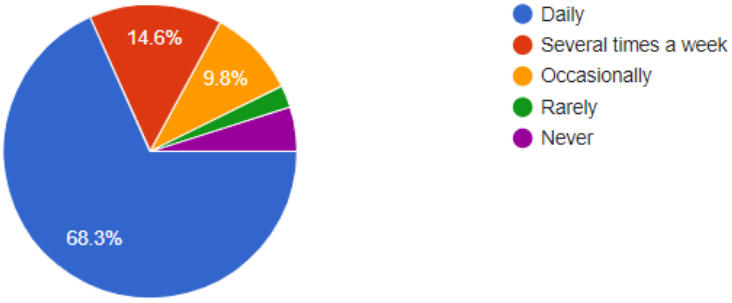

What is your current mode of transportation?

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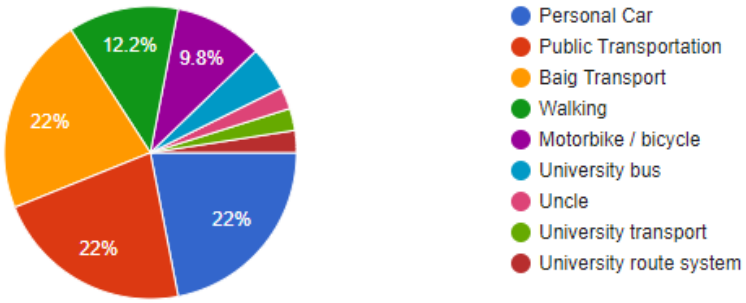
41 responses



On a scale of 1 to 5, how satisfied are you with your current Transport service?

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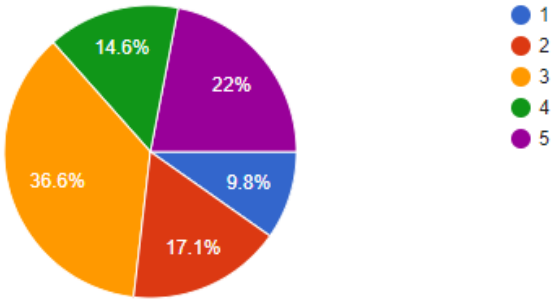
41 responses



What challenges are you currently facing when using your current mode of transportation?

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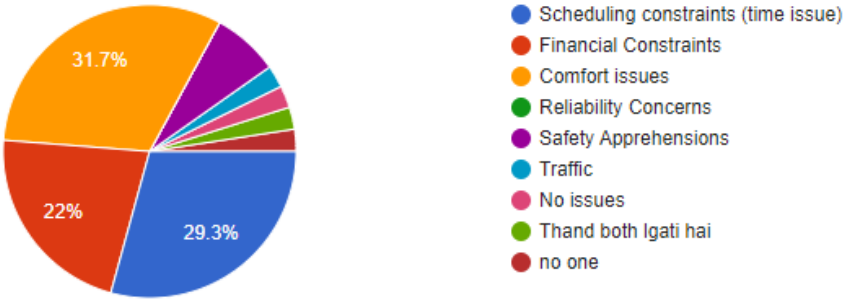

Have you ever participated in a carpooling arrangement before?

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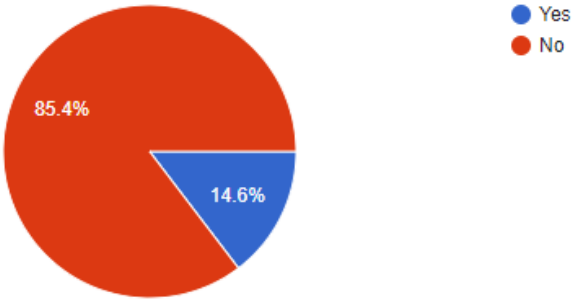
41 responses



If yes, please share your experience: • What worked well? • What could be improved?

10 responses

It was alright, it could be improved though as there were a lot of issues with people not showing up on time.

What worked well? Easy coordination with fellow carpoolers. Reliable and punctual pick-up/drop-off times. What could be improved? Better communication about schedule changes. More flexibility in meeting points for convenience.

Abc

Needs improvement

I am ok with it

Personal car is always best.

No of students per bus should be less

I have not participated

What factors are most important to you when considering carpooling?

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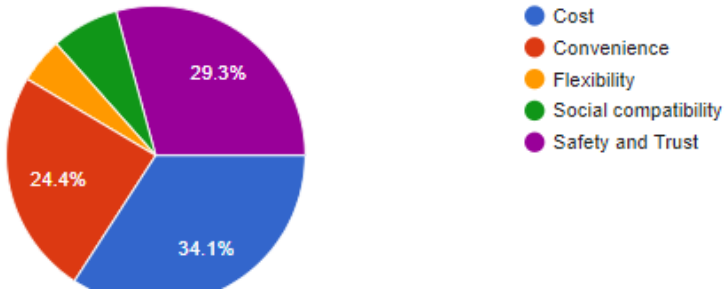
41 responses



How important is safety and security to you when considering carpooling options?

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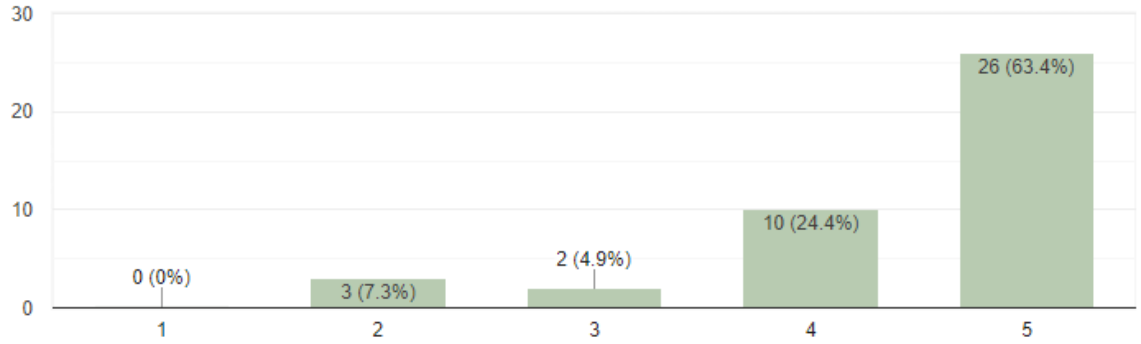
41 responses



What features or measures would make you feel more secure when carpooling?

17 responses

Trusted individuals should be with me.

Real-time GPS tracking of the carpool route. Verified profiles and background checks for all participants. Emergency button or communication system within the carpooling app.

Being able to carpool with women only

sharing ride with my family members and calling police

Security and reliability

Safety, authenticity

Driver behaviour

How comfortable are you with using mobile applications for coordinating and managing carpooling?

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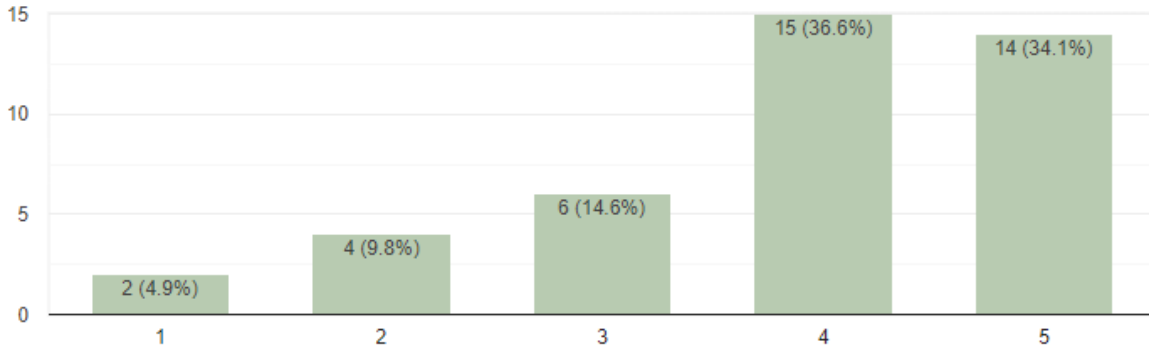
41 responses



What features would you like to see in a carpooling app for the university community?

14 responses

A verification for students who are carpooling.

budget friendly.

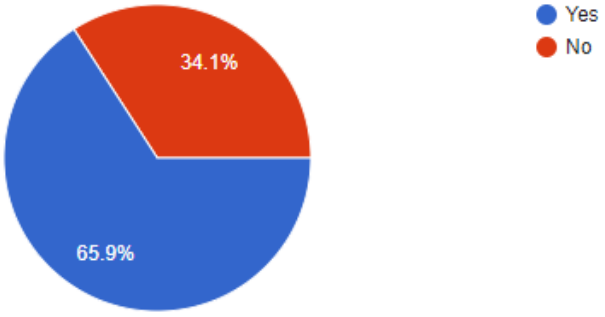
A user-friendly interface for easy scheduling.
Real-time tracking for efficient coordination.
Option to filter or match with users based on preferences (e.g., schedule, route).
In-app messaging for seamless communication.
Integration with university events for shared rides to activities.

Basic information, time slots

Would you be more likely to participate in a carpooling program if there were incentives or rewards offered?

Copy

41 responses



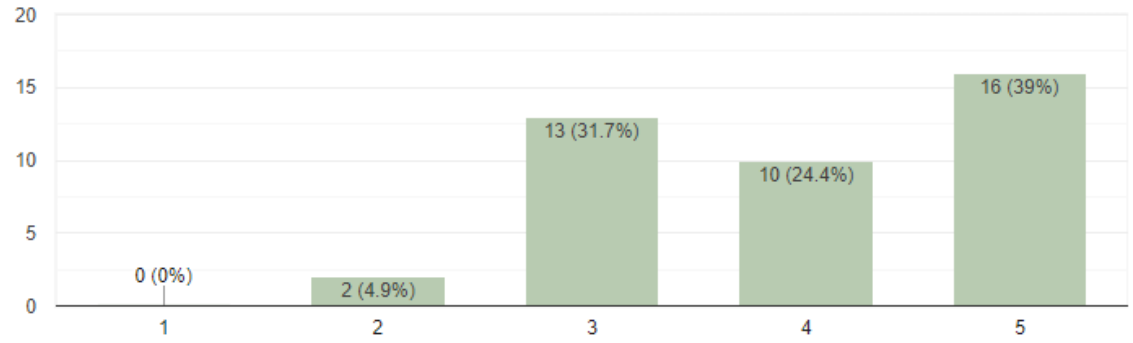
If yes, what kind of incentives would be appealing to you?

10 responses

Financial
Reduced parking fees on campus. Priority parking spaces for carpool participants. Loyalty points redeemable for campus services or merchandise. Recognition or rewards for consistent participation (e.g., certificates, badges). Discounts at local businesses for carpool members.
Car free of cost
Nothing
Anything
Flexible timings

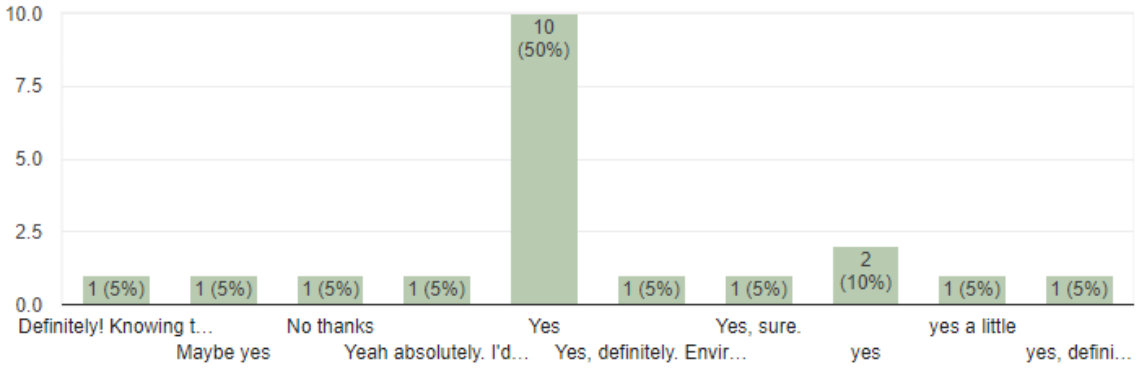
How important is environmental sustainability in your choice of commuting options? Copy

41 responses



Would you be more likely to participate in carpooling if it had a positive environmental impact? Copy

20 responses



Demographic Information:

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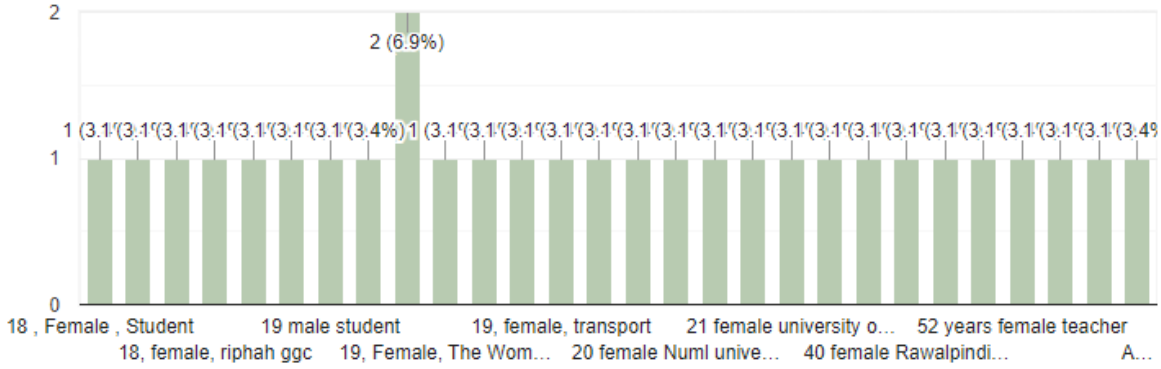
- Age: _____
- Gender: _____
- Affiliation with the University: _____

29 responses



Are there any challenges or concerns you foresee in implementing a carpooling system at the university?

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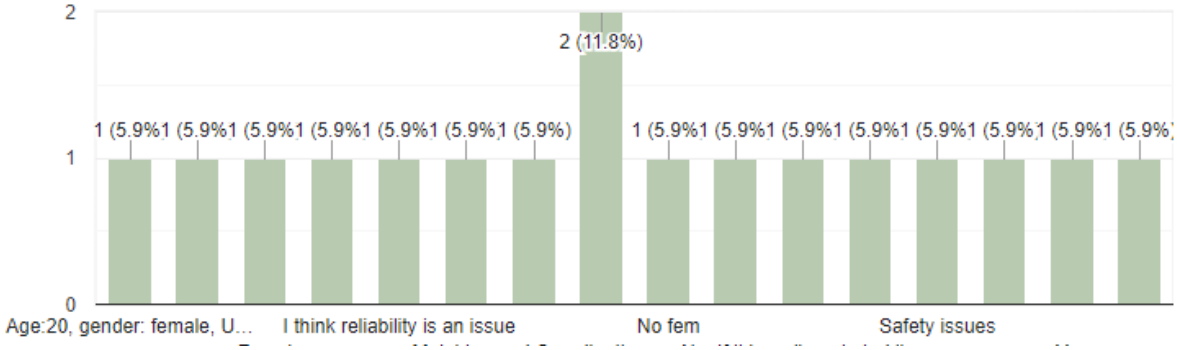
17 responses



How do you prefer to provide feedback on the carpooling system, and how frequently?

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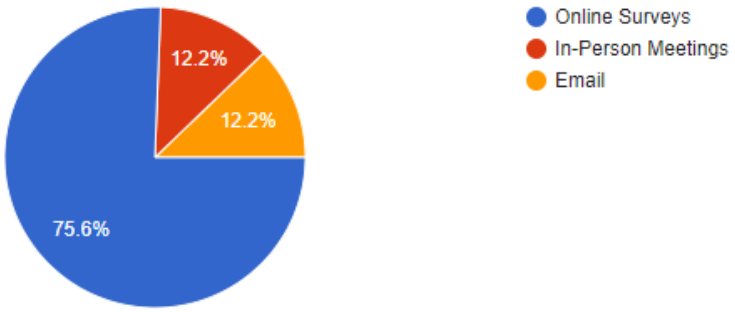
41 responses



How frequently would you like to provide feedback?

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21 responses