

Pool - carpooling app

SW Engineering CSC648-848-05 Fall 2023

Milestone 1 | 09/21/2023

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History Table

Milestones	Date
M1V2	10/8/23
M1V1	9/21/23
M1V1	9/21/23

Executive Summary

We're all students and work, some of us even do both. Having to drive from San Jose or the East Bay all the way to San Francisco can be less burdensome with an app like Pool. We all commute and are all looking for an alternative to the pricey big name apps like Uber and Lyft. Even in places where public transit is relatively connected, a more private transit experience is strongly preferred to buses and trains. For drivers, Pool would be much easier on our wallets by alleviating gas and toll prices. Uber, Lyft, and public transportation also lack community building elements that we all crave as busy people with little time for socializing.

We're a team of full stack web developers ready to revolutionize the commuting experience. As CS students and workers, we've all experienced the pain points of commuting using apps like Lyft and Uber, of driving during peak traffic, and of navigating the complex and sometimes unpredictable web of public transit. These experiences are at the forefront of the conception, design, and development of Pool.

Pool makes it convenient for people to commute to work – even during peak traffic, without relying on public transit or traditional ridesharing apps. By using Pool to carpool with fellow community members, passengers and drivers alike reduces commuter costs while limiting environmental impact and building community in the process. Plus, it's just nice to have someone else drive sometimes; Pool allows users to relax in the passenger's seat without the price tag of a Lyft or Uber.

Other ridesharing apps don't guarantee access to HOV and low-traffic lanes requiring FasTrak. Pool verifies all drivers for FasTrak subscriptions. Most carpooling apps don't break down the cost for you, but Pool will break down the costs of tolls and fuel per passenger. Pool is laser focused on the commuting experience and empowers users to ride to work with a trusted and familiar group of passengers, and a verified FasTrak driver able to cruise through traffic using HOV lanes. After work, expand your transit experience with your carpooling crew; go grocery shopping, get dropped off at the gym, or head home from sports practice together – all while paying less, having fun, and reducing your carbon footprint.

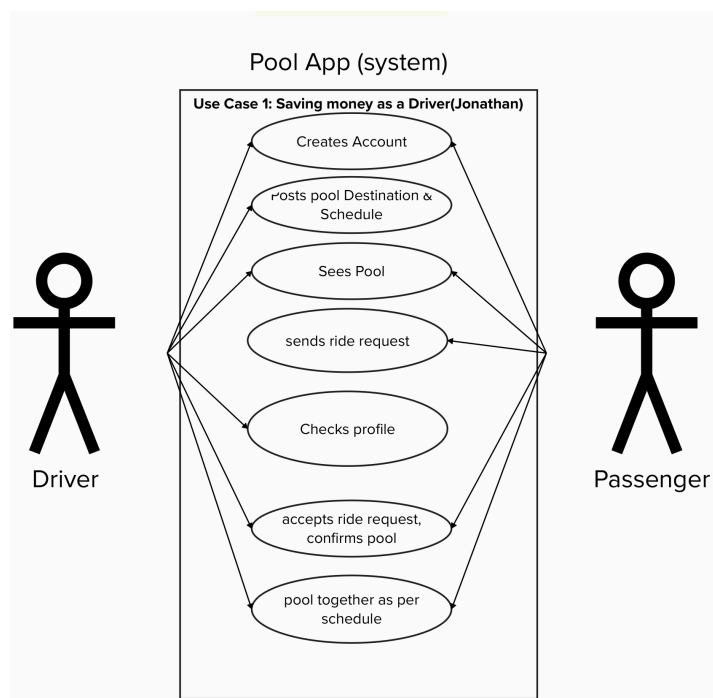
Main Use Cases

Use Cases: Drivers

Use Case 1: Saving money as a driver

Actors: Amanda

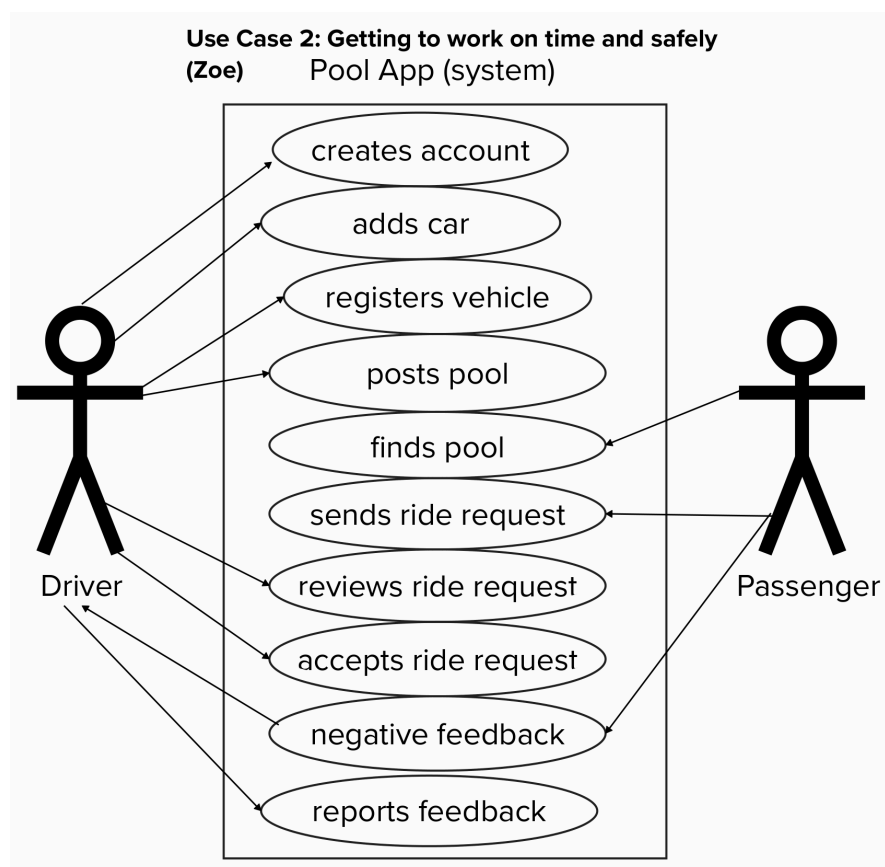
Amanda is a recent college graduate who has moved to Livermore, CA for her new job. Amanda prefers not to have to rely on public transportation to move around the bay, so she drove her car to California. Her commute requires her to cross the Bay Bridge into San Francisco which costs money from the toll system. Additionally, there are toll lanes on the highway down from Livermore that require additional fees. Amanda discovers Pool by talking to some of her friends that consistently use Pool for their daily commute. Just like her coworkers, Amanda is able to find passengers that also live in Livermore that commute daily to San Francisco in a “pool”. Amanda creates an account and posts pools for each week day from Livermore to San Francisco. Amanda makes some small adjustments to pickup time and end location, and soon receives rider requests from passengers who wish to join her pool. Since there are multiple passengers in Amanda’s vehicle, she qualifies for discounts not only on the highway, but for crossing the Bay Bridge as well.



Use Case 2: Getting to work on time and safely

Actors: Alex

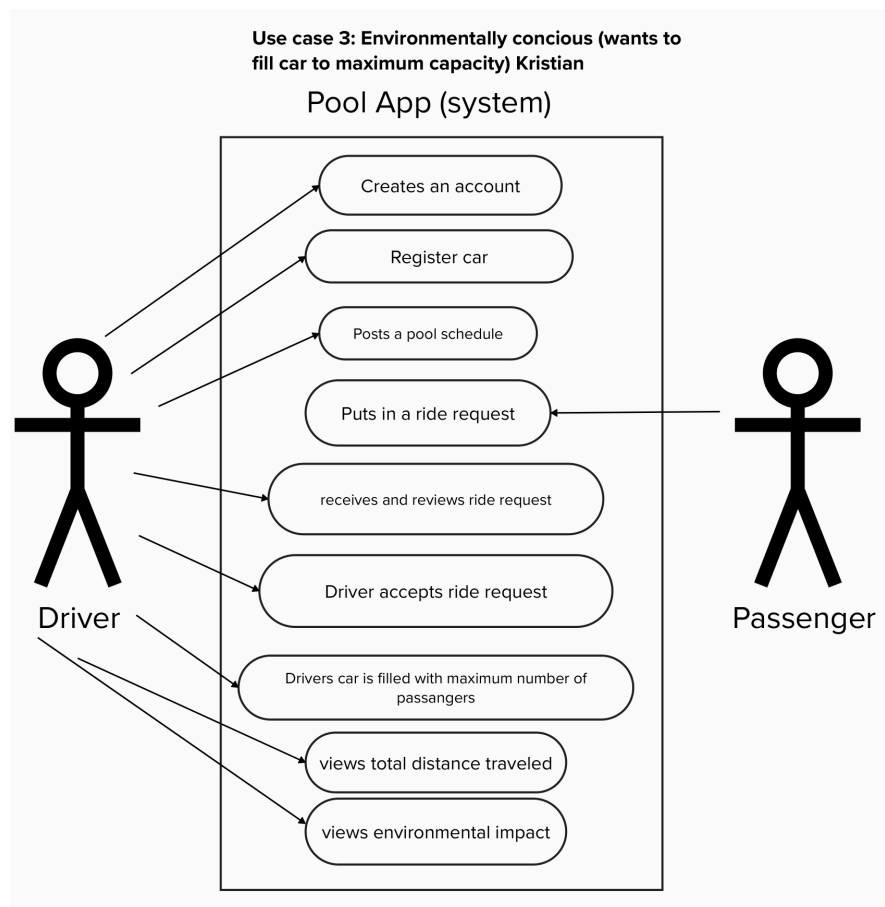
Alex loves driving and has faced harassment on public transit, so choosing to drive to work is a no brainer – she'll even pay a premium for this choice (tolls, gas, parking, etc). But getting to work on time is a major problem as a commuter traveling from Marin County into San Francisco, over the Golden Gate. Alex has tried carpooling before, so she decides to try out Pool as a driver in her own car, where she can better control her environment and the passengers she commutes with by reviewing the profiles of prospective passengers in ride requests before accepting or declining them. And when she receives transphobic or otherwise inappropriate feedback from passengers, she can view it before it becomes public and easily report it. On days where Alex doesn't feel like dealing with people, it's easy to toggle off notifications so she can review ride requests when she's ready.



Use Case 3: Environmentally Conscious

Actors: Carol

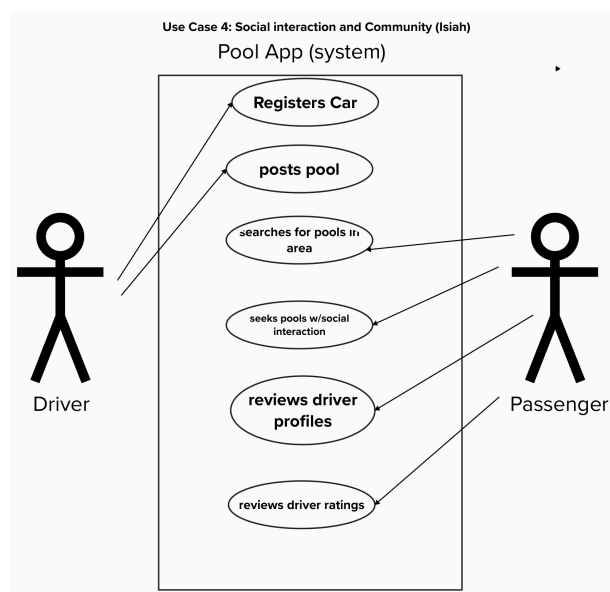
Carol has been seeing a lot of news articles about the acceleration of climate change and is wondering what she can do to limit her environmental footprint. But she likes her car and enjoys driving to work. So she creates a password protected account on Pool. There, she can post pools that align with her commuting schedule and receive ride requests from prospective passengers who are going in the same general direction. Sometimes, Carol drives a little out of her way to pick up and drop passengers off as per their ride requests, but it's worth it because Carol prefers to have a full car to reduce her impact on the environment. Plus, she loves seeing her total distance traveled and environmental impact from all of her past rides; it reaffirms her choice to be a driver on the Pool app. When Carol thinks of other features that could create more in-app incentives for lessening environmental impact, she files a report ticket for the Pool customer support team with her suggestions.



Use Case 4: Social interaction and community

Actors: Sarah

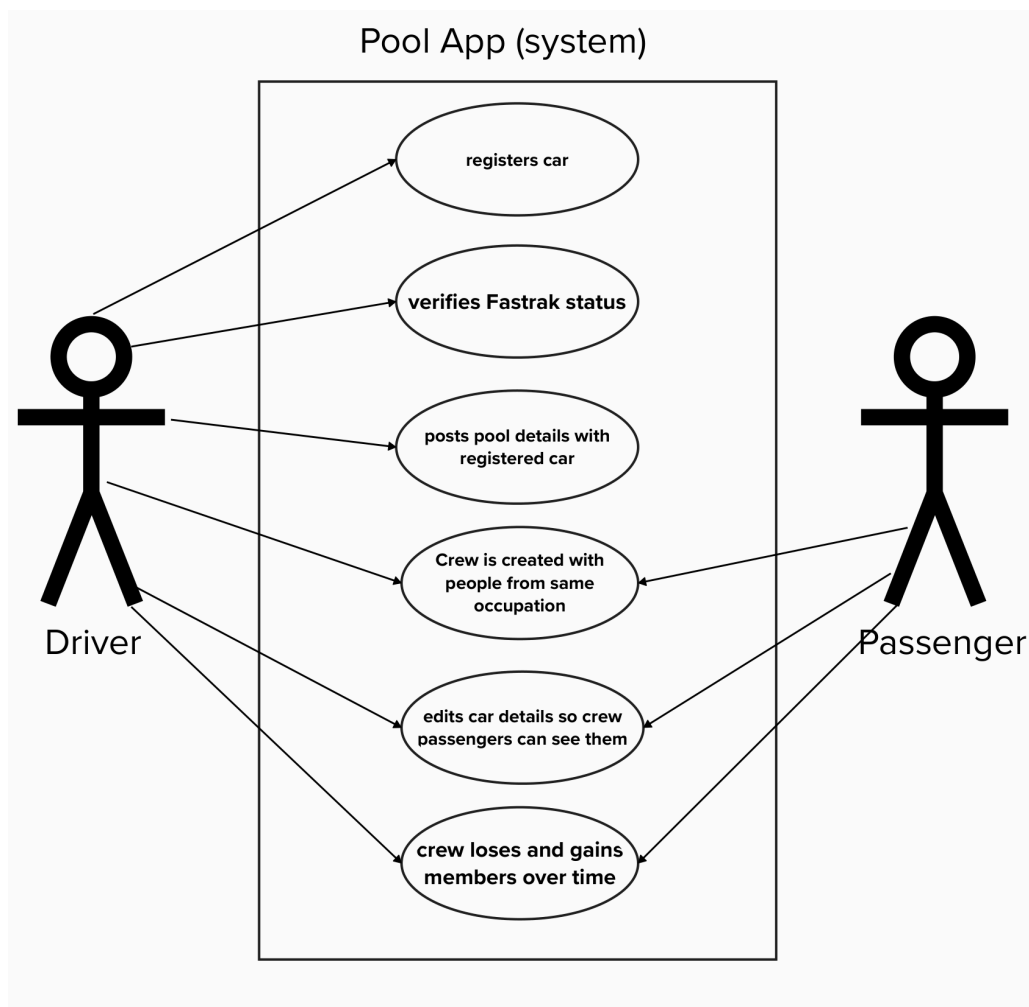
Sarah is a retired teacher in her early 60's, living in a quiet suburban neighborhood in the Bay Area. She no longer commutes to work and enjoys her retirement, but she frequently needs to cross the Bay Bridge and navigate the city for her errands, social outings, and medical appointments. Sarah's primary concern is the hassle and stress of her regular commutes. Sarah is not looking to save money but to simplify her errands and improve her overall quality of life. Sarah is seeking a carpooling app that can help her find companions for her trips into the city. She hopes to connect with individuals who share her interests or have similar destinations. This way, she can have enjoyable conversations and company during her commutes, making her trips more pleasant and less stressful. Safety and reliability are vital to her, ensuring that she shares rides with trustworthy individuals. In her research, she learns that the Pool app has passenger and driver ratings, which entices her to try it out. Because Pool does not require her to create an account to search for available pools in her area, she starts by doing this. When Sarah tells her daughter that Pool has an emergency contact feature, her daughter feels much better about the prospect of her creating an account as a passenger, knowing that she'll be contacted by phone and email in the event of any unforeseen circumstances. And in the event Sarah deems the app too difficult to navigate, she can try chatting with support or can always just delete the account.



Use Case 5: Reduce commuting time and having Fastrak

Actors: John

John, a software engineer in San Francisco, uses Fastrak to optimize his daily commute from San Jose. To save time and money, he ensures his Fastrak account is funded, allowing for smooth toll payments on the Bay Bridge and express lanes. John participates in carpooling through the Pool app as a Fastrak verified driver, sharing his registered vehicle with co-workers from the same area in a pool, which not only reduces his toll expenses but also makes his commute more enjoyable. John and his co-workers recently created a crew from their regular pool commute to make traveling together using the Pool app even easier.

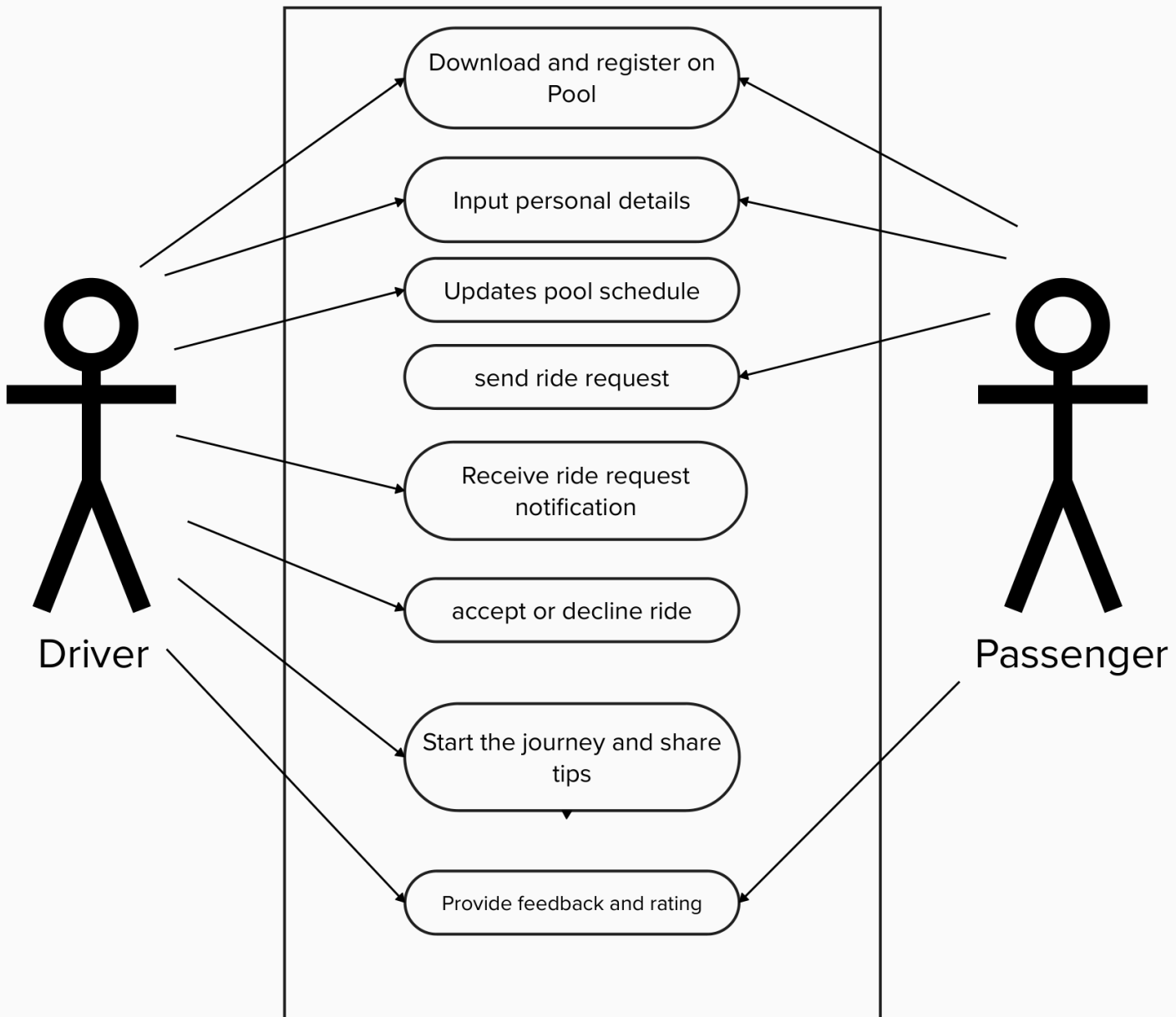


Use Case 6: Building connections while lending a helping hand

Actors: Ashley, Jeff

Ashley is a senior at San Francisco State who has been living in the city for over three years. Originally from a suburban area, Ashley became acquainted with San Francisco's dynamics with its unique neighborhoods and city life. Her residence in the Outer Richmond area allows her to quietly live outside of the busier parts of the city and her commute time to the university isn't half bad. Ashley has been using Pool for over a year now as a driver, and the app not only helps her offer rides to fellow students which makes their commutes easier, but it also helps offset some of her expenses with contributions from her passengers. Ashley is aware of the challenges new students face, especially those who are new to the city, so each semester, Ashley updates her pool schedule on the app, sharing pool routes with start and end locations she frequently takes, marking which pools are recurring, and indicating any available seats in her car. One evening, a notification from Pool pops up, a new passenger by the name of Jeff, is requesting a ride that aligns perfectly with her pool. Noting that he's a transfer student living in the Outer Sunset, Ashley realizes that his location is right along her daily pool route. Recalling how confused she was when she first came to the city, Ashley empathizes with Jeff, from one student to another, so she accepts the ride request for the next morning. Ashley pulls up outside Jeff's apartment the following day since he requested a pickup location different than Ashley's pool start location, they exchange greetings, and their pool begins. Ashley shares her experiences and gives Jeff tips about university life in San Francisco State and how to get around San Francisco, although the pool was short, the engagement made the once mundane drive to school an opportunity for connection and friendship. As the weeks went by, Ashley and Jeff's rides became more lively, with discussions, shared playlists and mutual appreciation of the city landmarks. Pool has turned Ashley's daily drive from a solitary task into a shared experience that fosters friendship and a sense of community, leading to the creation of this two person crew.

Use Case 6 Building connections
while lending a helping hand (Phillip)
Pool App (system)

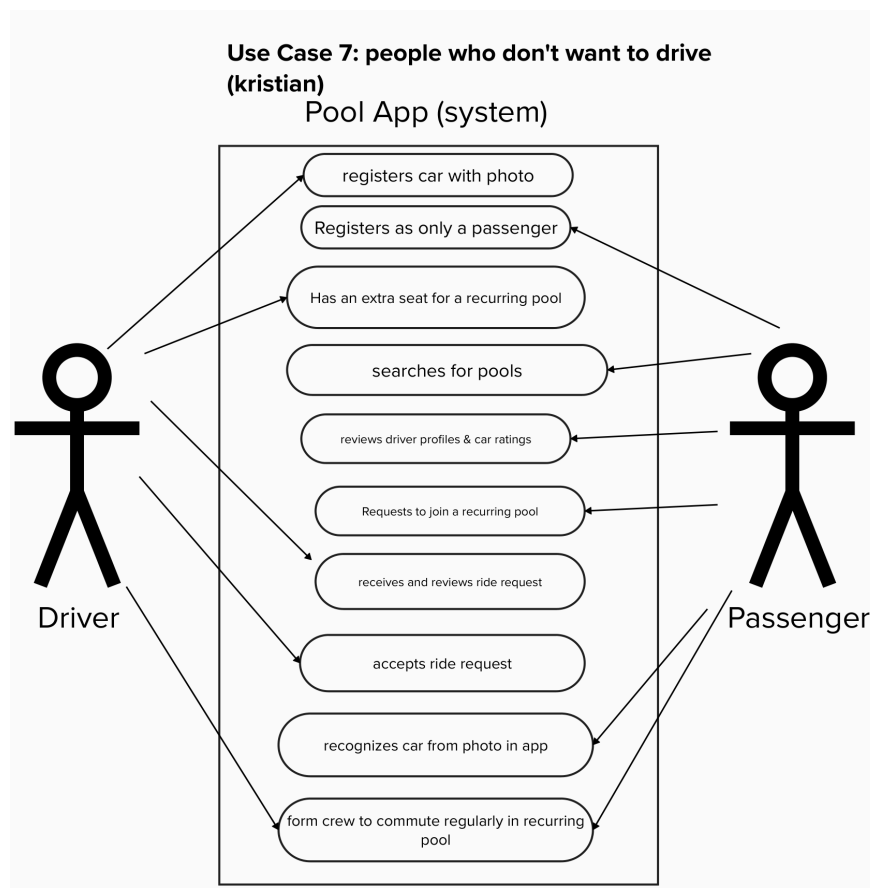


Use Cases: Passengers

Use Case 7: People who do not want to drive

Actors: Tom (carpool passenger), Driver

Tom is a business professional who works in the San Francisco financial district. Tom and his wife recently moved away from their downtown apartment to a home in San Mateo, California. When Tom Lived downtown he was conveniently located next to an underground Muni train station and only needed to go a few stops to get to work. After moving to San Mateo he tried driving, but quickly realized he did not like driving during peak traffic hours, it caused him a great deal of distress. Because Tom does not like driving during peak hours, he creates an account on the Pool carpooling website, he is able to register as only a passenger without the need to be a driver.. Then Tom searches the Pool website for recurring Pools he can regularly join to share a car to work. Tom finds an available pool that has space in the car; both the driver and car have great ratings, so he sends a ride request to the driver. Plus, the driver's profile shows that he accepts Venmo, making it easy for Tom to pay the very reasonable toll contribution of \$1 using his posted account details. The driver reviews Tom's profile and approves his ride request. Tom easily recognizes the car at the pickup location of his first pool based on the make, model, year and color, which matches its picture in the app. Tom now commutes to work regularly with a crew and he no longer dreads his daily commute to work – and because the car has air conditioning and wifi, he can even get a head start on work during his commute, in comfort.

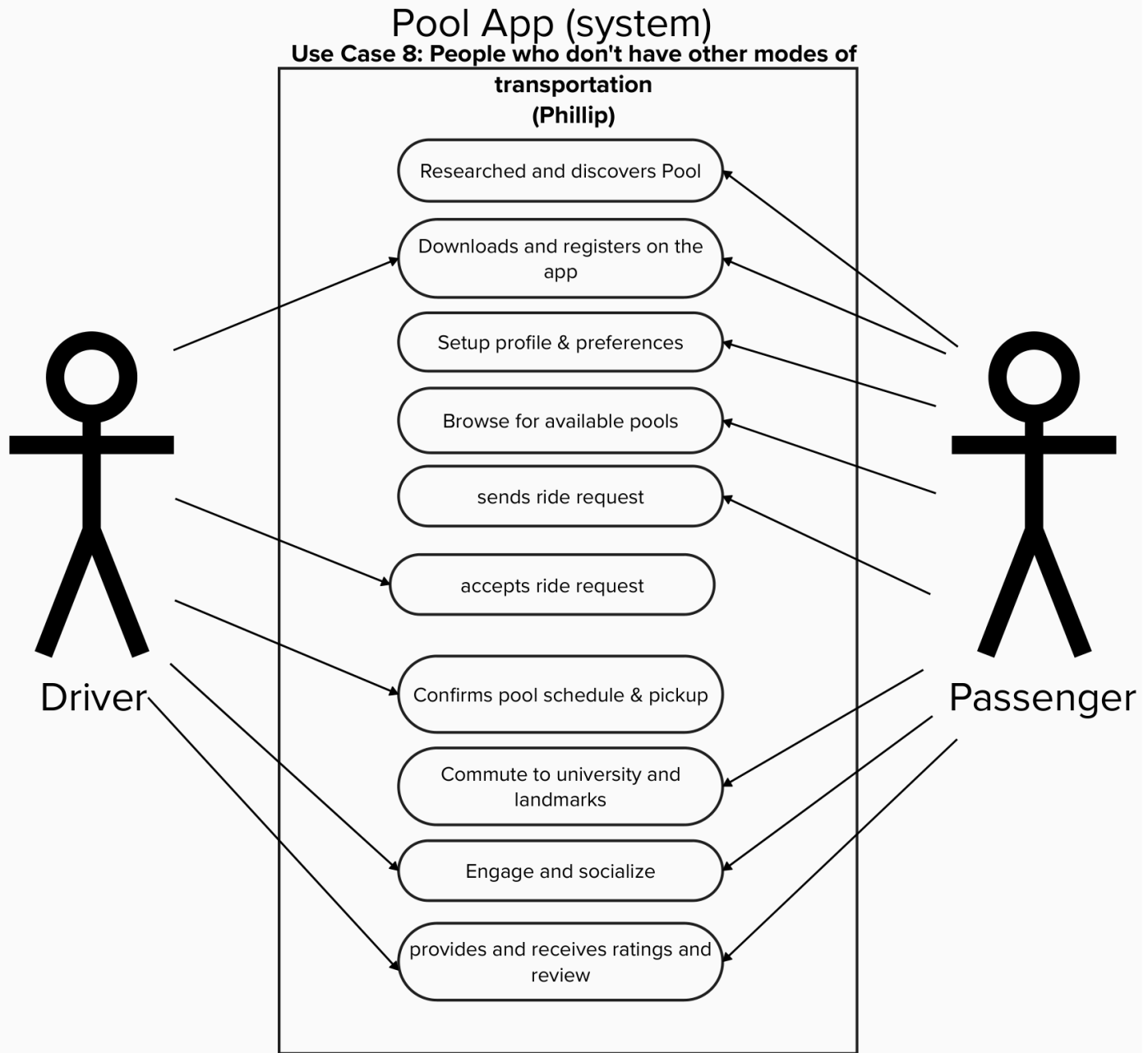


Use Case 8: People who don't have other modes of transportation

Actors: Jeff

Jeff is a university student who recently transferred to San Francisco from his community college in a relatively smaller town where he only had to walk to where he needed to be, so a car was unnecessary. Excited to start attending San Francisco State and a new life in a different city, Jeff forgot how much bigger San Francisco was compared to where he was from. Initially intimidated by the city's overwhelming and bustling transportation system, Jeff began to stress out, although there were public transport options available, things such as unfamiliar routes and packed schedules made his commute to the university stressful. While attending a university orientation event, Jeff hears about Pool, an app specifically designed for students and residents of San Francisco looking to share rides, intrigued by the idea, he downloads the app right away. After getting the app, Jeff quickly set up his profile, detailing his commute from his apartment in the Outer Sunset to SF State, he inputs his class times to allow the app to suggest optimal pick-up times and check preferences such as fellow student passengers or quiet rides to study during the journey. The app identifies several drivers with overlapping routes, but a particular driver was also a senior student from his university and has been carpooling for the past year, they have been driving by his apartment every morning and have space in their car. The next morning, Jeff waits outside his apartment and, right on time, the senior student from his university arrives, the ride to campus is smooth and quick, with the driver sharing tips about the city and university life, Jeff feels more connected, having made a new friend along with an efficient way to commute to school. As days turn into weeks, Jeff regularly uses Pool as a mode of transportation, not just for school but also for exploring the city and visiting iconic places such as the Golden Gate Bridge and Fisherman's Wharf. The app allows him to travel with locals, making his adaptation to San Francisco life cost-effective and socially enriching. Jeff provides positive feedback for his driver and gives her a great rating.

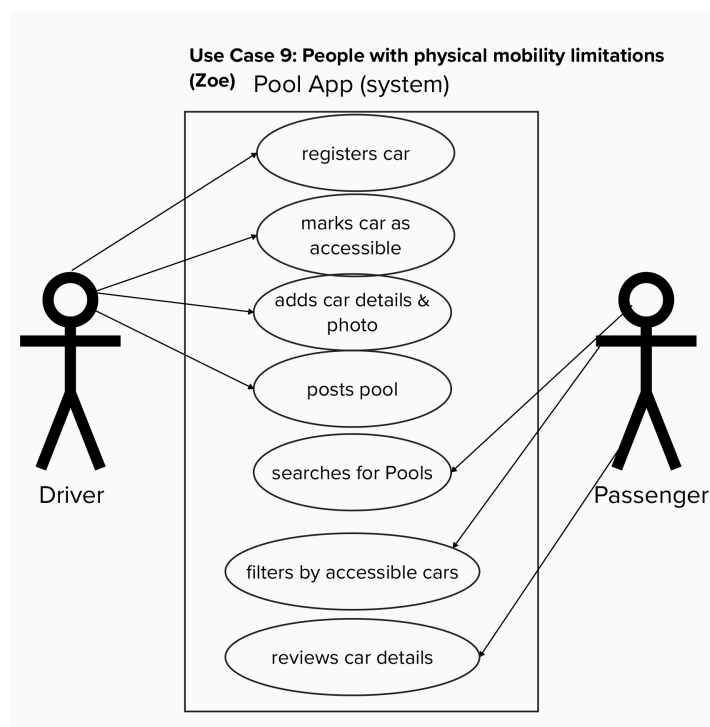
Passenger Use Cases



Use Case 9: People with physical mobility limitations

Actors: Ty

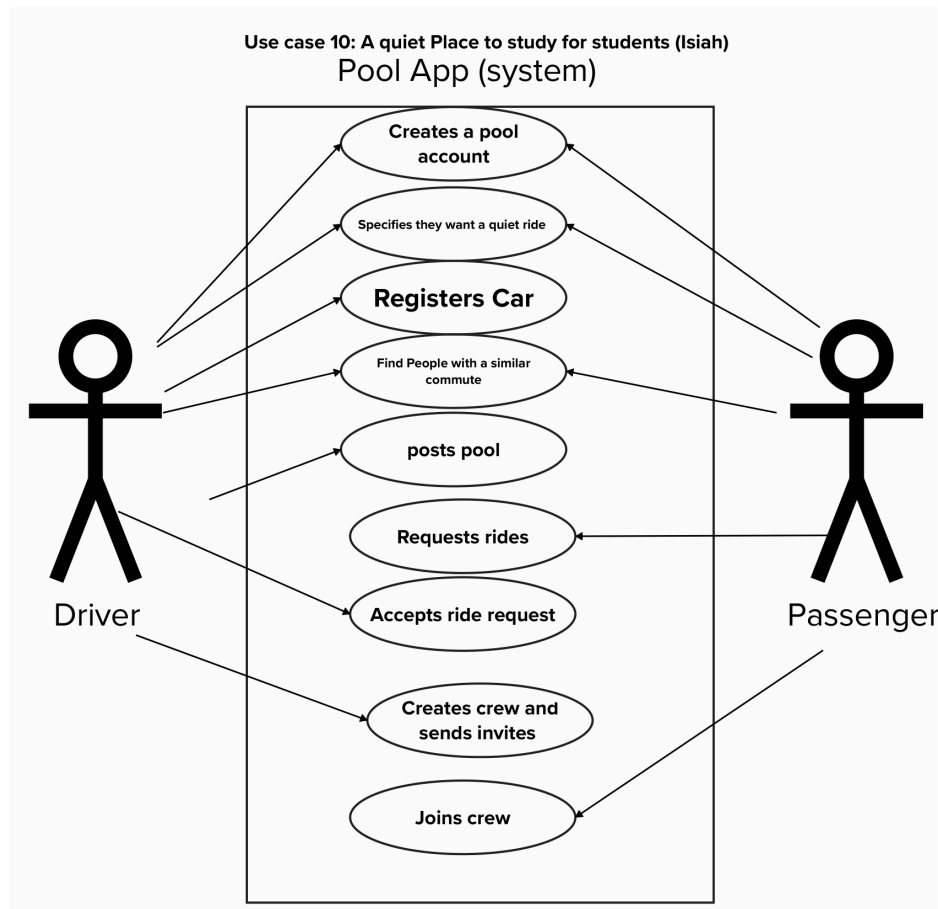
Ty has navigated their life in a wheelchair since they were a toddler, and has always been incredibly independent. This has left Ty with remarkable upper body strength and the ability to self transport around home as well as within their community. But even as an advanced wheelchair user, Ty struggles with public transit – at no fault of their own; many times, elevators are out of service at Bart stations, and Ty has no way of finding this out prior to their arrival, at which point they must completely renavigate and often end up arriving late for work. A friend recently told Ty about Pool, a community carpooling app. But Ty is skeptical of Pool, because their experiences with Lyft and Uber haven't been consistent; sometimes drivers who say their vehicle can accommodate wheelchairs actually can't, and the process of even communicating about this with drivers has been arduous. With no better options, Ty decides to try Pool since it allows you to filter by pools with accessible vehicles, but plans to set aside a whole extra hour for the experience in case it doesn't work out and they need to make alternative plans to get to work. Before creating an account, Ty simply browses to see if any pools in their area actually have wheelchair accommodations.



Use Case 10: A quiet place to study for students

Actors: Emily

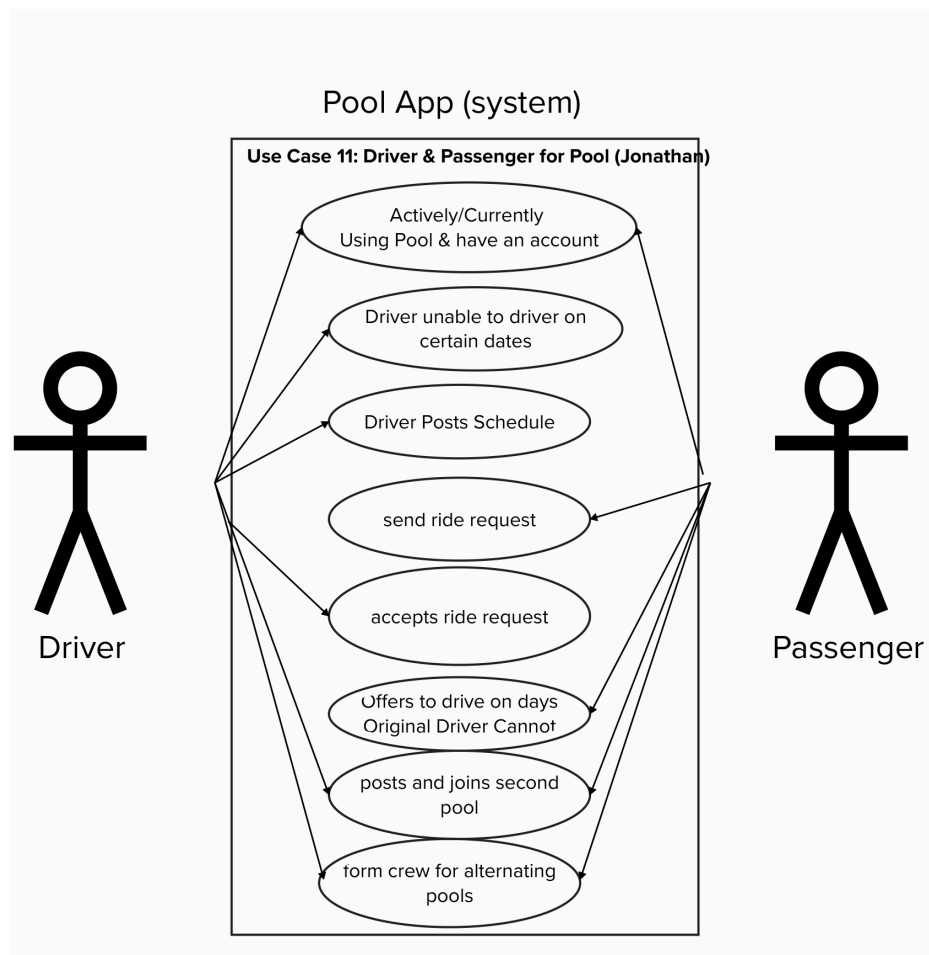
Emily is a University Student attending San Francisco State University but lives in Milpitas. She has a long commute to campus, and she's determined to make the most of her time. Emily uses the Pool app to find pools to school with wifi where she can study during the journey, so she searches for pool names and descriptions containing keywords like "study" and "students". For Emily, the pool isn't just a mode of transportation; it's her mobile study space. She is actively looking for a crew of fellow passengers who also value a quiet and focused environment during their pool. By carpooling with others who share her goal, Emily can make the most of her daily commute, optimize her study time, and arrive at school prepared for her classes. After her fourth pool with a consistent group of passengers who also see their commute as an opportunity to enhance their productivity and learning experience, Emily invites the members of her pool to create a crew. The members all accept and they proceed to regularly pool together.



Use Case 11: Driver & Passenger for Pool

Actors: Jason, Marissa

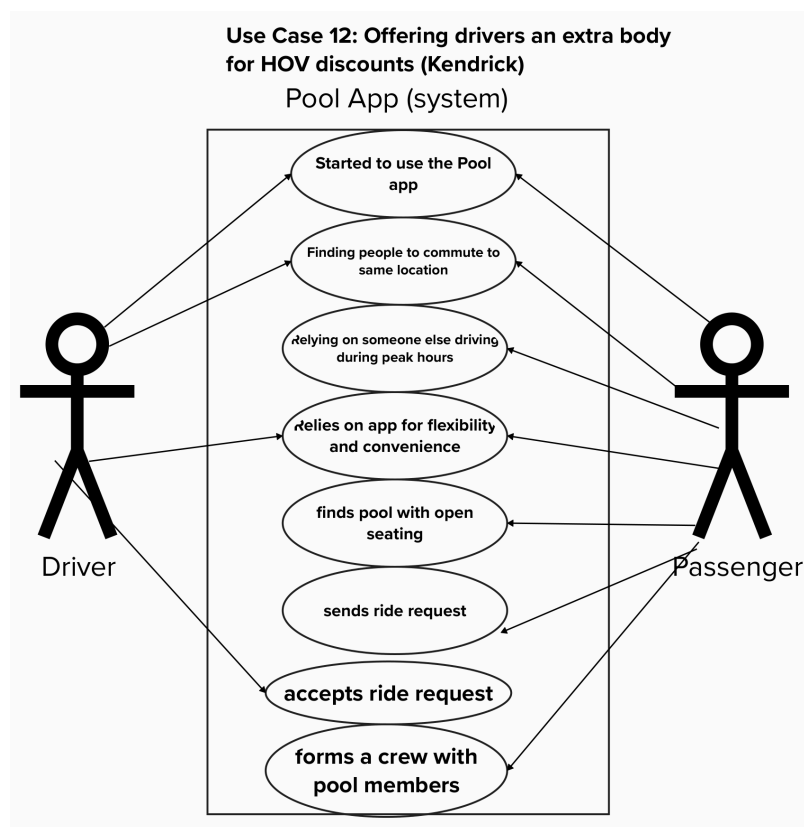
Jason recently moved to the East Bay for work and has been living there for the past 3 years. During his time there, he has met coworkers that also live in East Bay and have agreed to form a crew and commute together regularly through the Pool app. Jason doesn't mind driving, but he sleeps later than usual every other Tuesday night to help his kids study for their school's biweekly math competitions. Because of the lack of sleep Jason gets, Jason doesn't feel comfortable driving on less sleep than usual – especially when transporting his youngest to daycare en route. Jason has informed his coworkers of his situation beforehand so they are aware that he can't drive their crew on this day of the week. One of his coworkers, Marissa, agrees to sign up as a driver and register her vehicle – which has child seats – and create a recurring pool to drive their crew to work every other Wednesday. When Jason's schedule later changes, it's easy for him to leave his Wednesday crew and add this day back to his own recurring pool's schedule.



Use Case 12: Offering drivers an extra body for HOV discounts

Actors: Tom

Tom, a business professional working in San Francisco SoMa, recently relocated to the East Bay and faced the challenge of commuting during peak traffic hours, which caused him distress. To alleviate this, Tom turned to the Pool app. He wanted to use the app to start commuting with a regular pool who he could form a crew with to regularly share a car with to work, so he started by seeking out pools. After Tom sent his first crew invites to members of a pool he'd ridden with twice, one member declined, but the group was still big enough to form a new crew without him. Tom preferred being a passenger rather than a driver during peak hours, and the app made it easy to find free pools posted by drivers seeking HOV discounts. Now, Tom no longer dreads his daily commute, where he had to find his luck for parking, as he enjoys a reliable and stress-free mode of transportation, thanks to his Pool crew. As a passenger, Tom benefits from the app's flexibility and convenience, transforming his daily commute into a more pleasant experience.



Main Data Items and Entities

User: browsing capabilities only, doesn't require an account

Account: can be created by user, required for drivers and passengers

Password: tied to one user, stored separately from other user details

Driver: user with an account, registers vehicles and submits trips

Passenger: user with an account, must be ID verified, requests rides in many trips

Profile: associated with a user who has an account, visible to drivers and passengers within a common pool, and after a trip for a limited time

Crew: a common group of people who pool together

Car: registered to one driver, associated with many pools

Pool: created by a driver, can have passengers, can be converted into a crew

Ratings: for drivers and passengers to rate each other

Ride request: how passengers request to be admitted into a pool

Notifications: how users are informed that an action has been taken in regards to a ride request they are associated with

Functional Requirements

1. User

- 1.1. A user shall search for pools.
- 1.2. A user shall create an account
- 1.3. A user shall register as a driver
- 1.4. A user shall register as a passenger
- 1.5. A user shall be able to view their passenger profile
- 1.6. A user shall be able to view their driver profile
- 1.7. A user shall be able to view their passenger ratings received
- 1.8. A user shall be able to view their driver ratings received
- 1.9. A user shall be able to view their passenger feedbacks received
- 1.10. A user shall be able to view their driver feedbacks received
- 1.11. A user shall be able to report any feedbacks
- 1.12. A user shall have an emergency contact
- 1.13. A user shall be able to delete their account
- 1.14. A user shall be able to file a report ticket
- 1.15. A user shall be able to chat with support

2. Profile

- 2.1. A profile shall belong to a passenger
- 2.2. A profile shall belong to a driver
- 2.3. A profile shall contain user details
- 2.4. A profile shall display ride history
- 2.5. A profile shall display the average rating
- 2.6. A profile shall contain payment details
- 2.7. A profile shall display total distance traveled
- 2.8. A profile shall display total environmental impact
- 2.9. A profile shall display total number of crews with membership

3. Driver

- 3.1. A driver shall be FasTrak verified

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- 3.2. A driver shall create pools
 - 3.3. A driver shall have ratings
 - 3.4. A driver shall have cars
 - 3.5. A driver shall have crews
 - 3.6. A driver shall be associated with an account
 - 3.7. A driver shall send ride requests for their pool(s)

4. Passenger

- 4.1. A passenger shall join pools
- 4.2. A passenger shall join crews.
- 4.3. A passenger shall send invites for crews.
- 4.4. A passenger shall be associated with one and only one profile
- 4.5. A passenger shall be associated with one and only one account
- 4.6. A passenger shall have ratings

5. Crew

- 5.1. A crew shall be created by a user
- 5.2. A crew shall have a name
- 5.3. A crew have a description
- 5.4. A crew member shall be able to invite users to their crew
- 5.5. A crew invite shall be accepted
- 5.6. A crew invite shall be declined
- 5.7. A crew creator shall be able to remove users from their crew
- 5.8. A user shall be able to leave a crew

6. Car

- 6.1. A car shall be associated with a driver
- 6.2. A car shall be registered
- 6.3. A car shall have ratings

7. Pool:

- 7.1. A pool shall have a description
- 7.2. A pool shall have a start time.

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- 7.3. A pool shall have an end time.
 - 7.4. A pool shall have an occurrence rate.
 - 7.5. A pool shall have passengers.
 - 7.6. A pool shall have ride requests.
 - 7.7. A pool shall have a car
 - 7.8. A pool shall have an start location
 - 7.9. A pool shall have an end location
 - 7.10. A pool shall be viewable by its passengers or driver
 - 7.11. A pool shall have a total distance in miles

8. Ratings

- 8.1. A rating shall have a numerical value of 1-5
- 8.2. A rating for a driver shall be provided by a passenger belonging to a common pool
- 8.3. A rating for a passenger shall be provided by a driver belonging to a common pool
- 8.4. A rating for a car shall be provided by a passenger belonging to a common pool

9. Ride request

- 9.1. A ride request shall be made by or for passengers
- 9.2. A ride request shall be made for a Crew
- 9.3. A ride request shall be made for a Pool
- 9.4. A ride request shall have seats
- 9.5. A ride request shall contain the Profile associated with the requesting Passenger(s)
- 9.6. A ride request shall contain the name associated with the requesting Crew
- 9.7. A ride request shall contain the description associated with the requesting Crew
- 9.8. A ride request shall have zero or one pickup location(s)
- 9.9. A ride request shall have zero or one dropoff location(s)
- 9.10. A ride request shall be accepted

9.11. A ride request shall be declined

10. Notifications

10.1. Notifications may be triggered by many actions.

10.2. Notifications may be toggled on or off per account.

Non Functional Requirements

1. Scalability

- 1.1. Pool shall use scalable storage in Google Cloud Platform.
- 1.2. Pool shall use load balancing on GCP as demand increases.
- 1.3. Pool team shall monitor CPU usage and traffic on GCP and allocate resources as necessary.

2. Reliability

- 2.1. Pool shall be available to users 24/7 with minimal downtime.
- 2.2. Pool shall use user input validation to ensure the integrity of data stored and retrieved.
- 2.3. Pool shall perform regular data backups in GCP to ensure no data loss.

3. Regulatory

- 3.1. Pool shall be in compliance with cookie and tracking regulations.
- 3.2. Pool shall comply with Web Content Accessibility Guidelines (WCAG) to ensure accessibility to individuals with disabilities.

4. Maintainability

- 4.1. Pool shall implement version control using GitHub to track changes to the codebase.
- 4.2. Pool shall use a GitHub flow branching strategy.
- 4.3. Pool shall use Apache Maven version 3.9.4 for backend dependency management.
- 4.4. Pool shall use the latest npm version 7.0 (Node package Manager) for the react.js front end.

5. Serviceability

- 5.1. Application backend is capable of switching between different data sources when it is required to call a backup data source
- 5.2. Application has an intentional splash page for unexpected downtime.
- 5.3. Code deployments and maintenance will not require downtime.

6. Utility

- 6.1. Web Application will have search functionality to assist users.
- 6.2. The system will have a user-friendly interface for new and existing users.

7. Manageability

- 7.1. Alerting mechanisms should allow administrators to easily & quickly understand problems during critical events
- 7.2. Administrators will have control of Pool's system through dev portals of Google Cloud and MySQL Workbench v 8.0.34

8. Data Integrity

- 8.1. Passwords shall be encrypted.
- 8.2. Encryption and decryption shall be tested for accuracy.

9. Capacity

- 9.1. Pool shall specify amount of data the application can handle
- 9.2. Pool shall specify maximum number of concurrent user sessions to support seamless user experience when in high traffic periods.

10. Availability

- 10.1. Application shall have a high level of system uptime
- 10.2. Application shall be available through various platforms and devices

11. Usability

- 11.1. Users shall be able to easily navigate through Pool
- 11.2. Pool shall give error messages that are clear and helpful when wanting to resolve issue

12. Interoperability

- 12.1. Pool shall be able to integrate with map services to provide directions
- 12.2. Pool shall be compatible for different range of vehicles

13. Privacy

- 13.1. Passwords shall be stored as hashes, ie. SHA256 hashing function.
- 13.2. Pool shall have a response plan in the event of a data breach.
- 13.3. User accounts shall require authentication for access.
- 13.4. PII shall be handled with an added layer of care and protection.
- 13.5. Requesting systems must have the required credentials in order to access application data.

14. Coding Standards

- 14.1. Testing coverage tooling such as SonarQube will be implemented to expose areas of the codebase requiring test coverage.
- 14.2. Code shall be peer reviewed prior to being merged into the master branch.

15. Networks

- 15.1. Pool shall be performant on low bandwidth networks.
- 15.2. Pool shall leverage caching to increase performance during periods of reduced network availability.

16. Databases

- 16.1. Pool shall use database optimization techniques to increase performance.
- 16.2. User actions and associated data shall be preserved at the database level.

17. Performance

- 17.1. Application will have an average response time of 2 seconds or less.
- 17.2. Application utilizes efficient data storage techniques to reduce load time.
- 17.3. Pool shall minimize device CPU usage.
- 17.4. Pool shall minimize device memory usage.

18. Navigation & Wayfinding

- 18.1. All open fields shall have sufficient validations.
- 18.2. All open validations shall have helpful error handling that help the user course correct.
- 18.3. Open fields shall auto suggest and when possible, pre-fill data to reduce the cognitive burden required to complete an action.

19. Security

- 19.1. Data shall be backed up regularly.
- 19.2. Data shall be sent over https protocol.

20. Portability

- 20.1. Application shall have cross platform compatibility across all actively supported iOS, MacOS, Windows OS, Linux OS, and Android OS devices.
- 20.2. Application shall function on the latest version of most common web browsers, i.e. Safari, Chrome, Firefox, DuckDuckGo

21. Cost & Budgeting

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- 21.1. Application operating entity shall maintain sufficient financial resources capable of maintaining and scaling core services including the database, servers, third party applications and software, etc.
 - 21.2. Google Cloud should not have to incur any charges based on memory usage

22. Storage

- 22.1. Tables should not exceed 400 bytes
- 22.2. Values in tables should not exceed 50 bytes

23. Accessibility

- 23.1. Application frontend can accommodate users who may require a larger font size.
- 23.2. Application frontend can be easily translated to any language.
- 23.3. Application frontend can be easily navigated by users without sight.
- 23.4. Application frontend is optimized for readability.
- 23.5. Application signup should take no more than 10 clicks

24. Environmental Impact

- 24.1. The application shall incentivize making full use of car's capacity to optimize environmental impacts
- 24.2. The application shall have a feature that will remind drivers to turn off their engines if they're waiting for long periods of time, like waiting for carpool participants
- 24.3. The application shall give priority or recognition to drivers with hybrid or electric vehicles to promote environmental sustainability
- 24.4. The application shall provide periodic emission saving reports to users to keep them motivated and informed

Competitive Analysis

Table 1

Features	Uber https://www.uber.com/	Lyft https://www.lyft.com/	Merge https://merge.511.org/#/	SF Casual Carpool https://sfcasualcarpool.com/	Public Transit https://www.bart.gov/	Taxis/Flywheel https://www.flywheel.com/
UI/UX	Intuitive, each category has concisely what one needs.	User friendly , intuitive UI/Ux	Simple, Compact, not overly flashy, easy to navigate	UI design is simplistic and easy to navigate	Varies by service and transit agency, not consistent	User friendly, easy to navigate and accessible to many tabs
Accessibility	Covers all of the major cities spanning multiple countries as well areas with smaller populations.	Robust coverage in metropolitan areas. Sparser coverage farther from large cities. Mobile version.	Nationwide, dependent on user population for rider options	There are no accessibility features, things like dark mode is absent on the site, and there are no instructions for non abled people, and the drop off point(s) are very limited.	Accessibility varies for web experiences. In person accessibility varies greatly by vehicle in use (light rail vs bus when it comes to Muni), and whether or not elevators are in service for BART.	Covers four different cities
Community	Based on one's location, uber drivers and riders are paired	Riders are paired with drivers based on their	Small community, but enough carpooling options. Community	The stops across the bay are condensed , so drivers and passenger	BART has had some recent efforts to build community on	Not many carpooling options and the rider asks for a pickup. If one needs to learn more

	together.	vicinity to one another.	y based on how the demand for carpooling in a given area	s are most likely going to be going the same way, so familiar drivers/passengers is a possibility. However, ride etiquette is random and based on the people you carpool with.	board, none for other public transit agencies .	about the company they have to reach out.
Privacy	An in depth policy that labels what the drivers can and cannot see from the rider and vice versa, including but not limited to ratings, phone numbers, profile picture, last name etc.	Robust data privacy. Issues with drivers posting dash cams without rider permission have occurred .	User profile shows only what user wants to publicly show, no profile picture, cookies used to share with third parties, location data tracking the moment app is downloaded	SF Casual Carpool doesn't really ask for your phone number or details, so what you decide to share is up to you when meeting drivers or other passengers.	Standard cookie policies on most sites, none in IRL experiences.	Do not gather info of visitors under 13 of age. Collects personal that is listed and it is all accessed once the user gives consent. Only name, phone # and email can be inputted. No profile pic or pronouns.
Pricing	Pricing is mainly based on	Pricing varies because of the	Pricing varies depende	Pricing is dependent on the driver, the	Due to a lack of connectivity	Pricing is based on the base fare,

	<p>the base rate, the operating fee, and where one is in a busy time or area. There is a pricing estimate on their website. For major cities and long commutes, expect higher pricings.</p>	<p>surge pricing model, but is generally expensive for daily commuting.</p>	<p>nt on location A to B and driver. From first glance, no money required except for tip at the end</p>	<p>driver is responsible for communicating with the passengers if they would like a small contribution to cover expenses (usually \$1).</p>	<p>between services, expensive.</p>	<p>distance, time, additional charges, tips. No pricing estimate is located in their data</p>
Sustainability	<p>In 2020, Uber had announced a global commitment to becoming a zero-emission mobility platform. Their goal by 2025 is that a large percentage of drivers transition to EVs. (Electric Vehicles.)</p>	<p>Lyft pool service has been suspended. Uses a one driver one request ride request model contributing to added traffic congestion and greater environmental impact.</p>	<p>As of 2022, Merge has been announced as an official carpool collaborator for the Bay Area, extremely community driven as passengers are only expected to tip at the end</p>	<p>The casual carpool system comprises and relies on common sense, as passengers and drivers are expected to act responsibly. And the entire system is community driven, so it's cost effective and adaptive, but a challenge would definitely</p>	<p>BART is electric, so low environmental impact. BART also utilizes sheep and goat herds for natural land maintenance. Muni is a mixed gas/electric fleet (50% electric).</p>	<p>Rideshare hasn't announced much for the sustainability. Although, in 2022 Flywheel had partnered up with Uber.</p>

				be monetization and funding.		
Personalization	Very Barebones personalization, one can add their name, pronouns, profile picture, and their home and work addresses.	Account links to social media and remembers most frequently traveled destinations.	Only can post short description and commute preferences	No personalization since there's no need to nor ability to put any personal information on the website.	None	Can favor their favorite location, set preferred vehicle type, only schedule rides to airport
Trust & Safety	Uber has highlighted a lot of safety measures. They have a multi-step background process for uber drivers. As well as policies such as no front seat use for riders, 911 assistance built into the app, auto insurance, and ways to report any issues	Have only an initial background check. Many incidents have made the news questioning safety standards.	Trust solely based on driver and passenger relationship. No authorization required. Driver may ask for authorization after messaging about commute	Random carpool forming, no system to really allow riders or drivers to know who they're meeting.	BART launched a "citizen oversight board" to increase accountability of BART police	Taxi drivers require a higher level of licensing and permits than rideshare drivers.

	on their app.					
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Table 2

Features	Uber	Lyft	Merge	SF Casual Carpool	Public Transit	Taxis	Pool
Finding a ride	++	++	++	+	+	-	+
Ride w/your "Crew"	-	-	-	-	-	-	++
Ride ratings	++	++	+	-	-	-	++
profiles	+	-	+	-	-	-	++
carpooling	-	-	+	++	+	+	++
Reducing carbon emissions	+	-	+	++	++	+	++

Legend: + = has this feature, ++ = does this really well, - = doesn't have this feature

Pool's laser focus on carpooling, with an emphasis on people and planet, sets it apart from its competition in the ridesharing market. Competitors focus on putting profit over people, and this shows in the general lack of customization in apps like Uber and Lyft, a general disregard for the environment (demonstrated by the discontinuation of both apps' pooling feature), and lack of regard for passengers who may get stuck in traffic due to not all drivers having Fastrak. Pool uniquely allows passengers to ride with their own "Crew", a feature that enhances community and safety by allowing passengers and drivers to ride with familiar faces. Crews offer a safer, consistent, and predictable riding experience, which is often absent from shared transit experiences provided by SF Casual Carpool, public transit, and taxis. Pool makes rides cost-effective and environmentally friendly by requiring drivers to provide an active Fastrak ID so that all pools are HOV and fast lane eligible by default. Pool takes into account user preferences, community-building, and environmental considerations and puts them all together to offer a diverse and user-driven ride sharing platform. This is all made possible through partnerships with city and county governments, as well as other public and private entities interested in offering ride sharing services to its constituencies, residents, and employees. Funded through these partnerships as well as governmental

grants, Pool makes ride sharing cost effective for everyone involved. This model allows Pool to put people over profit and focus on valuable user improvements without needing to focus on expanding its bottom line.

High-level System Architecture & Technologies Used

Server Host: Google Cloud

Operating System: Windows and Mac

Database: MySQL v 8.0.34

Web Server: Tomcat v 8.5 (via Spring Boot)

Server-Side Language: Java

Additional Technologies:

Web Framework: Spring Boot v 3.1.3 and React.js v 18.2

IDE: Visual Studio Code 1.81 and IntelliJ v 2023.2.1

SSL Cert: Google-managed SSL

Checklist

1. **Done** ☒ Team found a time slot to meet outside of the class.
2. **Done** ☒ Github Master chosen.
3. **Done** ☒ Team decided and agreed together on using the listed SW tools and deployment server.
4. **Done** ☒ Team ready and able to use the chosen back and front end frameworks and those who need to learn are working on learning and practicing.
5. **Done** ☒ Team lead ensured that all team members read the final M1 and agree/understand it before submission.
6. **Done** ☒ GitHub is organized as discussed in class (e.g. master branch, development branch, folder for milestone documents etc.)

List of Team Contributions

Contribution Scores

- Isiah: 10
- Jonathan: 10
- Kendrick: 8
- Kristian: 10
- Phillip: 10

Team Contributions: Checkpoint 1

Executive Summary

Required roles: full team, collaborative work on a Zoom

- ☒ Isiah: (V1) verbally contributed
- ☒ Jonathan: (V1) verbally contributed, (V2) collaboratively worked through revisions (adding team motivation + info about team) to executive summary
- ☒ Kendrick: (V1) verbally contributed, (V2) collaboratively worked through revisions (adding team motivation + info about team) to executive summary
- ☒ Kristian: (V1) verbally contributed, (V2) collaboratively worked through revisions (adding team motivation + info about team) to executive summary
- ☒ Phillip: (V1) verbally contributed
- ☒ Zoe: (V1) typed and screenshared while team verbally contributed, (V2) facilitated collaborative revision session

Main Use Cases

Required roles: full team, each member writes one passenger use case and one driver use case and creates corresponding visual diagrams (asynchronously)

- ☒ Isiah: (V1) Use cases 4 & 10
- ☒ Jonathan: (V1) Use cases 1 & 11, (V2) edited Use case 1
- ☒ Kendrick: (V1) Use cases 5 & 12, (V2) edited Use cases 2 & 5
- ☒ Kristian: (V1) Use cases 3 & 7, (V2) edited Use cases 3 & 7
- ☒ Phillip: (V1) Use cases 6 & 8
- ☒ Zoe: (V1) Use cases 2 & 9

Main Data Items & Entities

Required roles: full team, collaborative work on two Zooms (two sessions split between team members)

- ☒ Isiah: (V1) wrote two data items and their entities
- ☒ Jonathan: (V1) wrote two data items and their entities
- ☒ Kendrick: (V1) wrote two data items and their entities
- ☒ Kristian: (V1) wrote two data items and their entities
- ☒ Phillip: (V1) wrote two data items and their entities
- ☒ Zoe: (V1) facilitated co-working session during which we all worked on this section

Functional Requirements

Required roles: full team, collaborative work on two Zooms (two sessions split between team members)

- ☒ Isiah: (V1) requirements for Profile and Crew
- ☒ Jonathan: (V1) requirements for Ratings
- ☒ Kendrick: (V1) requirements for Ride Request
- ☒ Kristian: (V1) requirements for Contact Information (now deprecated) and Passenger
- ☒ Phillip: (V1) requirements for User and Car
- ☒ Zoe: (V1) requirements for Driver and Pool

Nonfunctional Requirements

Required roles: full team, collaborative work on Zoom plus asynchronous contributions (five additional nonfunctional requirements each)

- ☒ Isiah: (V1) contributed collaboratively on Zoom, plus added five nonfunctional requirements across several categories asynchronously
- ☒ Jonathan: (V1) contributed collaboratively on Zoom, plus added five nonfunctional requirements across several categories asynchronously, (V2) wrote new functional requirements for serviceability, utility, manageability, and data integrity categories
- ☒ Kendrick: (V1) contributed collaboratively on Zoom, plus added five nonfunctional requirements across several categories asynchronously, (V2) wrote

new nonfunctional requirements for capacity, availability, usability and interoperability categories

- ☒ Kristian: (V1) contributed collaboratively on Zoom, plus added five nonfunctional requirements across several categories asynchronously, (V2) wrote new functional requirements for scalability, reliability, regulatory, and maintainability categories
- ☒ Phillip: : (V1) contributed collaboratively on Zoom, plus added five nonfunctional requirements across several categories asynchronously
- ☒ Zoe: (V1) facilitated collaborative work session on Zoom, assigned our asynchronous work, reviewed work, wrote new nonfunctional requirements for privacy, coding standards, networks, and database categories

Competitive Analysis

Required roles: full team, collaborative work on Zoom plus asynchronous contributions (team worked together on column 1 in both tables and ranked our product together, each team member was also assigned a competitor to rank against column 1 in each table asynchronously)

- ☒ Isiah: (V1) “Uber” row in Table 1 and Table 2
- ☒ Jonathan: (V1) “Merge” row in Table 1 and Table 2, (V2) added URLs to Table headers (Merge and SF Casual Carpool) and collaborative work on summary
- ☒ Kendrick: (V1) “Taxis” row in Table 1 and Table 2, (V2) added URLs to Table headers (public transit and taxis) and collaborative work on summary
- ☒ Kristian: (V1) “Lyft” row in Table 1 and Table 2, (V2) added URLs to Table headers (Uber and Lyft) and collaborative work on summary
- ☒ Phillip: (V1) “SF Casual Carpool” row in Table 1 and Table 2
- ☒ Zoe: (V1) “Public Transit” row in Table 1 and Table 2, (V2) facilitated collaborative revision session

High-level System Architecture & Tech Used

Required roles: full team, collaborative work on Zoom

- ☒ Isiah: participated in full-team discussion and working session where decisions were made for software stack, architecture, etc
- ☒ Jonathan: participated in full-team discussion and working session where decisions were made for software stack, architecture, etc

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- ☒ Kendrick: participated in full-team discussion and working session where decisions were made for software stack, architecture, etc
 - ☒ Kristian: participated in full-team discussion and working session where decisions were made for software stack, architecture, etc
 - ☒ Phillip: participated in full-team discussion and working session where decisions were made for software stack, architecture, etc
 - ☒ Zoe: facilitated in full-team discussion and working session where decisions were made for software stack, architecture, etc

Team Contributions: Checkpoint 2

Creating the application

Required roles: GitHub Guru, Backend Baron, Team Lead (collaborative work on two Zoom sessions with Backend Baron driving)

- ☒ Isiah: played an “active passenger” role while pairing with Phillip
- ☒ Phillip: played the “driver” role while pairing with Isiah, created the folder and file structure for the app using Spring initializer with all required dependencies (web, MySQL, etc), committed changes
- ☒ Zoe: facilitated coworking session, provided support as needed

Configuring Cloud Instance and Setting Up VM & CloudSQL DB

Required roles: Release Manager and Team Lead (collaborative work on three Zoom sessions with Release Manager driving, and later, Team Lead driving due to device incompatibility issue (ARM Mac).

- ☒ Kristian: set up our instance in Google Cloud Console: created a Cloud SQL db, created a virtual machine instance, configured settings to ensure credits won't run out. Tested the deploy process using a Docker image, paired with Zoe while she completed the deploy process.
- ☒ Zoe: supported Kristian in navigating Google Cloud Console, created a docker image, added to Artifact Registry, added image to vm, test ran live site to ensure it was successful.

Create About Page

Required roles: Frontend Lead (driving), DB Lead, Release Manager, Team Lead

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- ☒ Jonathan: created main About Page and created a team member page template for everyone to use for their own pages.

Create Team Member Pages

Required roles: Full team, everyone creates and contributes to their own page, Frontend Lead troubleshoots as needed and ensures consistency between pages.

- ☒ Isiah: created his team member page using the template Jonathan provided
- ☒ Jonathan: created his team member page using the template Jonathan provided
- ☒ Kendrick: created his team member page using the template Jonathan provided
- ☒ Kristian: created his team member page using the template Jonathan provided
- ☒ Phillip: created his team member page using the template Jonathan provided
- ☒ Zoe: created her team member page using the template Jonathan provided

Gathering and Documenting Credentials

- ☒ Zoe: created credentials .pdf provided by Milestone 1 guiding doc, added a copy of this table plus access instructions to our credentials folder in GitHub.