GEARS (Group Employee Automatic Rideshare System)

Information Analysis & Systems Design

CS-620-A

Team #1

Professor Cohen

Sacred Heart University

5151 Park Avenue

Fairfield, CT 06825

Spring 2022

Created: 1/10/2022

Team
Desiree Brinn-Rodriguez
Keerti Kumar Pasupula
Christopher Sikorski
Jagdeep Singh

Applications Used:

Microsoft Word, Visio, Excel, and Powerpoint

Table of Contents

1.0 Introduction to Group Employee Automatic Rideshare System

1.3 Abstract

Workweek commutes and transportation expenses represent necessary costs to employees in terms of both time and money. Large-scale companies (hospitals, manufacturing facilities, universities, etc.) may have a significant pool of essential employees commuting long distances. A high volume of commuters traveling in a similar direction at the same time contributes to predictable weekday traffic congestion and, in turn, excessive fuel consumption. GEARS (Group Employee Automatic Rideshare System) supports companies in offering practical solutions for daily employee commutes. GEARS groups employees with similar commutes and schedules to develop carpooling opportunities. Additionally, GEARS provides employee participants with daily notification updates on their carpool status. Through their Human Resource Department, companies can create customizable rewards programs for GEARS participants. Beyond reducing commuter costs, GEARS offers an opportunity to create coworker connections, reduce rush hour traffic, cut consumer costs, and lower fuel consumption resulting in a greener commuting process.

2.0 Preliminary Investigation Phase

2.1 Summary of Problems, Opportunities, and Directives

Workers face economic, social, and time challenges in the daily commuting process even when they attempt to utilize carpool alternatives. Commuters regularly face traffic congestion, vehicle wear and tear, and fluctuations in gas prices. Public transport may be out of reach for workers. Popular ride-hailing or taxi applications, like Uber, are geared towards one-time ride use. In these companies, drivers operate as contractors who have their own economic interests outside a commuter's goal of an economical trip to work. Current carpooling systems exist as either word of mouth operations or de-centralized applications that match individuals who are likely strangers rather than coworkers. Hesitancy exists when potential rideshare individuals lack knowledge of the driver or rider's background.

As a result, and exacerbated by the COVID-19 pandemic, workers have increasingly sought remote opportunities. According to the job-search platform, Glassdoor, keyword searches for remote work dramatically increased 460 percent over a two-year period through 2021 (Iacurci, 2021). However, for essential large businesses, such as hospitals, manufacturing facilities, and universities, many jobs require in-person work. Talent pools, especially for urban businesses, could be expanded if people were less hesitant about the hassle and expense of commuting.

Perhaps the most relevant problem involves the increasing costs of gasoline amid the Russian invasion of Ukraine. As part of their "10-Point Plan to Cut Oil Use," the International Energy Agency (IEA) recommends carpooling as one method to ease the "the majority of oil demand" in daily transportation (2022). Additionally, they advocate for governments to consider ways to "incentivize carpooling" (2022). Carpooling represents a

practical solution for individuals to reduce global oil demand. The concept of a rewards-based system provides further economic benefits back to the commuter.

In developing a system to reduce cost, GEARS (Group Employee Automatic Rideshare System) aims to build reliable ridesharing opportunities amongst employees at the same company. These drivers and riders commute to the same location and work similar schedules. The target customers for GEARS are large corporations with high volumes of essential employees, such as hospitals, universities, and manufacturing facilities. Commuters benefit from reduced transportation costs as well as customized company-designated rewards, such as meal vouchers, gas credits, or mileage reimbursement. Companies can leverage GEARS as an employee benefit. The ridesharing experience also creates company benefits, such as stronger worker connections and increased communication in teams. Employers can utilize GEARS to support green initiatives. Ridesharing opportunities translate into less cars on the road, less fossil fuel usage, and lower carbon emissions.

GEARS functions from the Human Resources/Employee Benefits division of a company. GEARS matches employees based on similar schedules and commutes while determining the eligibility of participants through background checks. By working with a company's Human Resource department, riders and drivers will be vetted and monitored for continuing eligibility; this monitoring process reduces rideshare hesitancy and creates accountability among users.

Rideshares work most efficiently using predictable schedules between riders and drivers. Employees (potential rideshare users) create a profile on the GEARS application, which includes their schedule and address. Employees can elect to be a rider, driver, or both depending on availability. GEARS will generate rideshare opportunities for the employee

Published by DigitalCommons@SHU, 2022

and send information to the Human Resource Coordinator for review. The driver/rider application version of GEARS provides real-time text alerts aligned with geolocation for the rideshare commute. As a feature of GEARS, users will also have the cushion of an Emergency Ride Home (ERH) service in the event a commuter needs to leave work early or a commuter needs to work late.

2.2 Statement of Preliminary Scope

2.2.1 Data Description of System

In investigating company-backed ridesharing systems, the types of data include geolocation, numerical, and text data. The following data will be stored and used in the rideshare matching system:

- *Employee/User information*—this includes the employee's name, home address, work schedule, email address, cell phone number, trip counters and eligibility (based on company policies)
- *Company/Employer information*—this includes the street address of the company, background information on employees including criminal records, reward options for GEARS' incentivization program
- *Driver information*—this includes license number, proof of insurance
- *Vehicle information*: vehicle capacity, mileage, license plate number
- *Trip information*—this includes start time, pickup time (for riders), arrival time, incidents

2.2.2 Business Processes

Rideshare matching applications and software are currently developed to connect drivers with riders who may or may not work at the same location. For example, the

Connecticut Department of Transportation operates *CTrides*, which is an initiative to promote alternative methods of transportation beyond single passenger rides (CT Department of Transportation, 2022). In current rideshare applications, connections between the rider and driver are independent from the workplace. Riders and drivers are ultimately strangers who may or may not share a common destination.

Through GEARS, the ride-matching system functions with a company's Human Resource Department. By using the existing process of the pre-employment background screening, GEARS designates driver eligibility. In establishing a driver, the rideshare participant attests to having sufficient motor vehicle insurance coverage. Both items assist in ensuring potential riders of their safety. Human Resource Coordinators can cancel rideshares based on employee eligibility and review system generated trip incident reports.

Potential drivers and riders initiate their future rideshare through the GEARS application and they are given a unique GEARS ID. The system rideshare matching will first scan the employee's schedule. If there are schedule matches in the system, GEARS will perform a distance match of up to a five-mile radius of the user's home for riders or drivers. If the future rideshare participant completes the initial profile and is matched with a rideshare, their eligibility is verified by Human Resources (HR). This screening involves a review of the employee's eligibility at the company (to determine that the employee is not on a suspension, leave, or other adverse situation). If the participant is a driver, HR will review or perform a background check. Human Resource Coordinators can also manage GEARS participants' rewards program.

Daily trips function between drivers and riders via alerts through the GEARS application. Based on the employee's start time, drivers will receive the initial notification to

Published by DigitalCommons@SHU, 2022

start their ride to their coworkers for pickup. Riders receive notifications when their driver is nearby for pickup. Riders also have the option to initiate an Emergency Ride Home (ERH) if a driver must cancel a trip or if the rider needs to leave work early.

2.2.3 System Interfaces: Users, Locations, and Other Systems

Interface with Users

Employees and Human Resource Benefit Coordinators are the main users of GEARS. Employees interested in ridesharing opportunities interact with GEARS in the following functions:

- Request or modify a rideshare

Employees who agree to participate in rideshare are divided into participating riders and drivers who use GEARS to:

- Initiate, modify, or cancel rideshare trips
- Request an emergency ride
- Claim rideshare benefit

Human Resource Benefit Coordinators interact with GEARS through the following functions:

- Perform background checks
- Track employee eligibility for rideshare participation
- Release rideshare-related benefits called rewards

Interface with Locations

GEARS offers ride-matching via an android/IOS application that can be accessed via a mobile device.

Interface with Other Systems

GEARS will interface with either Android or IOS for the rideshare application. The trip functions in GEARS will also send text or email notifications to the drivers and riders. HR Coordinators will be able to access the application and will have a separate dashboard for performing their business activities related to GEARS. Such actions including verifying employee eligibility and releasing rewards based on the trip success report. HR Coordinators will also be alerted of any incident reports related to the rideshare trips, which may include missed or late pickups or accidents.

2.3. Cost Effectiveness (Cost vs. Value)

In the cost value analysis, the following chart displays the total development cost, the projected revenue for the first six years of system implementation, and six years of operating costs. This analysis assumes a five percent increase in operating costs each year. Based on this analysis, the new system will be profitable and the benefits outweigh the costs. In a further payback analysis, the system will reach profitability just prior to the third year of operation. For an in-depth analysis of the following figures, reference the cost-benefit analysis of 5.2.2.

Published by DigitalCommons@SHU, 2022

Cost Value Analysis		
Expected Revenue (Years 1-6)		$660,000.00
Development Cost		
Total Personnel Cost	$65,000.00	
Total Hardware Cost	$16,600.00	
Total Development Cost		($81,600.00)
Expected Operating Costs (Years 1 to 6)		($251,670.77)
Total Profit		$326,729.23

**In-depth analysis is presented in 5.2.2*
**All formulas are derived from 5.2.2*
**Note: Preliminary estimates do not consider the time value of money*

Cost Value Analysis		
Expected Revenue (Years 1-6)		=SUM('Net Present Value'!B10:H10)
Development Cost		
Total Personnel Cost	=SUM('Estimated Costs'!E5:E10)	
Total Hardware Cost	=SUM('Estimated Costs'!E14:E20)	
Total Development Cost		=-'Estimated Costs'!E22
Expected Operating Costs (Years 1 to 6)		=SUM('Payback Analysis '!B5:H5)
Total Profit		=SUM(C2:C7)

**In-depth analysis is presented in 5.2.2*
**All formulas are derived from 5.2.2*
**Note: Preliminary estimates do not consider the time value of money*

2.4. Preliminary Project Plan

2.4.1. Master Schedule for Entire Project

ID	Task Name	Duration	Start	Finish	Resource Names	% Complete
1	Introduction	**2 Days**	1/7/2022	1/9/2022	Desiree	4.55%
2	Cover or Title page	2 Days	1/9/2022	1/11/2022	Desiree/Chris	9.09%
	Preliminary Investigation Phase	**5 Days**				
3	Summary of problems, opportunities, and directives	2 Days	1/16/2022	1/18/2022	Desiree	13.64%
4	Statement of preliminary scope	2 Days	1/16/2022	1/18/2022	Desiree	18.18%
5	Assess project worth in terms of Cost vs. Value	2 Days	1/15/2022	1/17/2022	Jagdeep/Desiree	22.73%
6	Preliminary Project Plan	1 Day	1/17/2022	1/17/2022	Keerti	27.27%
8	**Problem Analysis Phase**	**5 Days**			Team	36.36%
7	Study The problem domain	2 Days	2/9/2022	2/11/2022	Keerti/Chris	31.82%
8	Analyze problems and opportunities	2 Days	2/11/2022	2/13/2022	Desiree	36.36%
9	Establish System Improvement Objectives	1 Day	2/14/2022	2/14/2022	Jagdeep	40.91%
10	Re-evaluate and update project scope	1 Day	2/18/2022	2/18/2022	Team	45.45%
	Requirements Analysis Phase	**7 Days**				
11	Identify Requirements	2 Days	2/22/2022	2/24/2022	Keerti/Jagdeep	50.00%
12	Analyze functional requirements using system modeling approach	3 Days	2/25/2022	2/28/2022	Desiree/Chris	54.55%
13	Master list of all requirements	1 Day	2/29/222	2/29/2022	Keerti	59.09%
14	Re-evaluate and update project scope	1 Day	3/2/2022	3/2/2022	Team	63.64%
	Decision Analysis Phase	**5 Days**				
15	Identify candidate solutions	1 Day	3/3/2022	3/3/2022	Desiree	68.18%
16	Analyze candidate solutions	2 Days	3/4/2022	3/6/2022	Desiree	72.73%
17	Compare candidate solutions	1 Day	3/7/2022	3/7/2022	Chris	77.27%
18	Recommend a final "best" solution	1 Day	3/8/2022	3/8/2022	Team	81.82%
	Design Phase	**8 Days**				
19	Design the application architecture	1 Day	3/8/2022	3/8/2022	Chris	86.36%
20	Construct detailed models	3 Days	3/9/2022	3/12/2022	Team	90.91%
21	Design the system database	2 Days	3/10/2022	3/12/2022	Desiree	95.45%
22	Design the system interface for each model	2 Days	3/12/2022	3/14/2022	Jagdeep/Keerti	100.00%

Published by DigitalCommons@SHU, 2022

2.4.2 Resource Assignment

Personnel

- 1 System Analyst
- 2 Java/Flutter Programmers
- 1 System Architect
- 1 SQL/Firebase Database Specialist
- 1 Security Analyst
- 1 Network Specialist

Software

- Flutter (free)
- Firebase Cloud-based Database (free)
- Amazon Web Services (AWS)
- Geolocation API (i.e. Google API)
- SQL Server

Hardware

- Laptops
- External Monitors
- Android/IOS mobile devices

3.0 Problem Analysis Phase

3.1 Study the problem domain

To create an improved implementation of the rideshare experience, the system must address the issues of the current system. In this analysis, the Connecticut Department of Transportation's CTrides application is representative of the established system for carpooling. One effective aspect of the current system involves the rewards provided to carpooling drivers and riders. CTrides incorporates an incentivization structure for commuters' "efforts in helping Connecticut become a greener place" (CT Department of Transportation, 2014). Additionally, this analysis involves reviewing popular taxi or ride-hailing applications due to their prevalence. For example, Uber maintains the technology for proximity matching as well as push notifications when the driver is nearing the pickup location (Uber Technologies Inc., 2022). The new system can combine these beneficial components: the rewards concept of CTrides as well as the geolocation accuracy and communicative technologies of Uber.

The problems of the current system involve rider hesitancy, or the reluctance for riders to participate in carpool programs. Riders may have reservations about riding with unknown individuals or they are reluctant to sacrifice additional time during the commute. Problems of the system will be analyzed in 3.2 as part of understanding the current areas for opportunities.

3.1.1 Data collected by the system

According to "How Does Uber Work?" Uber contains a significant database of drivers, which enables riders to obtain a driver easily (2022). Uber collects geolocation information to calculate supply and demand as well as payment information from the

Published by DigitalCommons@SHU, 2022

customer. According to Uber's "FAQs," the advanced geolocation features in Uber allow it to forecast traffic patterns and detect congestion (2022). Uber collects information about its drivers and vehicle data.

CTrides requests user input on their "Find Rides" website to find a rideshare match (2022). There is also a corresponding mobile application. The rideshare match request only focuses on location, not schedule. Users are then shown potential carpools with drivers who live in the same vicinity and share a similar commute. The user must then join CTrides to send an initial communication through the CTrides website or application to determine schedule matching and if the carpool is currently at capacity.

3.1.1.1 Methods

The current system uses both an application and a website to collect data on drivers and riders.

- Drivers develop profiles on the application using their personal information, such as name, contact number, email, home and work addresses.
- Drivers indicate preferences for rides and companions.
- Riders enter trip information which includes start time, pickup time, and destination location.
- Riders who want to book a ride can communicate with the driver a make reservation

3.1.1.2 Storage

Details about riders is stored in an application or app, server, storage devices. Riders' personal records are kept in a physical file, computer hard drive, or server. Dates for pick-ups

are kept in the calendar, computer hard drive, or server. Payment rewards are stored by the owner either by hand or by the third party.

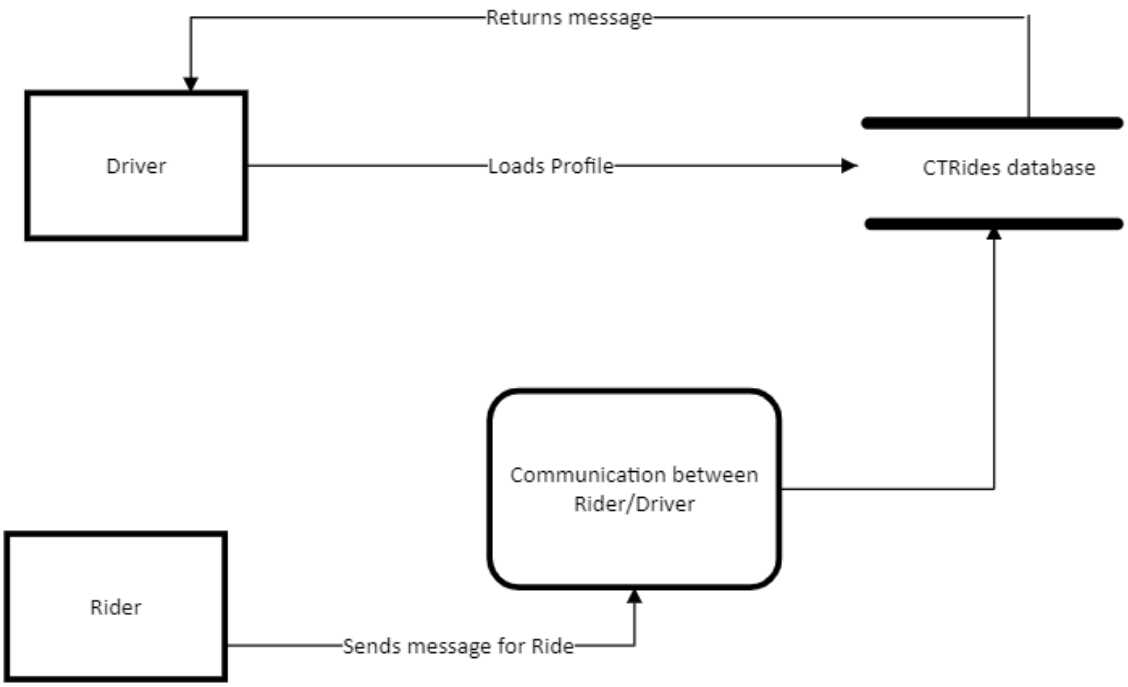
3.1.1.3 Personnel involved

Drivers and riders meet independently and can have multiple riders based on the set location. The CTrides application uses a third-party developer to maintain application and database.

3.1.1.4 Time involved

The timespan for ridesharing matches is based on availability of riders and drivers. The database match between riders and drivers is rider initiated. Riders can be matched instantly with drivers if available. Drivers must wait until riders become available to utilize the rideshare.

3.1.1.5 Sample data model



3.1.2 For each report reproduced by the system

3.1.2.1 List name and format

- Rider List: the Rider List is used by the driver to track rider pick-ups. It is obtained from a physical file or the mobile application that contains the home address, work address, and schedule of the rider.
- Driver/Rider Personal Information: driver/rider personal information is saved on the CTrides database.
- Messages: messages are stored in the mobile application or outside the application/website and in other messaging groups or applications (WhatsApp, messenger).

3.1.2.2 List inputs and outputs

Inputs are all the rider's personal details that are saved in files.

Inputs of the current system include:

- Home address (street address, city, state, and zip code) of both Rider and Driver.
- Destination work address (street address, city state, and zip code) of both Rider and Driver.
- Voluntary demographic data of the rider and driver: gender, smoking status, commute preferences, languages.
- Work start time and end time.
- Photographic image of Rider and Driver (if voluntarily offered).
- Driver's type of vehicle.
- Flags on Driver profile (due to incidents reported by riders).

Outputs of the current system include:

- Rider or Driver match
- Location information for Rider pickup.
- Rewards after completed commutes

3.1.2.3 List responsible personnel

Drivers manage trip initiation. Riders confirm rideshare participation. The CT Department of Transportation sponsors the ridesharing application, which operates via a third party application development company.

3.1.3 Processes currently implemented

3.1.3.1 List all processes

The following are the processes that are currently in place:

- *Join and download app or website*: Commuter interested in the ride share will need to sign up and download the app.
- *Ride matching*: Once the commuter signs up, the ride matching service matches the rider with a driver or a driver with a rider.
- *Select or decline rideshare*: Ride share matching service will give ride share options, i.e., bus, car, vanpool or train.
- *Try another time for new drivers*: Ride share matching service will give ride share new options if only looking to carpool
- *Rewards*: Rewards will be point redeemable at restaurants, retail, and gift cards.

3.1.3.2 List all hardware and software used

Hardware

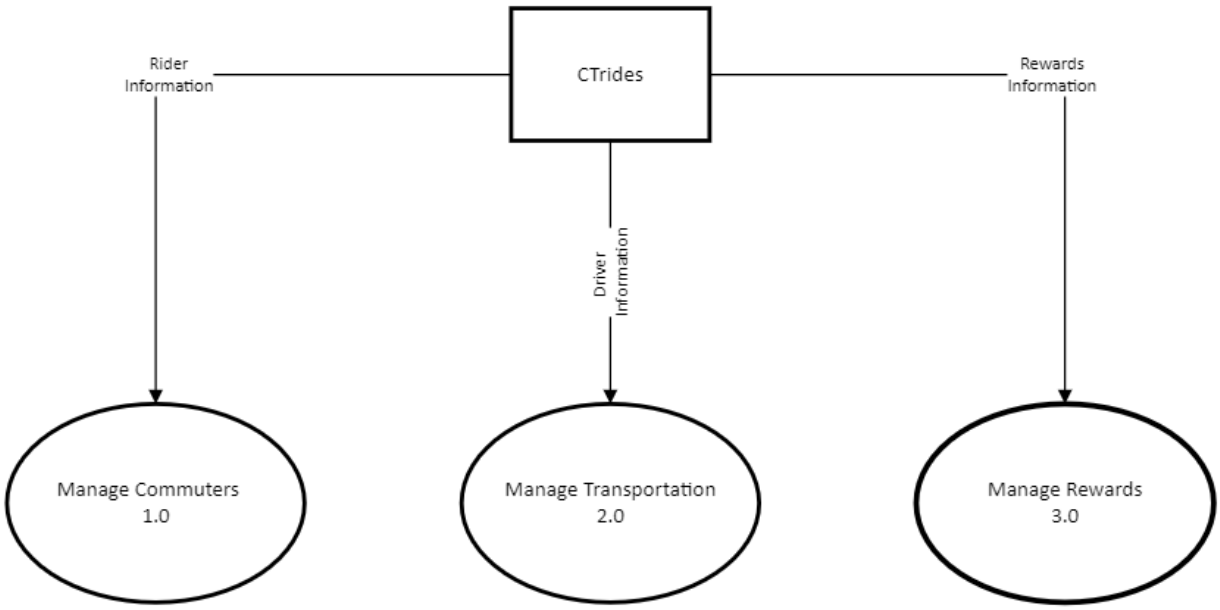
- Physical files
- Computers
- Servers
- Smart phones
- SQL database

Software – Custom off the shelf software

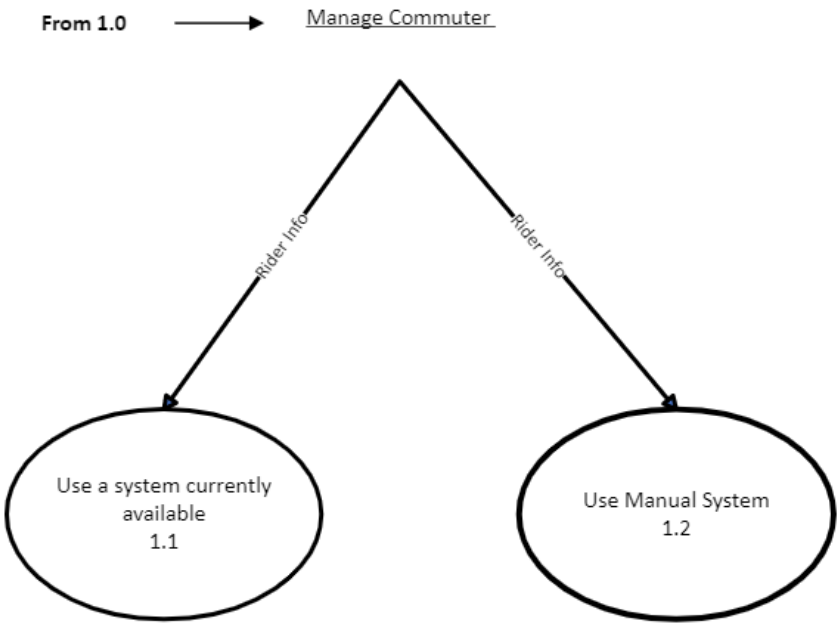
- Ride share app IOS/ANDROID
- Ride share software and database
- Microsoft Outlook

3.1.3.3 Functional decomposition diagram of current system

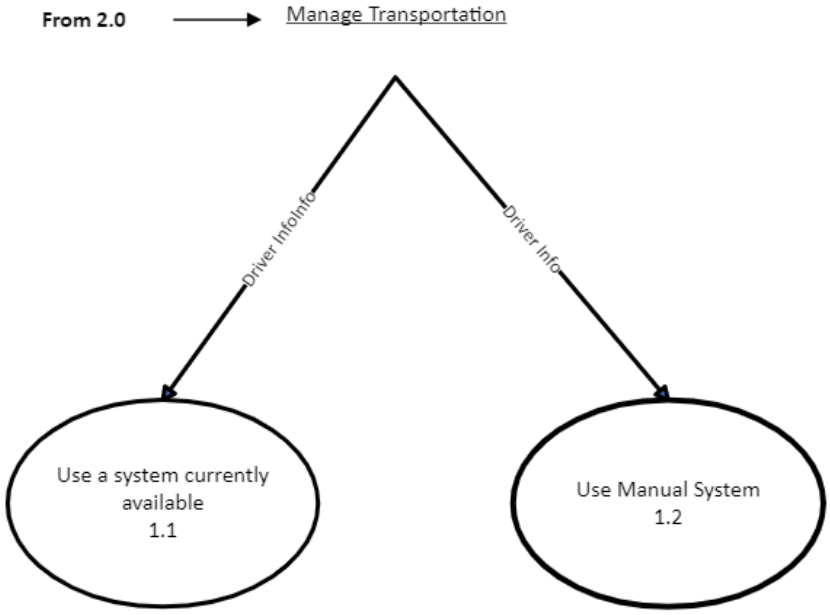
Level-0 Diagram for Current System



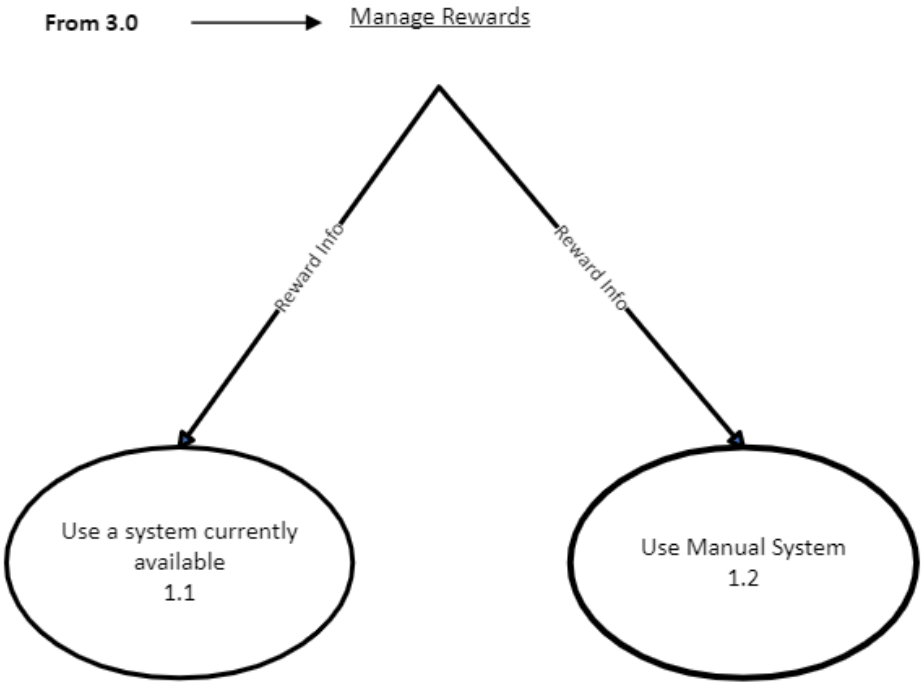
Level-1 Diagram for Current System



Level-2 Diagram for Current System



Level-3 Diagram for Current System



3.1.4 System Interfaces

3.1.4.1 Locations served by the system

The CT Rides system services commuters located within the state of Connecticut.

3.1.4.2 Users served by system

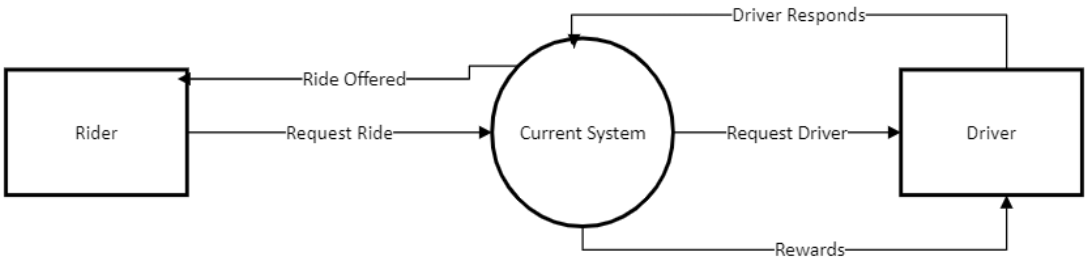
Current systems serve Connecticut commuters and workers.

3.1.4.3 Other systems it interacts with if any

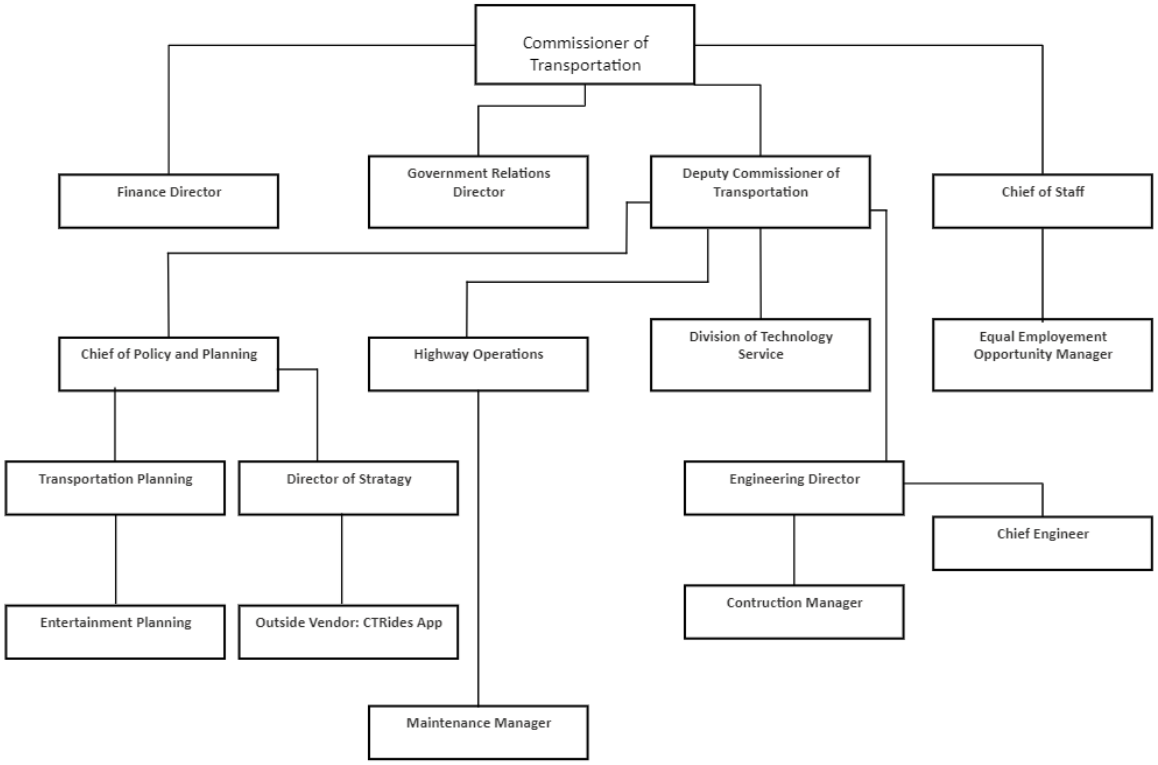
When drivers and riders log successful rideshare commutes, rewards are generated within the application using a QR code. This QR code is specific to an outside business, such as a restaurant or leisure attraction, to give the CTrides application user a benefit specific to that business.

Published by DigitalCommons@SHU, 2022

3.1.4.4 Context diagrams of current system



3.1.5 Current business structure hierarchy chart



3.2 Analyze Problems and Opportunities in Current System

3.2.1 Cause and Effect for Each Problem

In investigating the current system, the chart below illustrates the current system problems/opportunities as well as their relative causes and effects. This analysis is based on the implementation of the CTrides system, which is a state-based program. GEARS would

provide a product that is adaptable to consumers and would provide rideshare-matching services to meet their needs regardless of location. Additionally, GEARS would include a rideshare companion application for drivers and riders. Although CTrides has an application, it does not provide the geolocation companion features that have been successful components of other commuting-based applications, such as Uber. Therefore, GEARS would offer the mobile application as a companion for the in-app geolocation experience.

CAUSE-AND-EFFECT ANALYSIS		
Problem or Opportunity	**Causes**	**Effects**
1. There are low participation rates in the rideshare program.	1.1. The current system matches riders to drivers who may not work at the same company; the current system matches individuals who may be unknown to each other.	1.1. The effect is schedule matching can be an issue if drivers or riders are working at companies that do not have fixed shifts. The drivers and riders may lack an initial common ground for them to connect.
	1.2. Riders have anxieties about the safety and background of the driver. The current system does not offer background checks, a driver safety rating, or confirm automobile insurance of the driver.	1.2. The effect is rider hesitancy for joining rideshare programs due to riders not knowing the driver's record/background.
	1.3. Drivers have concerns about the rideshare being worthwhile for them. There is no standard compensation for time, gas, insurance, mileage, or wear and tear on vehicle.	1.3. The effect is driver hesitancy for supplying equipment (vehicle) and time. A rideshare system with a short supply of drivers will have less opportunities for riders.

	1.4. The current system lacks accountability for drivers and riders.	1.4. In this case, the effect is the pool of available drivers and riders may be unreliable. Drivers may lack accountability for being on time and riders lack accountability for compensation. Additionally, the lack of reliability for timeliness results in drivers and riders who are late or miss their destinations.
2. Rideshare drivers are not being reimbursed consistently.	2.1. Drivers set their own rates for service and must enter into their own agreements with riders; the current system does not have a reimbursement process.	2.1. The effect is these rideshare agreements may not be consistent between drivers and riders. A further effect may be unchecked discrimination in the rideshare agreements. This inconsistency lacks fair compensation for pickup obligations.
	2.2. Drivers become responsible if a rider does not pay. Drivers must create their own system for tracking payments and overseeing reimbursement process.	2.2. The effect of this issue is that drivers have another obligation to the process that will consume additional time.
3. Pickup process is unreliable.	3.1. Drivers and riders establish pickup times in advance. This system does not account for the variances of time that occur with daily activities. Drivers and riders must communicate tardiness for a rideshare pickup independent of a central communication system.	3.1. Riders may be left without a pickup, which will cause them to seek alternative means of transportation and may cause them to be late to their destination.

	3.2. Schedule changes can disrupt the established routine of the rideshare. The current process also does not account for unpredictable schedule changes. Driver and/or rider vacations, extended leaves from work, sick days, etc. will disrupt the rideshare.	3.2. When schedule changes occur unexpectedly, they are inconvenient for rideshare participants who must seek alternative means of transportation.
	3.3. The current system does not provide an example of the best path for drivers.	3.3. Drivers must develop their own strategy for pickup schedules and routes. These may not be the optimal paths for mileage or gas consumption.
4. Communication is not adequately supported.	4.1. Initial rideshare communication is time-sensitive, yet the current system does not support direct communication.	4.1. In establishing a rideshare, a rider must message a driver from the system website as the driver's direct email is hidden for privacy concerns. The driver must then sign into the website to view the message. This time lag results in the loss in possible rideshare agreements between otherwise optimal parties.
	4.2. The continued communication process is not established past initial rideshare match.	4.2. The effect of not having a communication process is that drivers and riders must establish their own preferred communication: text message, group texts, phone calls, emails, etc. This variety of communication methods leads to confusion and missed communication concerning rideshare updates.

	4.3. The current system lacks a centralized alert process for tracking rideshare progress. The current process relies on participants to be in control of their own updates despite possible hectic natures of daily life. Alerts must be sent by the participant and are not automatic.	4.3. Riders may be waiting for a driver who did not communicate that they are running late or vice versa. Drivers and riders may fail in their goal to reach their destinations on time.

3.2.2 Update Problem from Preliminary Phase

In addition to the problems listed in the preliminary phase, the current system problems involve a lack of communication, the absence of a compensation structure, and the anxieties of riders and drivers around the complexities of carpooling. Riders are fearful of the reliability of drivers. Drivers are hesitant to provide their time and money upfront without the security of guaranteed reimbursement of the rider's share.

3.3 Establish System Improvement Objectives

3.3.1 State New System Objectives

Based on the problems and opportunities explored in 3.2, the following chart represents new system objectives to improve the current system implementation.

Problem or Opportunity	System Objective
1. There are low participation rates in the rideshare program.	1. The new system will be designed to function as a company benefit and will operate within the Human Resources department at a company. Using the data housed in this department, the new system will match employees who work at the same company location and who work similar or the same schedule. 2. The new system offers a background check, confirms automobile insurance coverage of the driver and a driver

	safety rating. Also, the app has the top-rated driver on top of the list. 3. Since the driver and the rider are working at the same company, there will more opportunities for employees to develop trusting connections as drivers or riders of the rideshare system. To curb rider hesitancy, the new system will provide an alternative option for riders who need to leave work early or who are unable to use the rideshare at any given point. This will be considered an Emergency Ride Home (ERH) service that sources either an open rideshare match or an outside backup service, such as Uber or Lyft. This will be reimbursable (pending Human Resource review) from the company. 4. The new system will have company-tailored rewards for both driver and rider participation.
2. Rideshare drivers are not being reimbursed consistently.	1. Drivers/riders will both be rewarded for ridesharing. Rewards can be selected from a list of gift coupons which can be used at gas stations or retail stores. Additionally, the company can select in-house rewards, such as meal vouchers at the company cafeteria. Rewards will be administered by the company's Human Resource Department (Benefit Coordinator).
3. Pickup process is unreliable.	1. Drivers and riders get a real time notification through SMS, push messages, an alert notification to the driver and riders a day before the scheduled ride and in the morning prior to pick-up. The notification system will alert the driver to initiate the trip, alert rider that the driver is close by, and alert the riders ready to pick up (before the shift and at the end of the shift). 2. In case of any schedule, there will be a backup for the riders to opt an alternative ride or pick up. 3. The new system always picks up the fastest possible route based on maps navigation. 4. Since this new system will be implemented by the company's Human Resource department at both rider and driver's place of employment, there will be greater accountability for participation. HR will receive reports on successful trips as well as any incident reports or

Published by DigitalCommons@SHU, 2022

	reports of missed pickups (trip failures). This will encourage driver responsibility and support rider participation.
4. Communication is not adequately supported.	1. The new system application will support SMS and push notifications regarding trip status updates. Drivers will be alerted when to begin a trip, riders will know when the trip has been initiated as well as when the driver is close by/within range for pick up. Notifications will also be sent/pushed at the end of a shift for the ride home. 2. Riders can call the drivers through the app calling system or through cellular. Riders and Drivers can also share messages on the app.

3.3.2 List new system constraints

3.3.2.1 Schedule

The GEARS framework will be investigated and planned by 3/22/2022. This allows around 90 days to guarantee the new framework meets all prerequisites according to a plan viewpoint. After the plan, the framework will be created in an additional two months. The framework will offer a set program in view of fourteen-day, one month, 90 days, and a half year stretches. This is imperative assuming new projects should be added that require different development spans. There will be sufficient time for framework improvement and upgrades.

3.3.2.2 Cost

Cost Value Analysis		
Expected Revenue (Years 1-6)		$660,000.00
Development Cost		
Total Personnel Cost	$65,000.00	
Total Hardware Cost	$16,600.00	
Total Development Cost		($81,600.00)
Expected Operating Costs (Years 1 to 6)		($251,670.77)
Total Profit		$326,729.23
**In-depth analysis is presented in 5.2.2* **All formulas are derived from 5.2.2* **Note: Preliminary estimates do not consider the time value of money*		

Cost Value Analysis		
Expected Revenue (Years 1-6)		=SUM('Net Present Value'!B10:H10)
Development Cost		
Total Personnel Cost	=SUM('Estimated Costs'!E5:E10)	
Total Hardware Cost	=SUM('Estimated Costs'!E14:E20)	
Total Development Cost		=-'Estimated Costs'!E22
Expected Operating Costs (Years 1 to 6)		=SUM('Payback Analysis '!B5:H5)
Total Profit		=SUM(C2:C7)
**In-depth analysis is presented in 5.2.2* **All formulas are derived from 5.2.2* **Note: Preliminary estimates do not consider the time value of money*		

3.3.2.3 Technology

The new system will implement a geolocation-enabled, cloud-based mobile application on Android and IOS. Some companies may use an option to have drivers use a

Published by DigitalCommons@SHU, 2022

company-owned vehicle specifically for GEARS ridesharing. However, this would ultimately be the company's initiative and it is not a technological requirement of the GEARS system.

3.3.2.4 Policy

The company's Human Resource Department will have access to tracking all the rides, monitoring them; they are responsible for ensuring there is proper background check or review of incident reports prior to processing reimbursements. Companies can incorporate their own policies for driver/rider participation and their own rewards structure.

3.4 Re-evaluate and update project scope

Project scope does not need be updated.

4.0 Requirements Analysis Phase

4.1 Identify Requirements for New System

4.1.1 Functional Requirements: Inputs, Outputs, Processes, Storage and Control

Functional Requirements

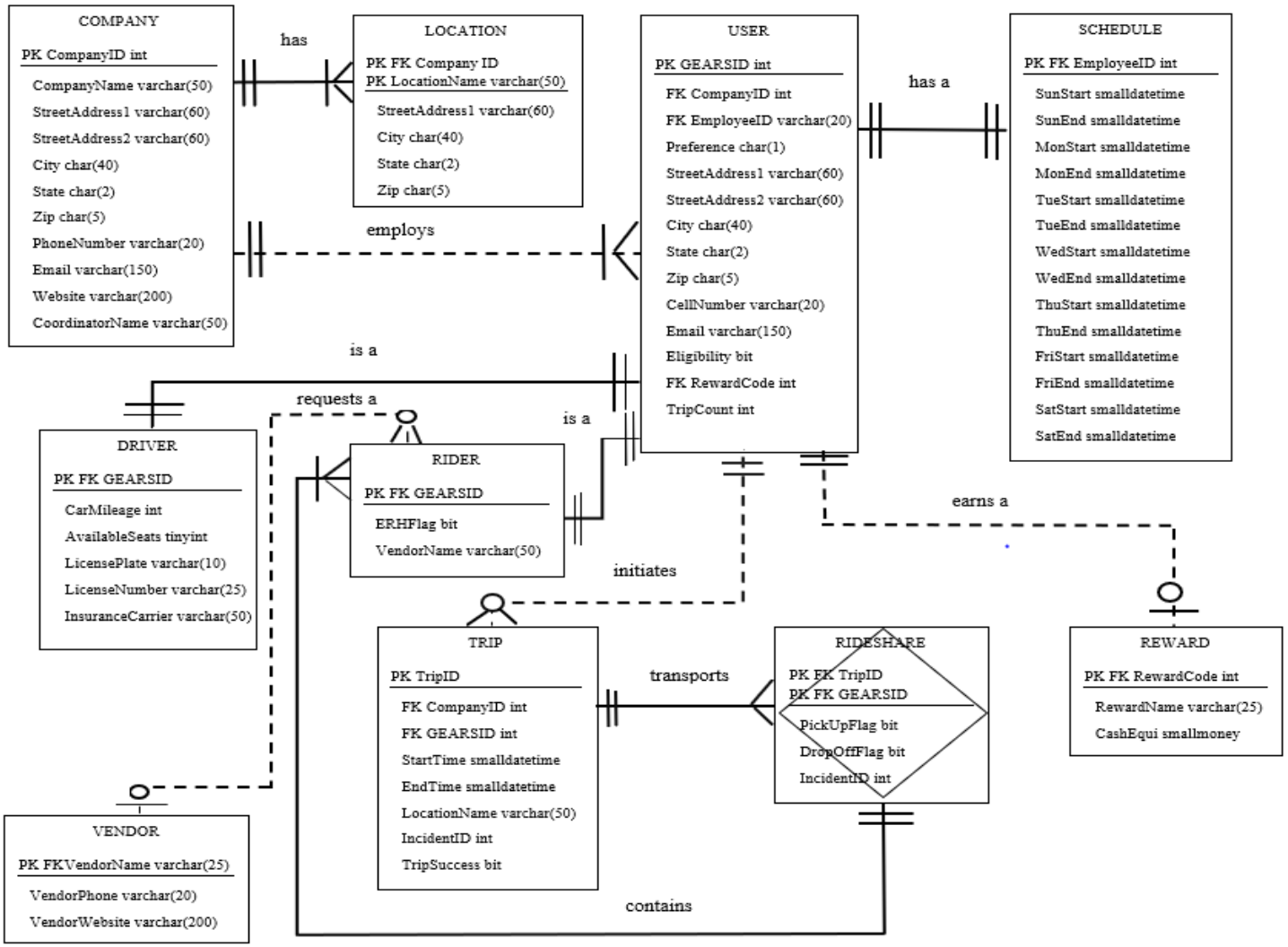
Requirement	Inputs	Outputs	Processes	Storage	Control
User-Friendly Program Based Application.	The system shall accept provider login credentials.	The system shall display reports in graphical format.	The system shall create new driver/rider profile.	The system shall store profile to driver/rider database.	The system shall grant access to provider through validated login credentials.
Uniform input fields	The system shall allow new driver/rider entries.	The system shall generate the total number rides scheduled for each day	The system shall create new record/ride for the driver/rider	The system shall store driver/rider data	System allows access to the employee data from the HR all employee database
SMS push notifications	System sends SMS push notifications to the driver and rider.	SMS push notifications sent to the driver, rider before ride start.	System looks for the contacts in the database.	All contacts are saved in the database system	System helps the users communicate smoothly.
Request emergency ride home	System allows the user to opt for an emergency ride home	System shall allow user to select emergency ride	System shall give options to select ride in emergency	System has an emergency ride service	System helps the user have a safe ride.
GPS tracking	System allows live tracking for the rides	System shall allow the user to live track their rides.	System allows the user to use the live tracking GPS system	System shall allow access to GPS live tracking system	System helps the user to track their ride.
Timely Schedules	System shall allow the user to schedule the rides based on their work schedules	System shall allow access to the schedules	Timely scheduling of the rides based on the users work schedule	System stores the work schedules of the users.	System helps the user follow their schedule

4.1.2 Non-functional Requirements

Requirement	Performance	Ease of use	Cost savings	Timelines and deadlines	Training	Quality Management	Security and Audits
Driver & Rider's feedback	Maintain quality and be consistent.	Feedback button/popup after the ride	Intangible benefit: reducing rider hesitancy	2 months of code and testing	N/A	Biweekly	N/A
Universal QR Codes	QR codes available to redeem the rewards	Camera access required to scan the code	10-50% cost savings in business office operations	2 months of code and testing	Video Tutorial	Biweekly	Need to ensure no duplication or copying of reward codes.
Safely reaching location on time	Drive safety/tracking and push notification sent to driver/rider/HR notification box	Access to the messages/push notifications	10-25% cost savings in business productivity	2 months of code and testing	N/A	Biweekly	Ensure users are opting in to receive SMS messages
Car breakdown (follow up another car to continue the ride)	Emergency ride button/tab available	Access to the other rideshare/cab services	10-25% cost savings in business productivity	2 months of code and testing	Video Tutorial	Biweekly	Ensuring driver and riders' wellbeing after accident
Insurance	Upload insurance documents upon signing up	Access to files/photos on the mobile device	Intangible benefit: reducing rider hesitancy	1 month of code and testing	N/A	Biweekly	N/A
Rewards	Tab available listing the available/not available rewards	List of rewards available	N/A	2 months of code and testing	Video Tutorial	Biweekly	Need to ensure no duplication or copying of reward codes.

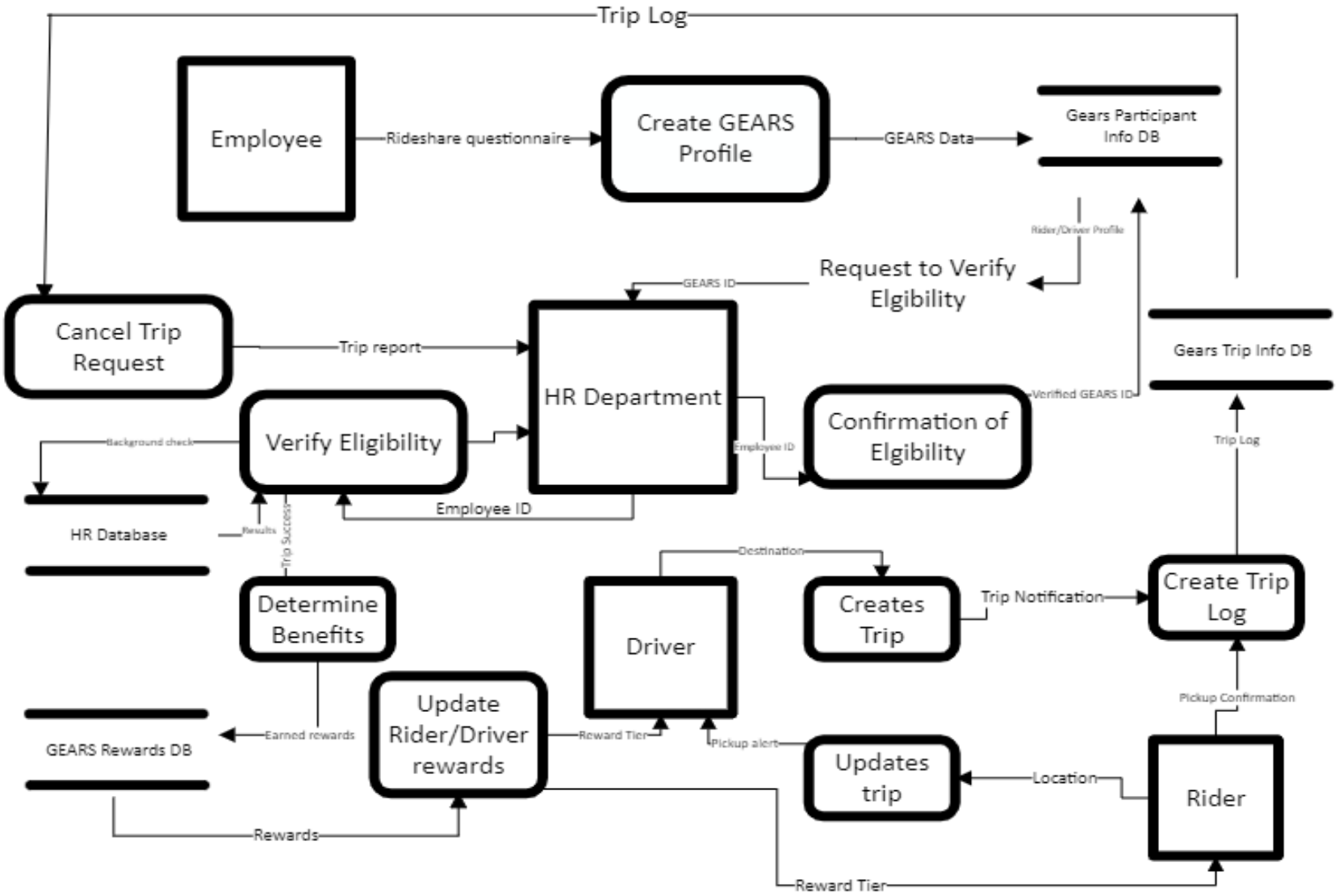
4.2 Analyze Functional Requirements for New System

4.2.1 Preliminary Data Model - Entity Relationship (ER) diagram

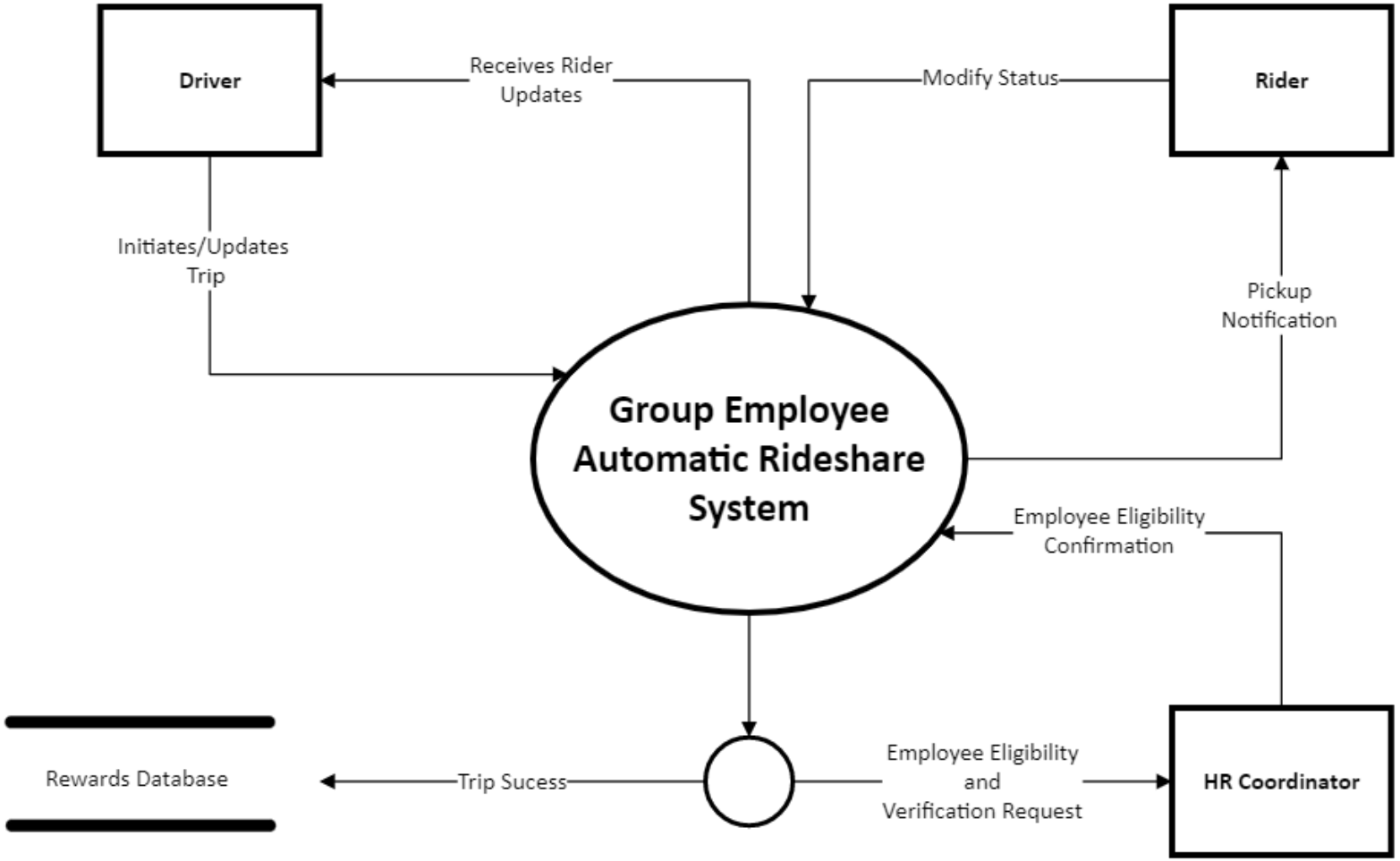


Published by DigitalCommons@SHU, 2022

4.2.2 Preliminary Process Model - Data Flow diagram (DFD)



4.2.3 Preliminary Interface model - Context diagram



Published by DigitalCommons@SHU, 2022

4.2.4 Event Table

Event Table						
Event	**Event Type**	**Trigger**	**Source**	**Use Case**	**Response**	**Destination**
Employee elects to be a rider or driver on GEARS application	External	GEARS profile rideshare creation	User	**Set Rideshare**	GEARS ID created/Rideshare Match	Human Resource (HR) Coordinator
HR Coordinator checks employee's eligibility	State	Background Check	HR Coordinator	**Check Eligibility**	Confirmation of rider/driver eligibility	GEARS database
Driver starts trip	External	Notification of work start/end time	User	**Start Trip**	Notification to pickup	Rider
Rider requests alternate ride	External	Emergency circumstance	User	**Emergency Ride Home**	GEARS rideshare match or display link to ride-hail application	User
Driver and rider successfully complete rideshare round trip (home-to-work and work-to-home)	State	Successful trip logged	GEARS Trip data store	**Release Rewards**	Generate benefit release	HR Coordinator

4.3 Master List of Requirements

4.3.1 Priority

Functional Requirements

Requirements	**Priority**
Mobile-based Application	High
Uniform input fields	High
SMS push notifications	High
Request emergency ride to home	High
GPS tracking	High
Timely Schedules	High

Non-Functional Requirements

Requirements	Priority
Driver & Rider's feedback	High
Universal QR Codes	Medium
Safely reaching location on time	High
Car breakdown (follow up another car to continue the ride)	Medium
Insurance	High
Human Resources Tracking Reports	Medium
Rewards	Medium

4.3.2 Deadlines for each

Functional Requirements

Requirements	Timelines and Deadlines
Mobile-based Application	One month to test and code.
Uniform input fields	Two months to test and code.
SMS push notifications	Two months to test and code.
Request emergency ride to home	Three months to test and code.
GPS tracking	Three months to test and code.
Timely Schedules	Three months to test and code.

Non-Functional Requirements

Requirements	Timelines and Deadlines
Driver & Rider's feedback	One month to test and code.
Universal QR Codes	Two months to test and code.
Safely reaching Location on time	Two months to test and code.
Car breakdown (follow up another car to continue the ride)	Three months to test and code.
Insurance	Three months to test and code.
Human Resources Tracking Reports	Three months to test and code.
Rewards	Three months to test and code.

4.3.3 Supporting requirements

Requirements	Levels
Database	High
Google Maps API	High
App Builder	High
Developer for websites	High
Technical Support	High
Data Backup	High

4.4 Re-evaluation and update project scope

Project scope does not need to be updated.

5.0 Decision Analysis Phase

5.1 Identify Candidate Solutions

For the identification of candidate solutions, there are two methods of approach with the implementation of a new ride-matching system. The first explored method involves a desktop software solution. In this system, the potential driver/rider would indicate their interest via a web-based questionnaire to receive a GEARS ID. This GEARS ID would then be processed by the Human Resource Coordinator through a desktop GEARS software. The software would connect to the company's HR database to ride-match employees based on similar schedules and starting point locations. HR would then need to send the employees their ride-match and the actual ridesharing experience would need to be implemented via the GEARS cloud-based, mobile application for IOS or Android.

An alternative solution would be a complete cloud-based, mobile application-based user experience. The driver/rider would submit their information via the GEARS application and the ride match would be automatically generated out of the GEARS system. The GEARS application would send a report to the Human Resources Coordinator to confirm employee eligibility for the program and designate benefits. The driver/rider trip connections would occur via the same application as the ride-match. The following charts showcase the feasibility of the desktop application versus the cloud-based, mobile application of GEARS.

5.2 Analyze candidate solutions

5.2.1 Feasibility Analysis

	Operational Feasibility
Software Implementation	The software implementation would not address the user's requirements fully. The desktop software would be able to provide ride-matching; however, it will not provide the real-time updates and geolocation features of an application-based system. Software would require installation on company desktops, which may require the participation of the company's in-house IT staff. Human Resource staff would require training on operating the software.
Application Implementation	An application-based system would fulfill user requirements and provide additional opportunities for future improvements/updates based on user feedback. The app-based solution would not require installation on company-protected devices like desktops. Rather, the application-based experience of installation would be similar to application downloads on personal devices via the Apple App store or Google Play Store.

	Technical Feasibility
Software Implementation	The software implementation would be technically feasible. However, there would be drawbacks in terms of tailored connections to a company's HR databases. This would require additional specialization and working hours for the installation process. Additionally, updates would need to be completed on the client's side, which would require additional staff at the client's space to perform update downloads and installation. To meet user requirements, the software implantation would further require a website and mobile application development to complement the ride-match software for a complete system. The application would require a map-based API to provide geolocation.
Application Implementation	The cloud-based mobile application-based system would be technically feasible. A website may be needed to complement the mobile application. This will require additional security measures to ensure the protection of user data. Additionally, cloud databases would need a method to receive regular updates from HR databases. This may require an in-house procedure for the Human Resource Coordinator to provide weekly updates to both import and export data via the GEARS website.

	Schedule Feasibility
Software Implementation	The software implementation requires the incorporation of the company's in-house staff as well as the development of several other subsystems to meet functional and non-functional requirements: desktop software for ride-matching, website, and mobile application. Because of these two factors, the time-period for design and implementation may take longer. Alternatively, additional programmers may need to be hired to compensate for the increased system complexity.
Application Implementation	A cloud-based mobile application would be deliverable provided the master schedule is followed for design and implementation.

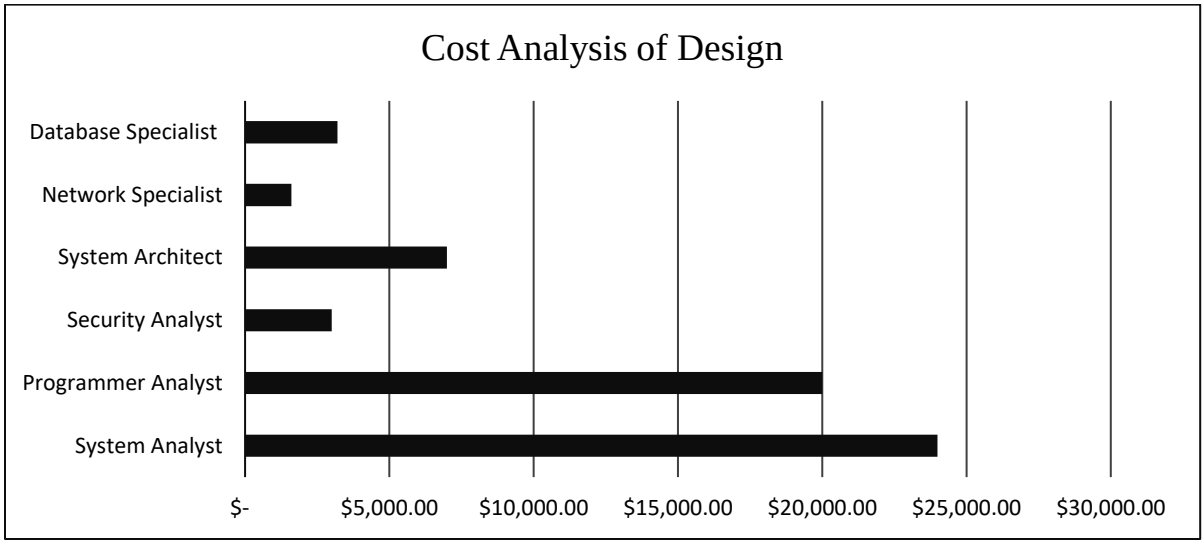
	Economic Feasibility
Software Implementation	Because the desktop software implementation would require additional programmers, it would be a more costly solution.
Application Implementation	The funding to develop the cloud-based mobile application is available. Additionally, GEARS, as a company solution, would generate revenue through corporate subscriptions, which will ultimately fund continued application maintenance and operation costs.

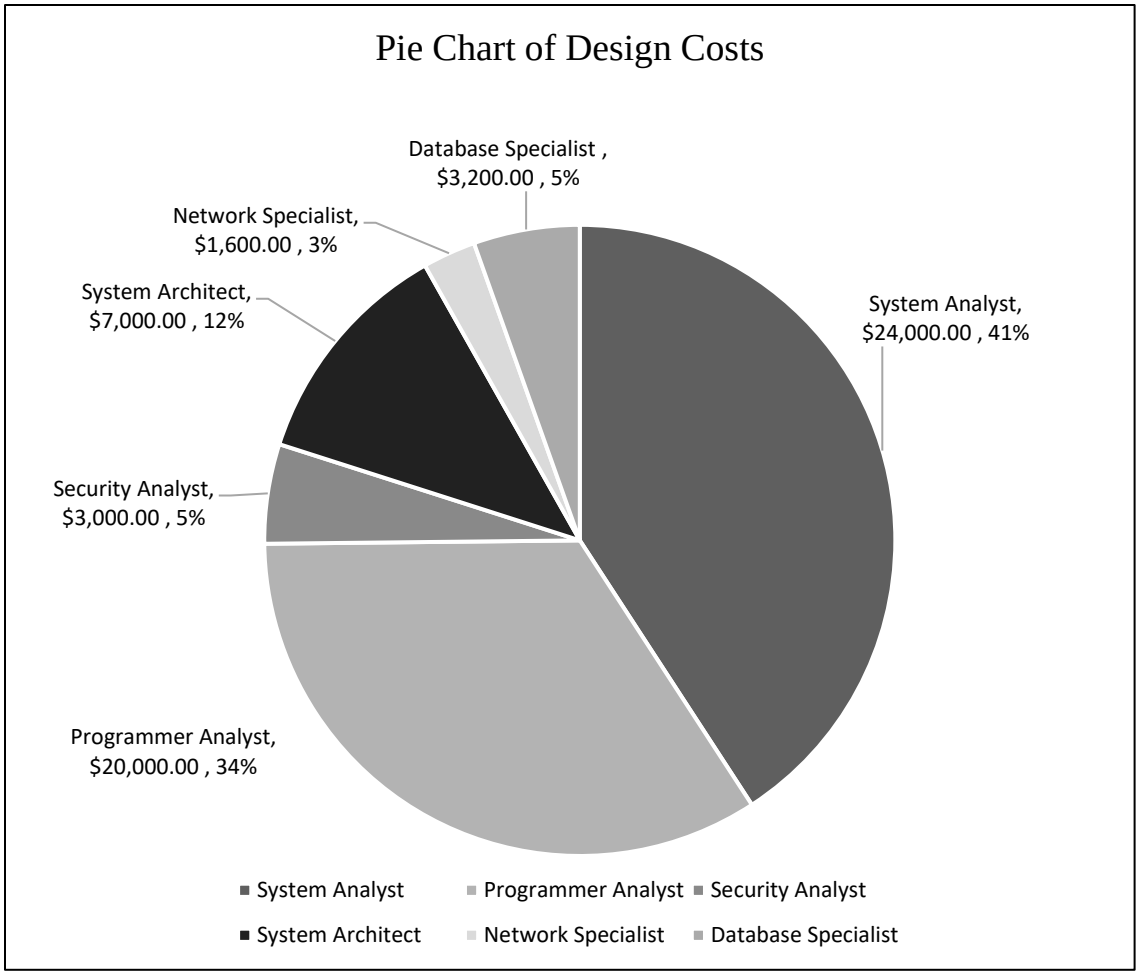
5.2.2 Cost-Benefit Analysis

Estimated Costs for Development and Operations				
Development Costs				
Personnel:	Number	Hourly Rate	Hours	Amount
System Analyst	1	60	400	=B5*C5*D5
Programmer Analyst	2	40	250	=B6*C6*D6
Security Analyst	1	60	80	=B7*C7*D7
System Architect	1	70	100	=B8*C8*D8
Network Specialist	1	40	80	=B9*C9*D9
Database Specialist	1	40	150	=B10*C10*D10
Expenses:				
New Hardware & Software:	Quantity	Unit Cost		
Google API (monthly contract)	3	1200		=B14*C14
Firebase Database (monthly contract)	3	300		=B15*C15
Laptops	6	1000		=B16*C16
External Monitors	6	200		=B17*C17
Mobile Application IDE	1	200		=B18*C18
Development server	1	1500		=B19*C19
Android and iOS Devices for testing	4	800		=B20*C20
Total Development Costs				=SUM(E5:E21)
Projected Annual Operating Costs				
Personnel:	Number	Hourly Rate	Hours	
Programmers/Analysts	2	60	260	=B25*C25*D25
Database Administrator	1	50	200	=B26*C26*D26
Expenses:	Quantity	Unit Cost		
Maintenance Agreement for Server	2	1500		=C29*B29
Maintenance Agreement for Database (monthly contract)	12	300		=C30*B30
Google API (monthly contract)	12	1200		=C31*B31
Total Projected Annual Cost				=SUM(E25:E31)

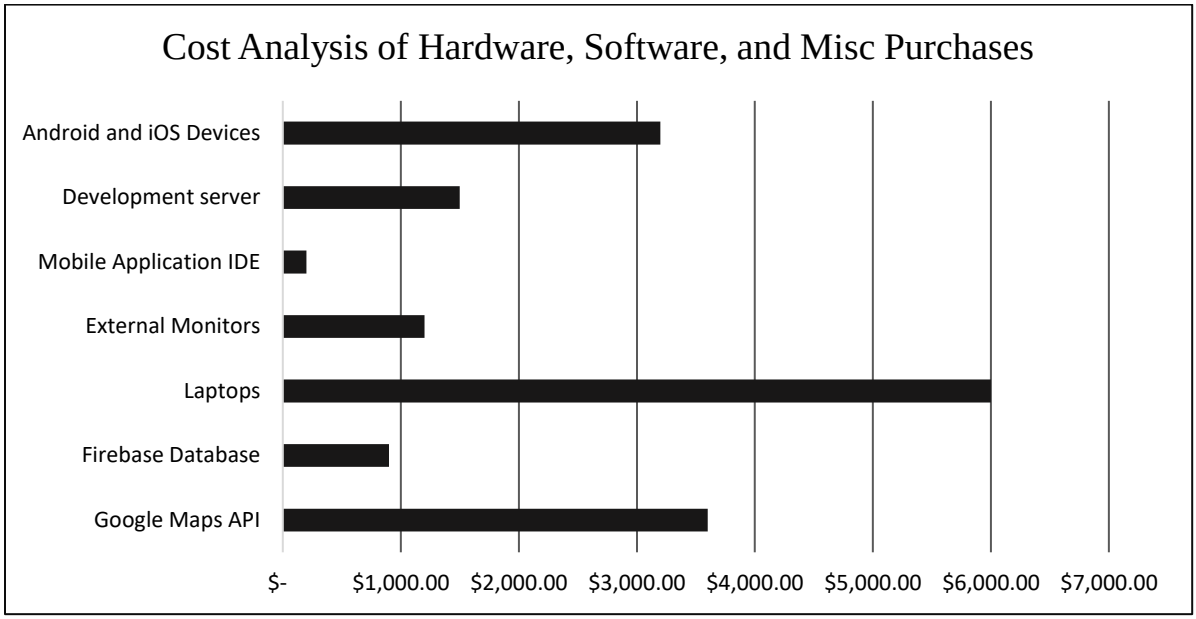
Estimated Costs for Development and Operations				
Development Costs				
Personnel:	Number	Hourly Rate	Hours	Amount
System Analyst	1	$60.00	400	$24,000.00
Programmer Analyst	2	$40.00	250	$20,000.00
Security Analyst	1	$60.00	80	$4,800.00
System Architect	1	$70.00	100	$7,000.00
Network Specialist	1	$40.00	80	$3,200.00
Database Specialist	1	$40.00	150	$6,000.00
Expenses:				
New Hardware & Software:	Quantity	Unit Cost		
Google API (monthly contract)	3	$1,200.00		$3,600.00
Firebase Database (monthly contract)	3	$300.00		$900.00
Laptops	6	$1,000.00		$6,000.00
External Monitors	6	$200.00		$1,200.00
Mobile Application IDE	1	$200.00		$200.00
Development server	1	$1,500.00		$1,500.00
Android and iOS Devices for testing	4	$800.00		$3,200.00
Total Development Costs				$81,600.00
Projected Annual Operating Costs				
Personnel:	Number	Hourly Rate	Hours	
Programmer/Analysts	2	$60.00	125	$15,000.00
Database Administrator	1	$50.00	20	$1,000.00
Expenses:	Quantity	Unit Cost		
Maintenance Agreement for Server	2	$1,500.00		$3,000.00
Maintenance Agreement for Database (monthly contract)	12	$300.00		$3,600.00
Google API (monthly contract)	12	$1,200.00		$14,400.00
Total Projected Annual Cost				$37,000.00

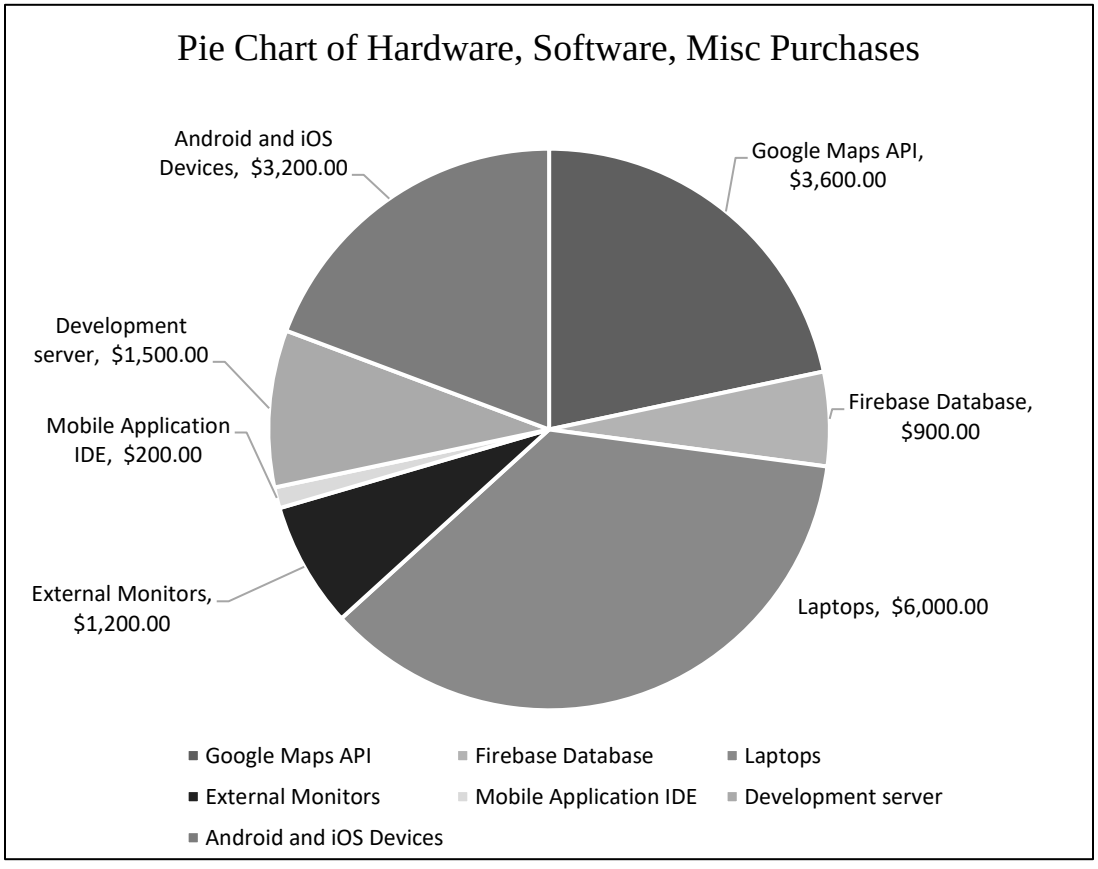
5.2.2.1 Cost Analysis of Design



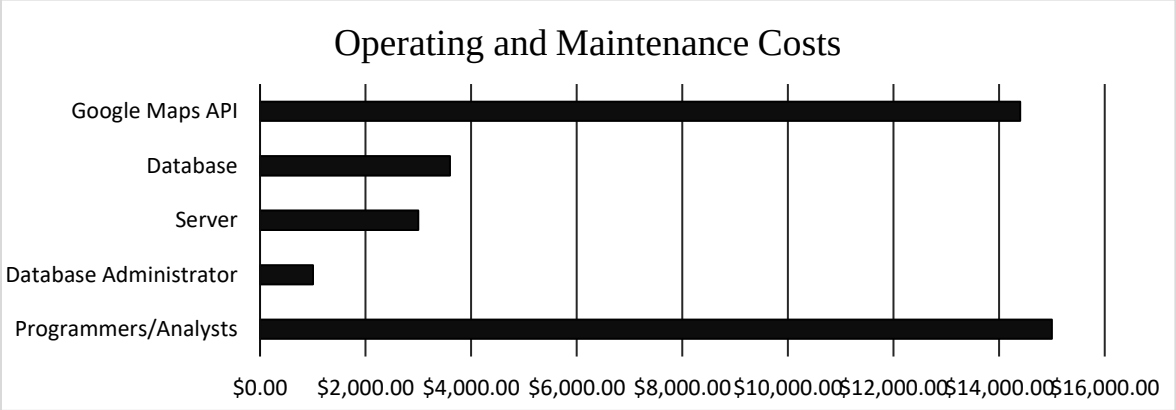


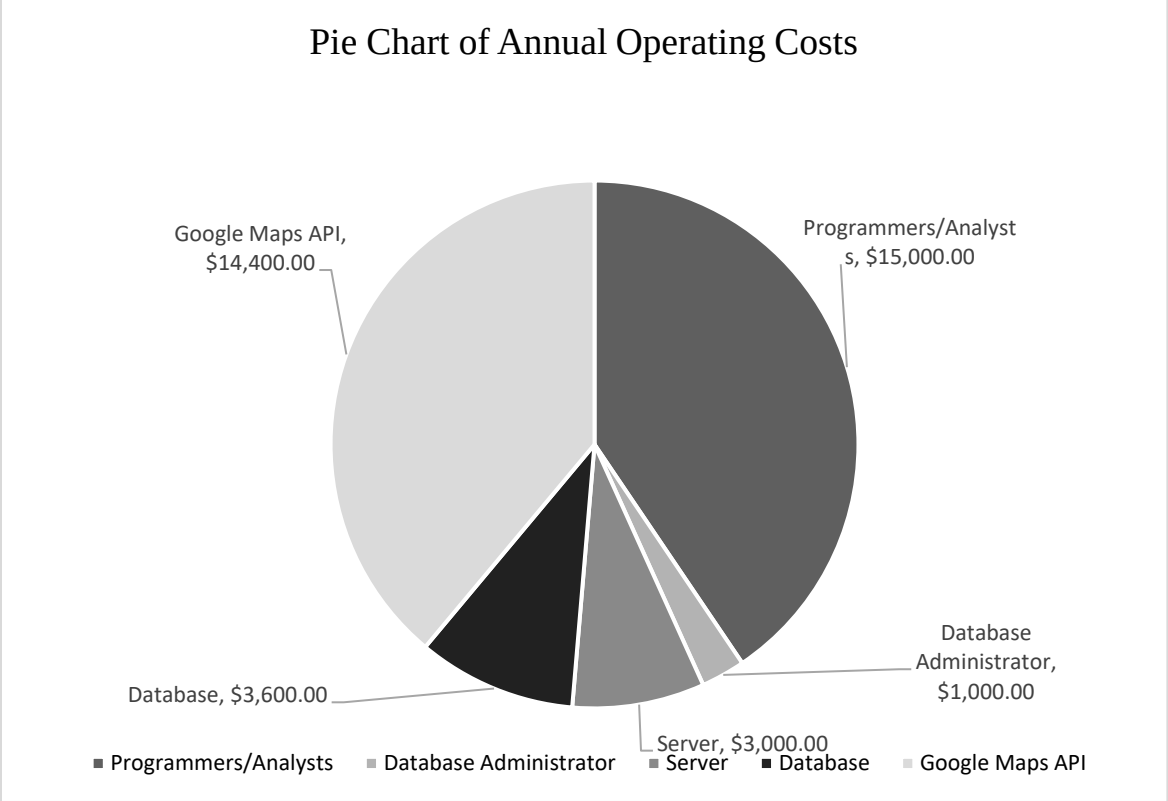
5.2.2.2 Cost Analysis of Hardware, Software, Miscellaneous Purchases





5.2.2.3 Cost Analysis of System Operation and Maintenance





5.2.2.4 Cost Analysis of Training

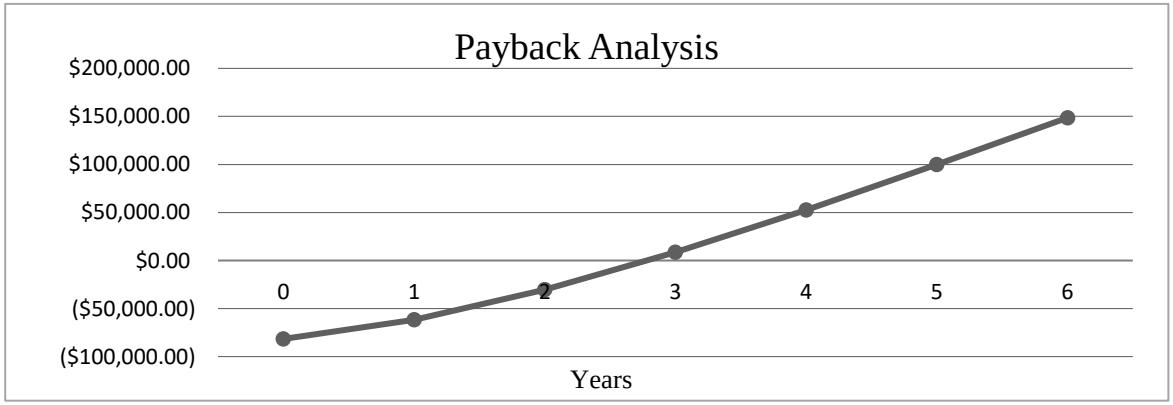
A brief tutorial (15 minutes or less) video will be developed by the front-end programming team as a demonstration of the system interface. This will be accessible within the application and is bundled with the development costs.

5.2.2.5 Analysis of Budget, Costs, and Business Benefits

GEARS Payback Analysis							
Cashflow Description:	**YEAR 0**	**YEAR 1**	**YEAR 2**	**YEAR 3**	**YEAR 4**	**YEAR 5**	**YEAR 6**
Development Cost:	=-1*'Estimated Costs'!E22						
Operation & Maintenance Cost:		=-1*'Estimated Costs'!E33	=(C5*0.05)+C5	=(D5*0.05)+D5	=(E5*0.05)+E5	=(F5*0.05)+F5	=(G5*0.05)+G5
Discount Factors for 15%:	1	=1/POWER((1+0.15),C2)	=1/POWER((1+0.15),D2)	=1/POWER((1+0.15),E2)	=1/POWER((1+0.15),F2)	=1/POWER((1+0.15),G2)	=1/POWER((1+0.15),H2)
Time-adjusted Costs (Adjusted to Present Value):	=B4*B6	=C5*C6	=D5*D6	=E5*E6	=F5*F6	=G5*G6	=H5*H6
Cumulative Time-Adjusted Costs Over Lifetime:	=B7	=B8+C7	=C8+D7	=D8+E7	=E8+F7	=F8+G7	=G8+H7
Benefits Derived from Operation of New System:	0	60,000	80,000	100,000	120,000	140,000	160,000
Discount factors for 15%:	=B6	=C6	=D6	=E6	=F6	=G6	=H6
Time-Adjusted Benefits (Current or Present Value):	=B11*B10	=C11*C10	=D11*D10	=E11*E10	=F11*F10	=G11*G10	=H11*H10
Cumulative Time-Adjusted Benefits Over Lifetime:	0	=B13+C12	=C13+D12	=D13+E12	=E13+F12	=F13+G12	=G13+H12
Cumulative Lifetime Time-Adjusted Costs + Benefits:	=B13+B8	=C13+C8	=D13+D8	=E13+E8	=F13+F8	=G13+G8	=H13+H8

Published by DigitalCommons@SHU, 2022

GEARS Payback Analysis							
Cashflow Description:	**YEAR 0**	**YEAR 1**	**YEAR 2**	**YEAR 3**	**YEAR 4**	**YEAR 5**	**YEAR 6**
Development Cost:	($81,600.00)						
Operation & Maintenance Cost:		($37,000.00)	($38,850.00)	($40,792.50)	($42,832.13)	($44,973.73)	($47,222.42)
Discount Factors for 15%:	1.000	0.870	0.756	0.658	0.572	0.497	0.432
Time-adjusted Costs (Adjusted to Present Value):	($81,600.00)	($32,173.91)	($29,376.18)	($26,821.73)	($24,489.41)	($22,359.89)	($20,415.55)
Cumulative Time-Adjusted Costs Over Lifetime:	($81,600.00)	($113,773.91)	($143,150.09)	($169,971.83)	($194,461.23)	($216,821.12)	($237,236.68)
Benefits Derived from Operation of New System:	$0.00	$60,000.00	$80,000.00	$100,000.00	$120,000.00	$140,000.00	$160,000.00
Discount factors for 15%:	1.000	0.870	0.756	0.658	0.572	0.497	0.432
Time-Adjusted Benefits (Current or Present Value):	$0.00	$52,173.91	$60,491.49	$65,751.62	$68,610.39	$69,604.74	$69,172.42
Cumulative Time-Adjusted Benefits Over Lifetime:	$0.00	$52,173.91	$112,665.41	$178,417.03	$247,027.42	$316,632.16	$385,804.58
Cumulative Lifetime Time-Adjusted Costs + Benefits:	($81,600.00)	($61,600.00)	($30,484.69)	$8,445.20	$52,566.19	$99,811.04	$148,567.90



Net Present Value Analysis for GEARS							
Cash Flow Description:	**YEAR 0**	**YEAR 1**	**YEAR 2**	**YEAR 3**	**YEAR 4**	**YEAR 5**	**YEAR 6**
Development Cost:	=-1*'Estimated Costs'!E22						
Operation & Maintenance Cost:		=-1*'Estimated Costs'!E33	=(C5*0.05)+C5	=(D5*0.05)+D5	=(E5*0.05)+E5	=(F5*0.05)+F5	=(G5*0.05)+G5
Discount Factors for 15%:	1	=1/POWER((1+0.15),C3)	=1/POWER((1+0.15),D3)	=1/POWER((1+0.15),E3)	=1/POWER((1+0.15),F3)	=1/POWER((1+0.15),G3)	=1/POWER((1+0.15),H3)
Present Value of Annual Costs:	=B4*B6	=C5*C6	=D5*D6	=E5*E6	=F5*F6	=G5*G6	=H5*H6
Total Present Value of Lifetime Costs:							='Payback Analysis '!H8

Benefits Derived from Operation of New System:	0	60,000	80,000	100,000	120,000	140,000	160,000
Discount factors for 15%:	=B6	=C6	=D6	=E6	=F6	=G6	=H6
Present Value of Annual Benefits:	=B11*B10	=C11*C10	=D11*D10	=E11*E10	=F11*F10	=G11*G10	=H11*H10
Total Present Value of Lifetime Benefits:							='Payback Analysis '!H13

NET PRESENT VALUE:							=H8+H13

Net Present Value Analysis for GEARS							
Cash Flow Description:	**YEAR 0**	**YEAR 1**	**YEAR 2**	**YEAR 3**	**YEAR 4**	**YEAR 5**	**YEAR 6**
Development Cost:	($81,600.00)						
Operation & Maintenance Cost:		($37,000.00)	($38,850.00)	($40,792.50)	($42,832.13)	($44,973.73)	($47,222.42)
Discount Factors for 15%:	1.000	0.870	0.756	0.658	0.572	0.497	0.432
Present Value of Annual Costs:	($81,600.00)	($32,173.91)	($29,376.18)	($26,821.73)	($24,489.41)	($22,359.89)	($20,415.55)
Total Present Value of Lifetime Costs:							($237,236.68)
Benefits Derived from Operation of New System:	$0.00	$60,000.00	$80,000.00	$100,000.00	$120,000.00	$140,000.00	$160,000.00
Discount factors for 15%:	1.000	0.870	0.756	0.658	0.572	0.497	0.432
Present Value of Annual Benefits:	$0.00	$52,173.91	$60,491.49	$65,751.62	$68,610.39	$69,604.74	$69,172.42
Total Present Value of Lifetime Benefits:							$385,804.58
NET PRESENT VALUE:							$148,567.90

5.3 Compare Candidate Solutions

Criteria	New (Recommended)	Existing
Operating Environment or Constraints	• Cloud based system for on time processing. • API mapping for live tracking. • Link between HR database and AWS cloud server	• Data connectivity required for all functionalities.
Hardware new and existing	Windows • 2+ GHz processor. • 8+ GB RAM. • 500 MB of available hard-disk space • AWS cloud-based database Mac • 2.1+ GHz Intel™ processor. • 8 GB RAM. • 500 MB of available hard-disk space. Mobile • iOS 13 and above • Android 11 and above • Wi-Fi or GSM or CDMA enabled.	• Desktop or laptop computer running Windows 11,10, and 7. • Pentium III or higher CPU • Display adapter resolution 1024 x 768 - Recommended 1280 x 1024 or higher • Monitor size - 17” or larger recommended • No mobile access
Software new and existing	• On premises developed with help from a contractor. • Tailored to company requirements and needs. • Able to update and control software on-site. • All the required features implemented • Ease of use and complies to all company policies	• No control over software improvements since it is a service through CT gov • Company needs are not directly. • No company reward program
Staffing new and existing	• IT person works with HR coordinator	• Web administrator
Training new and existing	• 15-minute video to show the steps and process of using the software	• User manual

Installation requirements	• Microsoft Windows Installer 5.0 • Apple App store (iOS) • Google Play (Android)	• Windows Compatible Web Browser with current updates/patches installed • Java Version 10 to view scanned image files
Performance requirements	• Online mapping and tracking • Able to work offline due to cell outages. • Realtime tracking.	• 95% of all response time should be less than 8.5 second • No mobile tracking
Development requirements	• Client-Server model • AWS account for cloud services	• Web based data driven model
Reports to be delivered	• Reports for rewards Driver/Rider • Reports for incidents	• SQL Server 2005, Enterprise Edition, SP2
Security requirements	• Access intranet information through the Internet • SSL secure authorization	• SSL Secure login
Auditing requirements	• Login and access log trails	• Periodic review

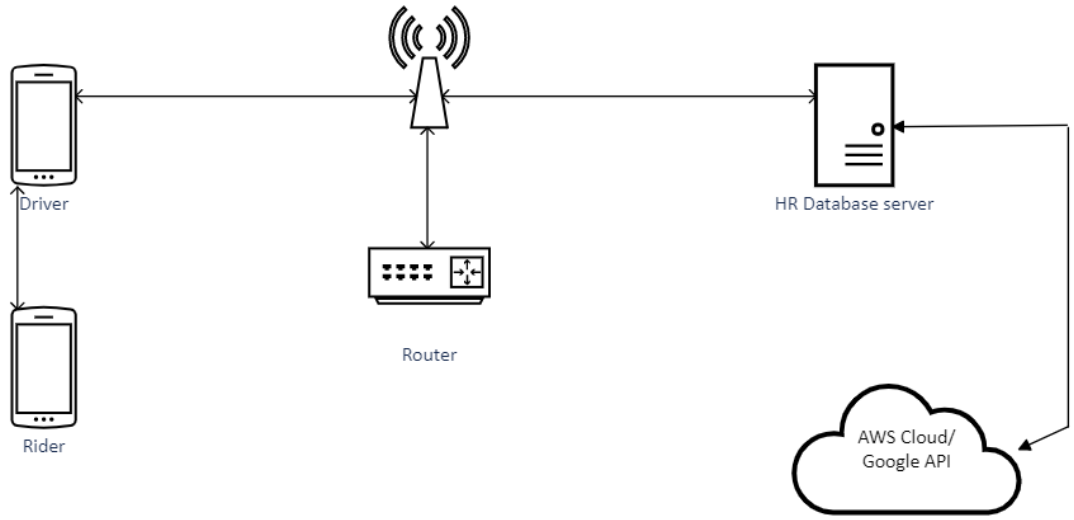
5.4 Recommended Solution

The recommended solution is a cloud-based mobile application of the Group Employee Automatic Rideshare System (GEARS).

6.0 Design Phase

6.1 Design the Application Architecture

The application architecture is offsite on the cloud and will not interfere with onsite applications. For security purposes, only functionally required employee data will be on the cloud. HR/IT will have access to the database for management and maintenance. Rider/driver cell phones will connect to the database through the application.



6.1.1 Networks

- The driver and riders will use their cell phones to access the application via Wi-Fi or cell towers.
- The AWS server will be accessed through HR via the corporate network and Ride/Driver will access though an application on their mobile phone.
- The router will be used to access the AWS server on the outside of the corporate network.

6.1.2 Database distribution

- AWS server will be used to for the employee database, rideshare rewards and mapping.
- The AWS server will be in the AWS cloud.
- Servers will be accessed using the router and or the cell phone application.

6.1.3 Customization and Integration of "Off the Shelf" Software

AWS database will be used for the application and HR/IT will manage the system.

6.1.4 User Interface Technology

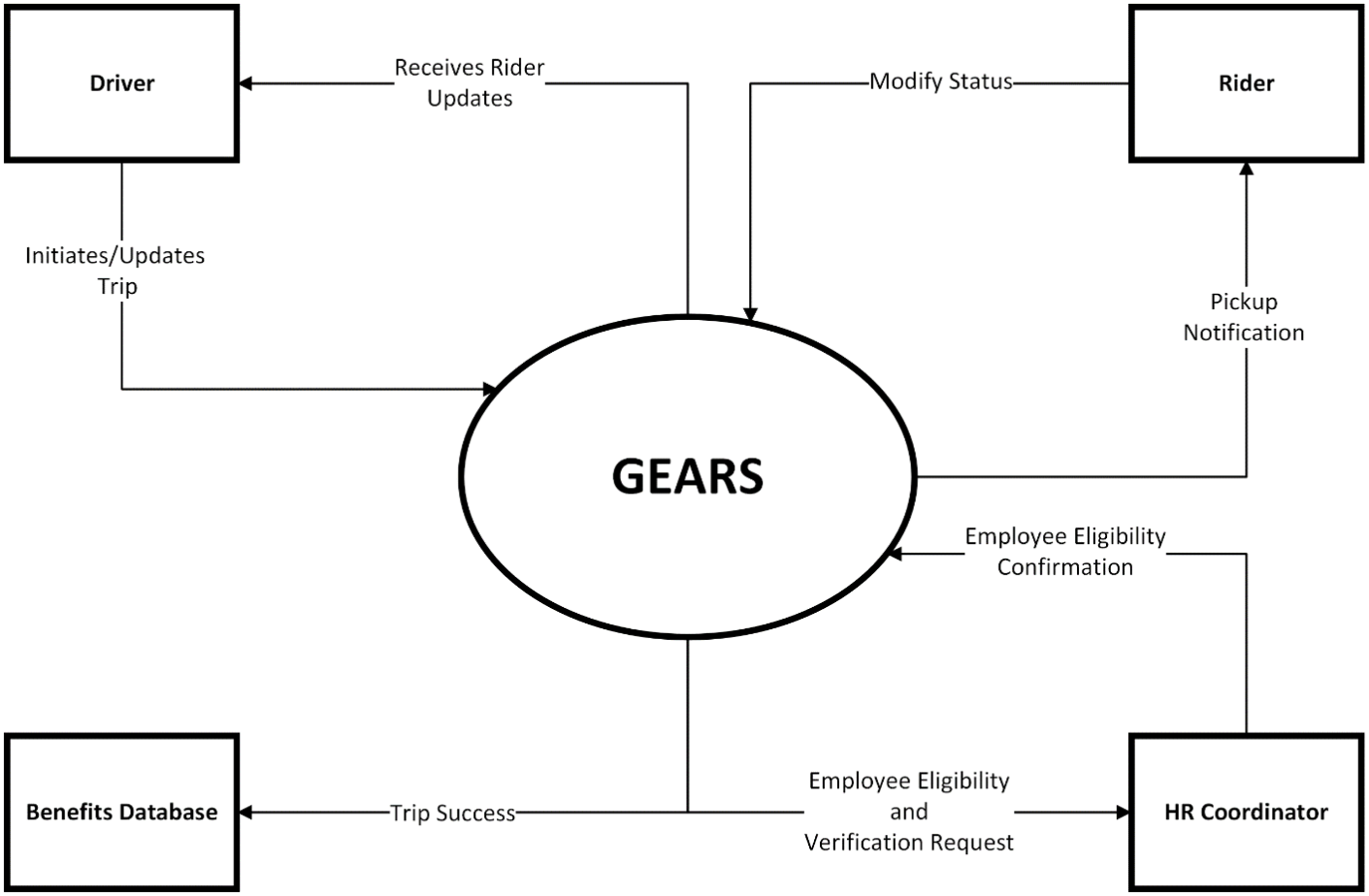
The interface technology will be a mobile application available on Android and IOS. The system users will be assigned dashboards. The HR Coordinator will manage employee participation from the company dashboard. The driver/rider will have a separate dashboard to be described in 6.4.

6.1.5 System Interface Technology

The system will be independent of all other systems and will not interfere or interface with current onsite systems.

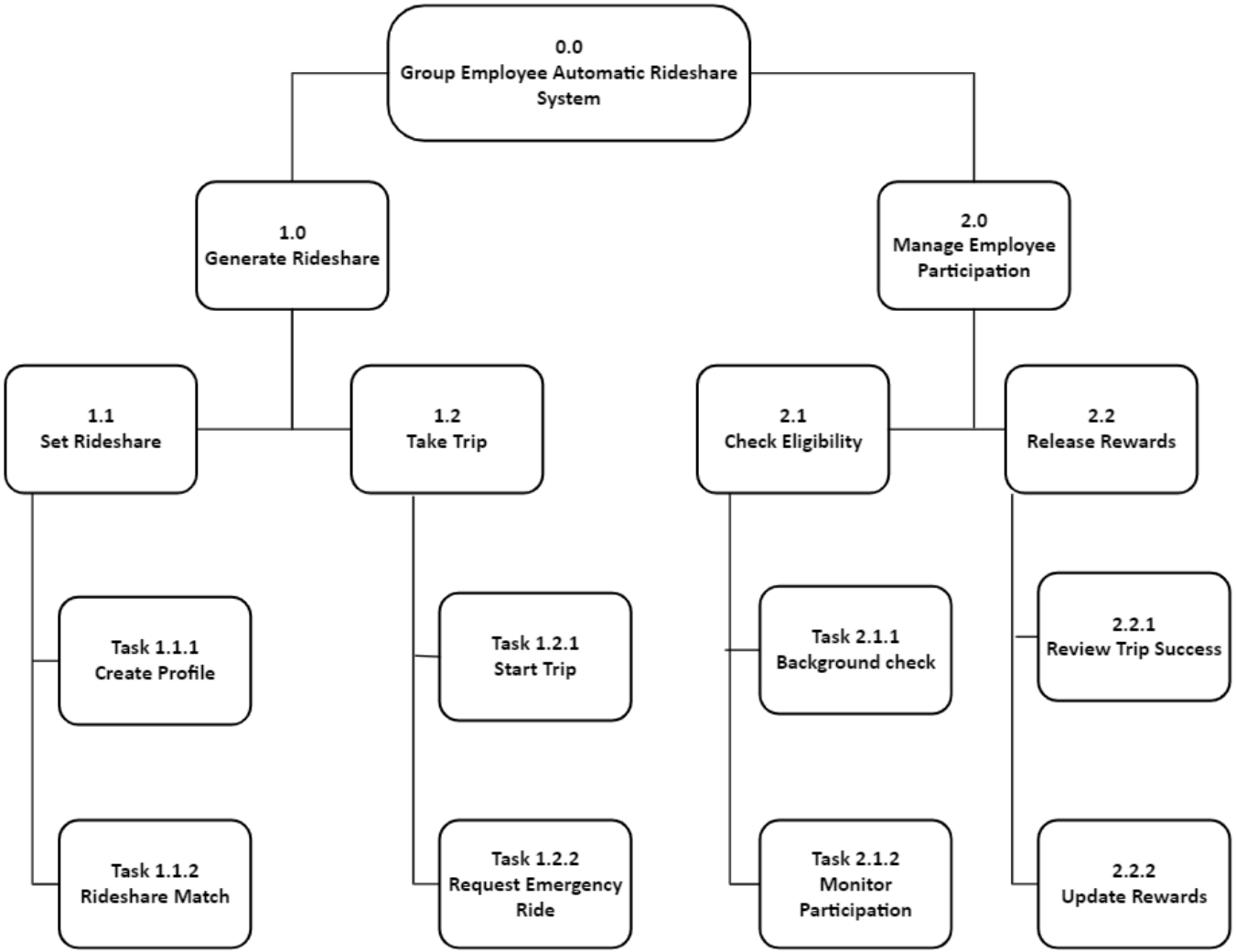
6.2 Construct Detailed Models

6.2.1 Context Model

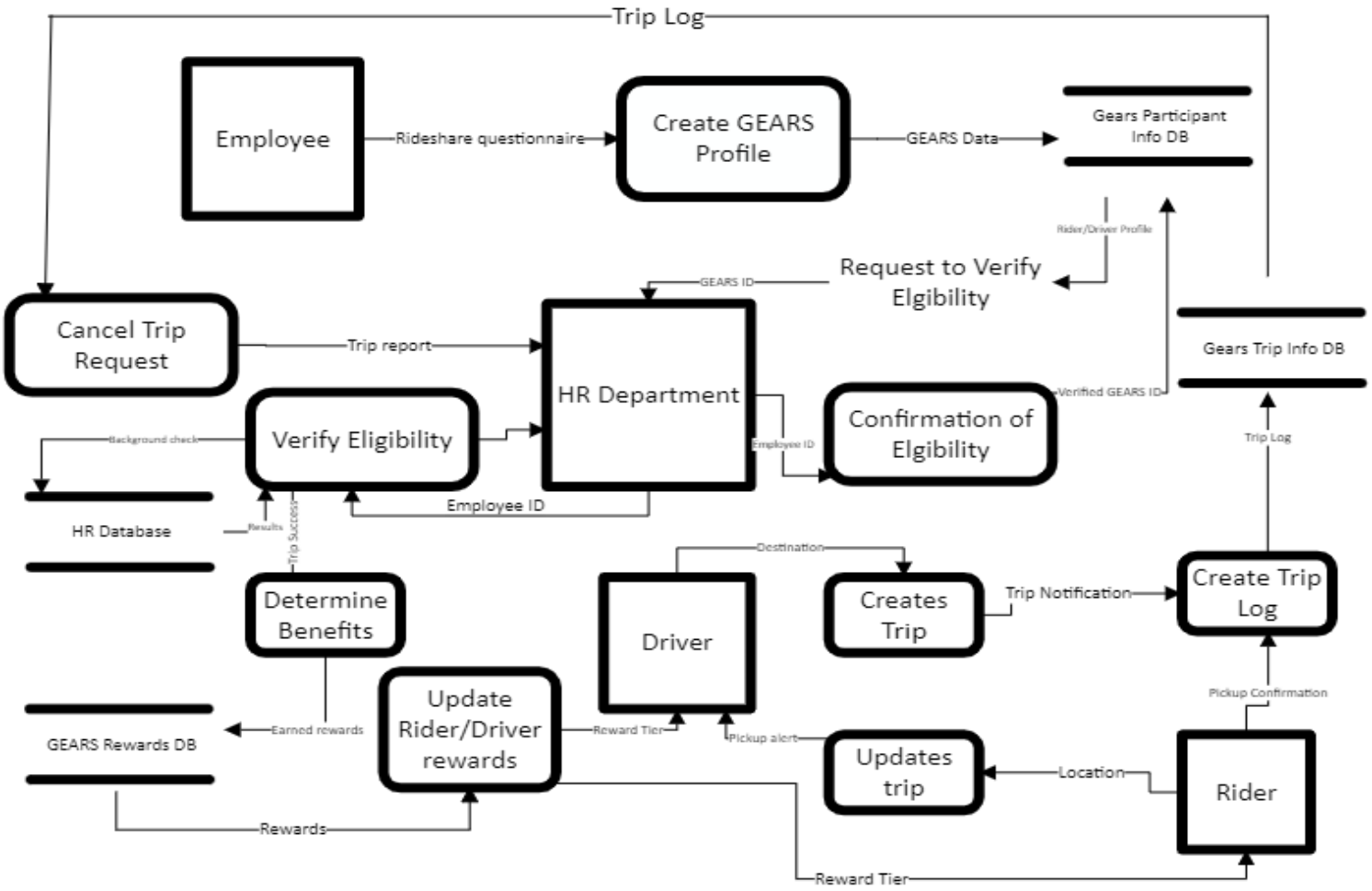


Published by DigitalCommons@SHU, 2022

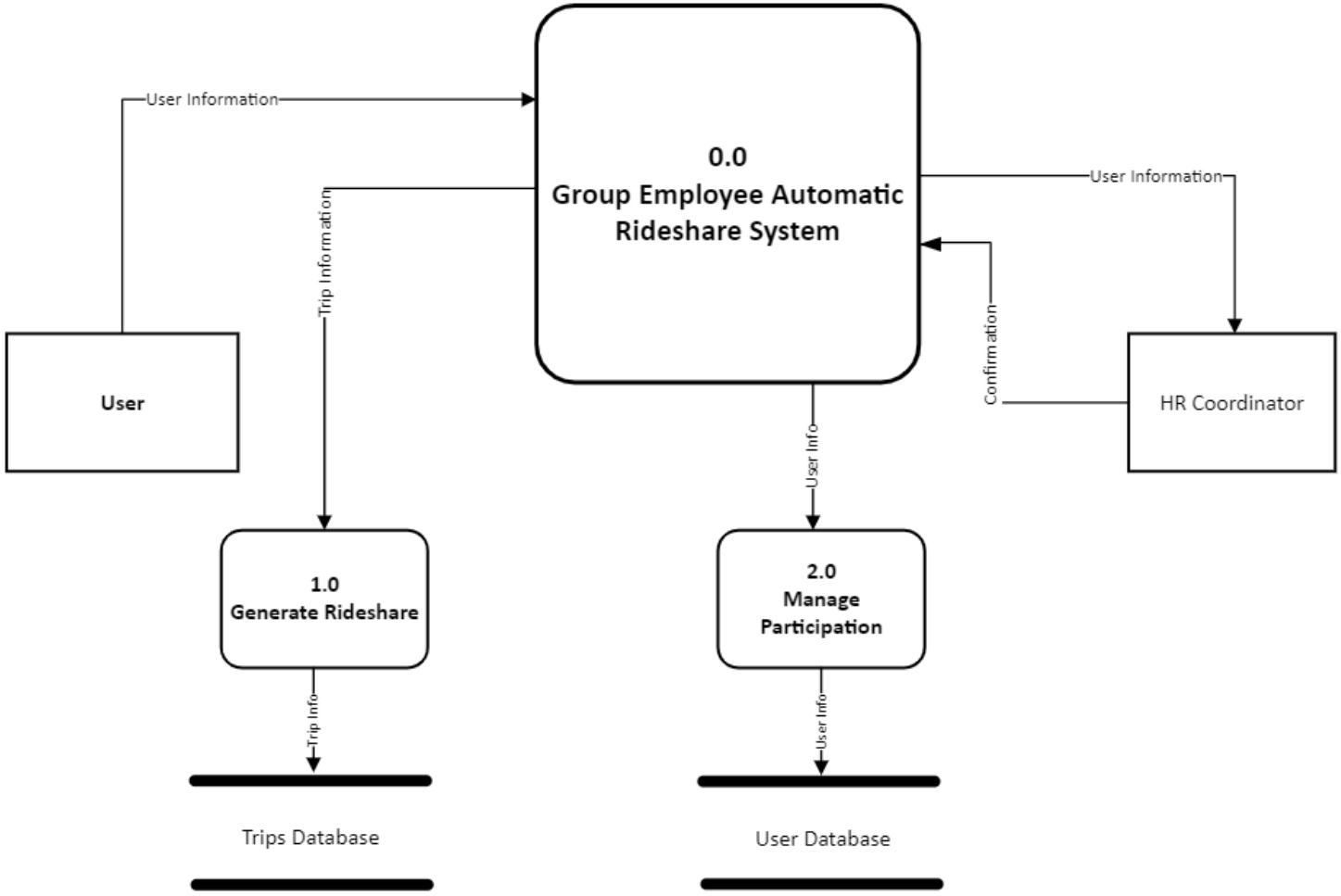
6.2.2 Data flow diagram (DFD) Decomposition to System Modules, and Tasks



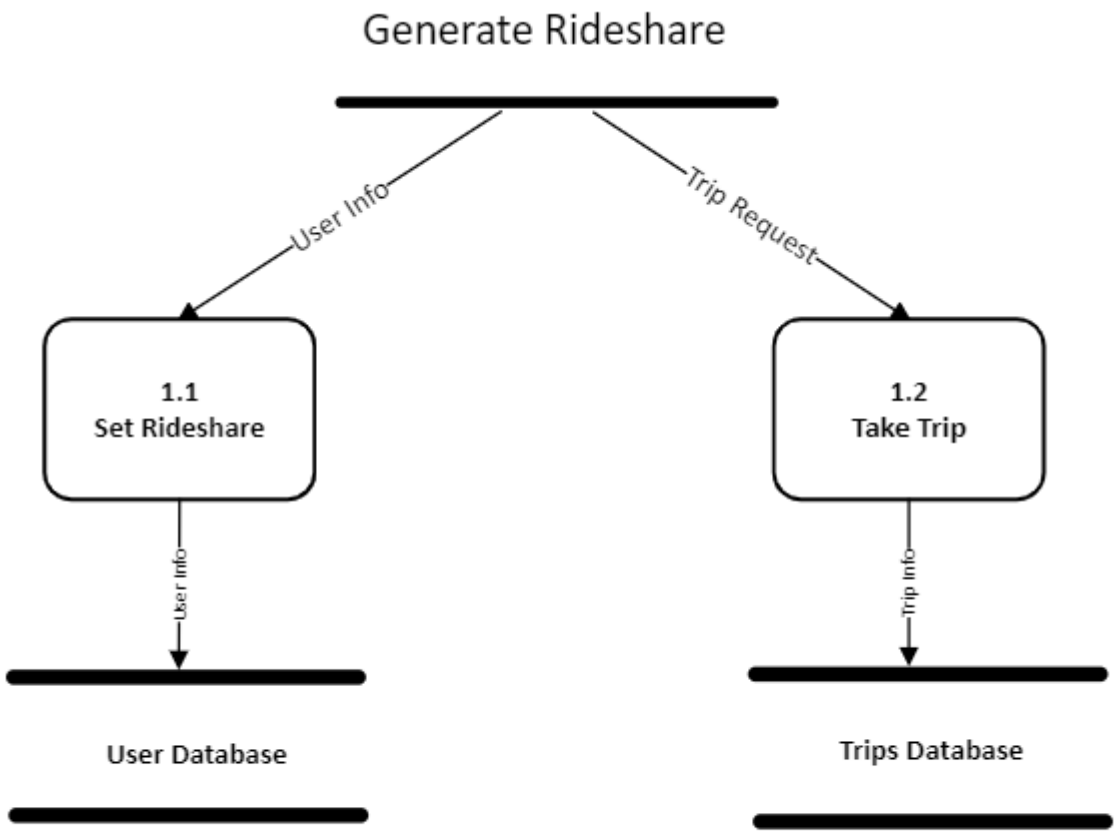
Event Level DFD



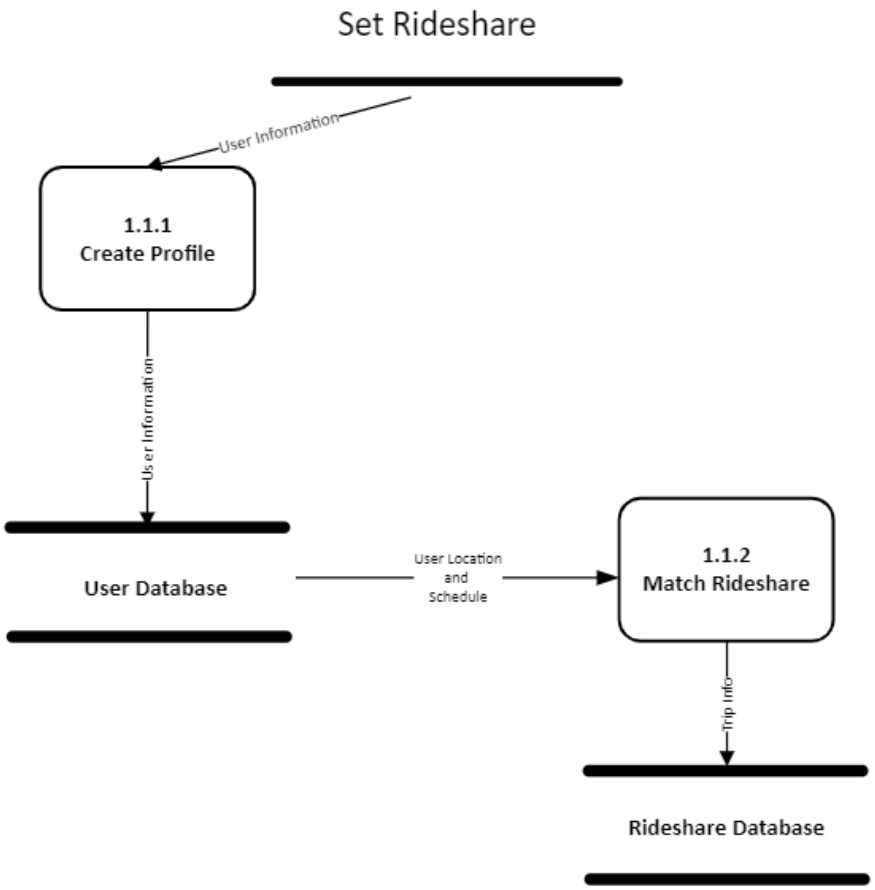
Level 0 DFD


User Information
0.0
Group Employee Automatic Rideshare System
User Information
Trip Information
Confirmation
User
HR Coordinator
User Info
1.0
Generate Rideshare
2.0
Manage Participation
Trip Info
User Info
Trips Database
User Database

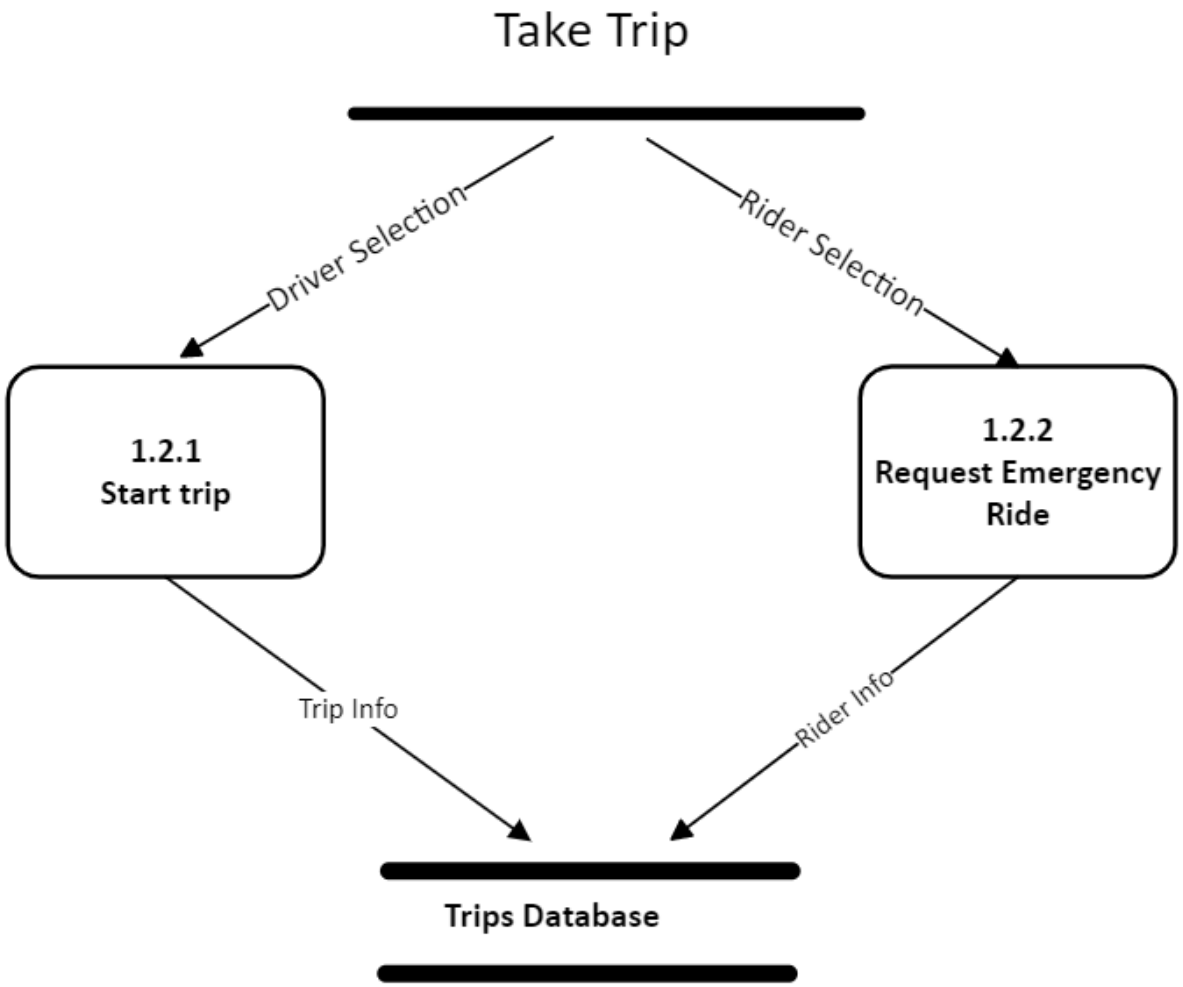
Level 1 DFD


Generate Rideshare
User Info
Trip Request
1.1
Set Rideshare
1.2
Take Trip
User Info
Trip Info
User Database
Trips Database

Level 1.1 DFD

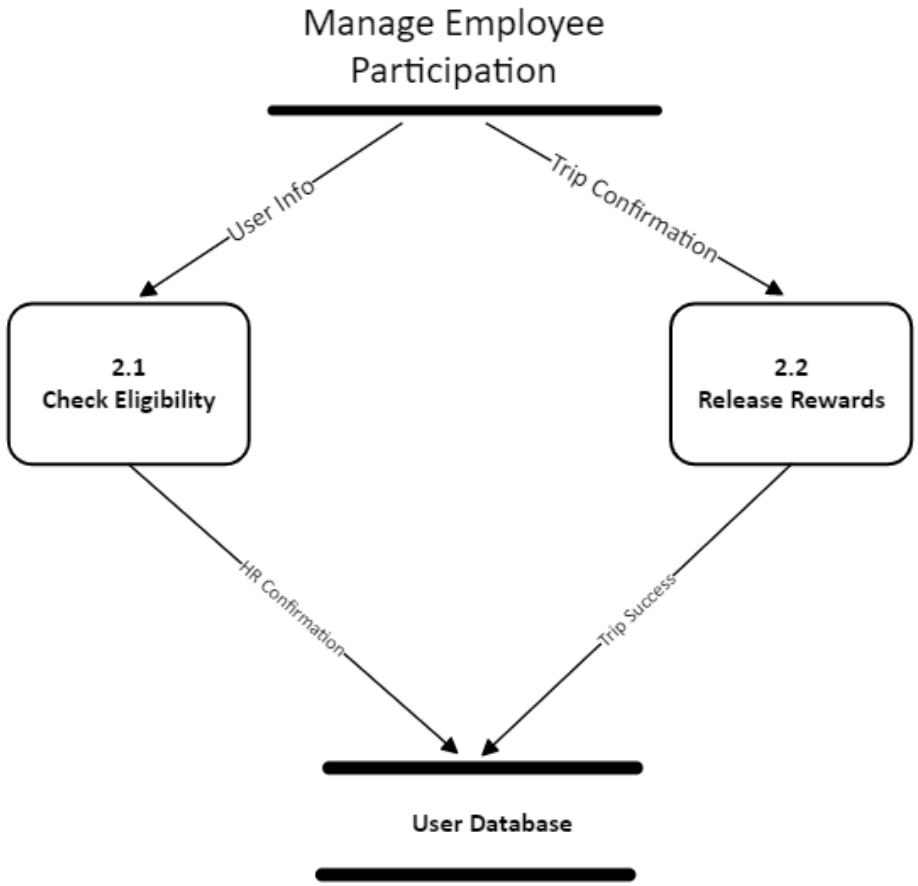

Set Rideshare
User Information
1.1.1
Create Profile
User Information
User Database
User Location
and
Schedule
1.1.2
Match Rideshare
Trip Info
Rideshare Database

Level 1.2 DFD

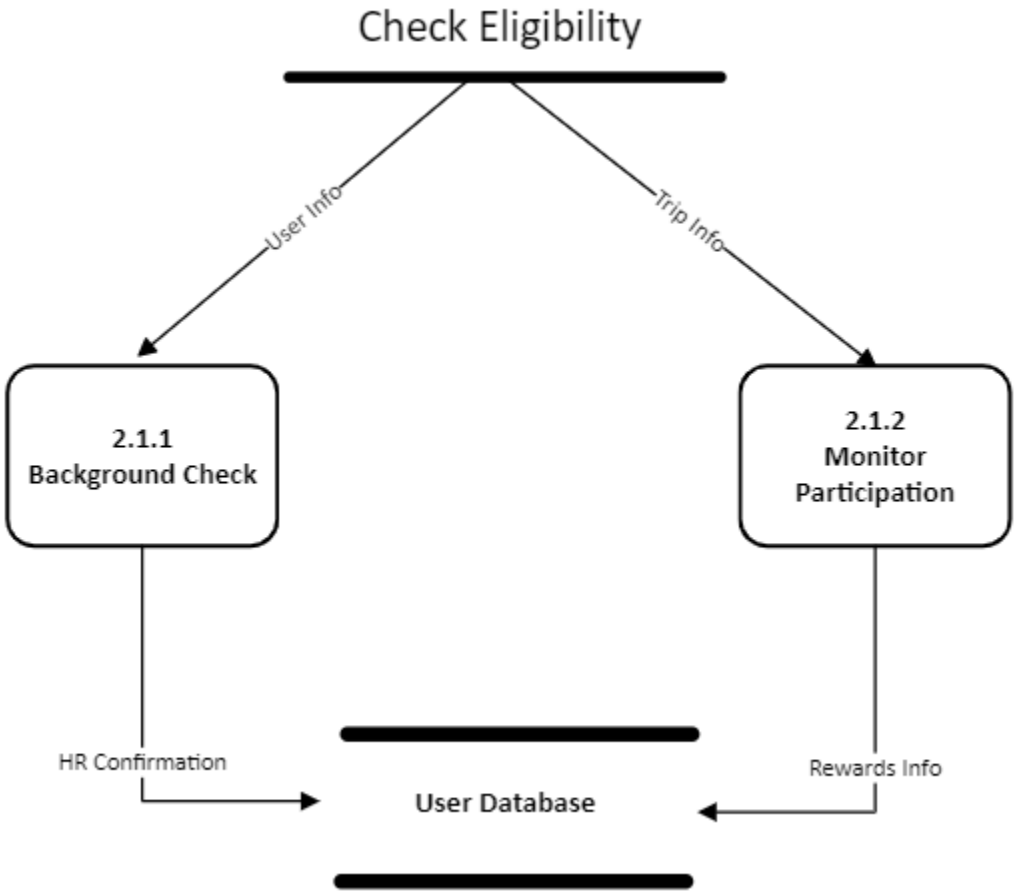


Published by DigitalCommons@SHU, 2022

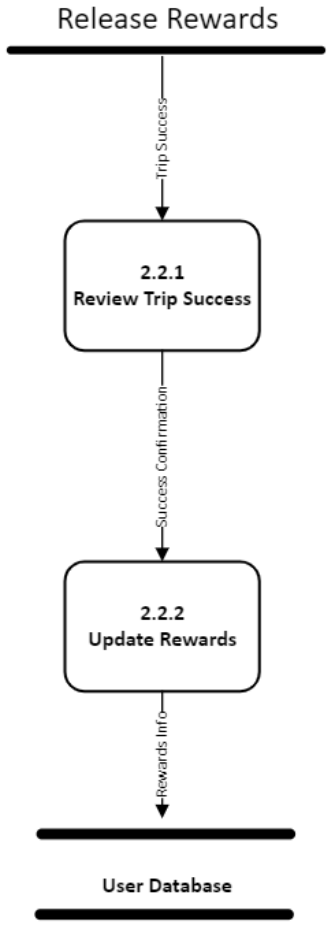
Level 2 DFD


Manage Employee Participation
User Info
Trip Confirmation
2.1
Check Eligibility
2.2
Release Rewards
HR Confirmation
Trip Success
User Database

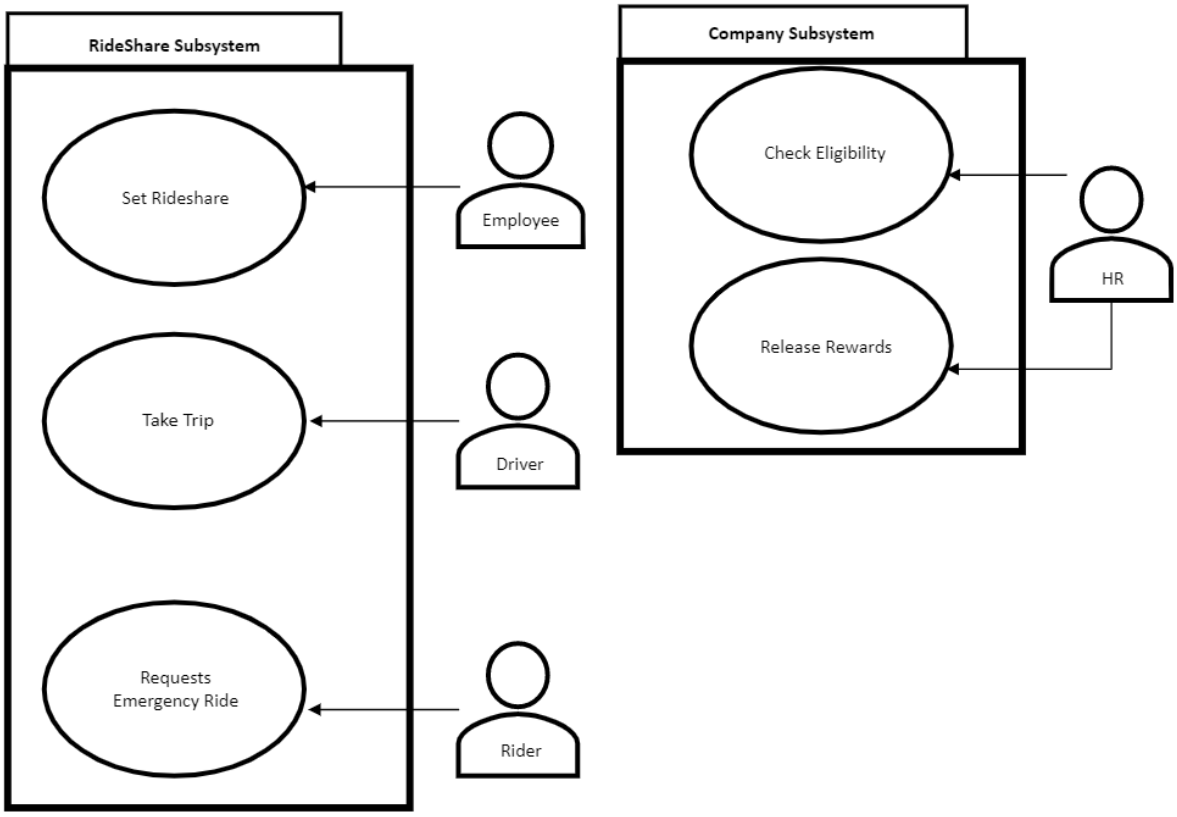
Level 2.1 DFD


Check Eligibility
User Info
Trip Info
2.1.1
Background Check
2.1.2
Monitor
Participation
HR Confirmation
Rewards Info
User Database

Level 2.2 DFD


Release Rewards
Trip Success
2.2.1
Review Trip Success
Success Confirmation
2.2.2
Update Rewards
Rewards Info
User Database

6.2.3 Use-Case Model Diagram with Use-Case Narratives



Author(s): __Desiree Brinn-Rodriguez_____ Date: __3/5/2022 Version: _1_____		
Use-Case Name :	Set Rideshare	**Use - Case Type Business Requirements :□** **System Analysis :□**
Use-Case ID :	GEARS01	
Priority :	High	
Source:	User	
Primary Business Actor:	Employee	
Other Participating Actors:	HR Coordinator	
Other Interested Stakeholders:	Driver, Rider	
Description:	This use case describes the initial setup of the rideshare in GEARS. The system captures the employee's preferences to be a rider or driver. Additionally, the system uses the employee's schedule and home address to match the employee to a driver (if the employee is a rider seeking a driver) or to rider(s) (if the employee elects to be a driver). If a rideshare match exists, the employee's information will be sent to the company's Human Resource Department (HR) who will determine the employee's eligibility in a later use case.	
Precondition:	The user initiating the rideshare request must be an employee of the same company of existing riders and drivers.	
Trigger:	This use case is initiated when an employee elects to be a rider or a driver on the GEARS mobile application.	
Typical Course of Events:	**Actor Action**	**System Response**
	Step 1: The employee identifies the company. **Step 2:** The employee selects to be either a rider or a driver. **Step 4:** The employee enters prompted information for schedule, home address, and preferences of communication. **Step 6:** The employee selects a rideshare match. **Step 8:** The employee agrees to join the rideshare and consents to a background check.	**Step 3:** The system responds by asking for the input of home address, schedule, and preferences of communication. **Step 5:** The system checks the schedule start time and the home address against the GEARS database to display rideshare matches. **Step 7:** The system displays rideshare agreement with join option and an option (if driver) for user to consent to a background check. **Step 9:** The system assigns a GEARS ID to the employee and sends a request to the company's HR Coordinator to verify eligibility

Alternate Courses:	**Alt-Step 3:** if user entered driver, the system prompts for car capacity, driver's license number, and license plate number. **Alt-Step 5:** if the information provided by the user is incomplete or in the incorrect format specified by the system, the system prompts the user to re-enter the information. **Alt-Step 5:** if no rideshare matches exist at this time, the system displays "no matches." The application terminates and returns to the home screen. The employee will receive a notification at a later time if a match is found. **Alt-Step 6:** the user declines the options for matches and the process terminates. The user is brought back to the GEARS application home screen. **Alt-Step 8:** the user takes the option to decline the background check and the process terminates. The user is brought back to the GEARS application home screen.
Conclusion:	The use case concludes when the employee receives a GEARS ID.
Postcondition:	HR receives the GEARS request for a background check with the employee's GEARS ID.
Business Rules:	The employee must be an active employee at the participating company for the rideshare.
Implementation Constraints and Specifications:	GUI mobile application for employee. Secure data transfer to HR to review employee eligibility.
Assumptions:	GEARS ID will transfer to HR department with employee information to initiate a background check.
Open issues:	N/A

Published by DigitalCommons@SHU, 2022

Author(s): __Jagdeep Singh/Desiree Brinn-Rodriguez_____		**Date: 3/5/2022 Version: _1_____**
Use-Case Name :	Check Eligibility	**Use - Case Type**
Use-Case ID :	GEARS02	**Business Requirements :□**
Priority :	High	
Source:	User	
Primary Business Actor:	Human Resource Coordinator	
Other Participating Actors:	Employee (Driver/Rider)	
Other Interested Stakeholders:	Company/HR	
Description:	This use case is to check the eligibility of the employee in the GEARS rideshare system. If electing to be a driver, the employee's eligibility is checked by performing full background check, verifying the vehicle's running condition, its insurance and a valid registration. The driver needs to have a valid insurance. Additionally, the driver needs to meet the company's policy for participation in GEARS. If electing to be a rider, the HR Coordinator will check the employee's eligibility for GEARS based on the company's policy.	
Precondition:	The user needs to be an active employee of the same company of existing drivers & riders, and the driver should have a registered vehicle	
Trigger:	This use case is initiated when an employee obtains a GEARS ID through the GEARS mobile application. The GEARS ID is sent to the HR Coordinator via the Company Dashboard.	
Typical Course of Events:	**Actor Action**	**System Response**
	Step 1: The HR Coordinator logs into the GEARS system. Step 3: The HR Coordinator selects Manage Employees. **Step 5:** The HR Coordinator confirms the employee is meeting company policy for participation.	**Step 2:** The system displays the Company Dashboard with options to Manage Employees or Manage Rewards. Step 4: The application displays employees who are awaiting verification of eligibility. **Step 6:** The system will confirm that there are no other requirements. **Step 7:** The user will be sent rideshare match confirmation. **Step 8:** The "Take Trip" function will be enabled on the application.
Alternate Courses:	**Alt-Step 5:** If required system sends notification to the user for any additional information for verification. **Alt Step 5:** If the employee is not meeting company policy, the HR alerts GEARS, which cancels the rideshare match. **Alt Step 6:** If the employee elected to be a driver, the system will prompt HR to perform a background check.	
Conclusion:	The use case concludes when the rider/driver receives a rideshare match confirmation.	
Postcondition:	User opts for being the driver and has a registered vehicle with all required documents.	

Business Rules:	The user must be an active employee at the participating company for the rideshare.
Implementation Constraints and Specifications:	GUI mobile application for employee.
	Secure data transfer to the HR to review employee eligibility.
Assumptions:	GEARS ID is created and sent to the HR for the background check
Open issues:	N/A

Author(s): __Jagdeep Singh/Desiree Brinn-Rodriguez_____		**Date: _3/6/2022** **Version: _1_____**
Use-Case Name :	Take Trip	**Use - Case Type**
Use-Case ID :	GEARS03	**Business Requirements :□**
Priority :	High	**System Analysis :□**
Source:	User	
Primary Business Actor:	Employee (Driver)	
Other Participating Actors:	Rider/Riders	
Other Interested Stakeholders:	HR Coordinator	
Description:	This use case displays the process of how the trip is started. The Driver views his/her rideshare matches listed by closest proximity. The driver initiates the day's trip to work by picking up the first rider and then all subsequent riders. The driver then proceeds with the riders to the work location. At the end of the shift, the driver and riders meet in a designated location and the driver drops off each rider at their home address. Once the driver completes the drop off for the last employee, the trip is logged. A response is sent to the company's Human Resource Department (HR) who will determine the driver/riders' rewards in a later use case.	
Precondition:	The user initiating the rideshare request must be an employee of the same company of existing riders and drivers.	
Trigger:	This use case is initiated when an employee driver is ready to start the trip on the GEARS mobile application.	
Typical Course of Events:	**Actor Action**	**System Response**
	Step 1: The employee driver initiates the trip.	**Step 2:** The system displays the address of the nearest rider for pickup. **Step 3:** The system notifies the rider that the driver is heading to their location.
	Step 3: The driver drives to pick up the rider.	**Step 4:** The system requests pickup confirmation from rider.
	Step 5: The carpool arrives to the work location. **Step 6:** The driver and rider(s) meet at the end of the day for the ride home.	
	Step 7: After dropping off the riders, the driver confirms the end of the trip.	**Step 8:** The system logs the trip success and sends update to the employees record to the HR Coordinator.

Alternate Courses:	**Alt-Step 1:** If the user is a driver and has never used the GEARS application, can select JOIN NOW, and if he/she is a registered user then clicks on Sign in. If the user forgets the username/password, can opt for lookup username or forgot password option.
	Alt-Step 5: If there is more than one rider, Steps 2-3 will loop until all riders are picked up.
	Alt-Step 6: If a rider has opted for an emergency ride home, the system notifies the driver.
Conclusion:	The use case concludes when the Driver picks up & drops off all the employees in a round trip to and from work.
Postcondition:	Trip success or failure is logged in the GEARS system and updated in the HR Coordinator's management profile.
Business Rules:	The employee must be an active employee at the participating company for the rideshare.
Implementation Constraints and Specifications:	GUI mobile application for employee.
	Geolocation API is used for driver/rider proximity and trip updates.
Assumptions:	Driver should see the list of employees for pickup and TAKE TRIP button enabled and upon completing all the drops END TRIP button is enabled.
Open issues:	N/A

Author(s): __Christopher Sikorski_____		**Date: _03/09/22_ Version: _1_____**
Use-Case Name :	Request Emergency Ride	**Use - Case Type**
Use-Case ID :	GEARS04	**Business Requirements :□**
Priority :	High	**System Analysis :□**
Source:	User	
Primary Business Actor:	Employee (Rider/Driver)	
Other Participating Actors:	Driver/Rider/Riders	
Other Interested Stakeholders:	Driver/Rider/Riders	
Description:	This use case displays the process of how to start an emergency ride. The rider can request an emergency ride due to car break down or if the driver/rider needs to work late or leave early. This is done through the GEARS app and will notify HR with the emergency ride. The Employee driver/rider can choose which emergency ride they need.	
Precondition:	The user initiating the emergency ride request must be an employee of the same company of existing riders and drivers.	
Trigger:	This use case is initiated when an employee driver/rider requests an emergency ride on the GEARS mobile application.	
Typical Course of Events:	**Actor Action**	**System Response**
	Step 1: The employee rider requests emergency ride on GEARS mobile application.	**Step 2:** The system displays the list of emergency ride choices available at the time of request.
	Step 3: Employee rider selects the emergency ride choice.	**Step 4:** The emergency ride picks up rider/driver.
	Step 6: The rider gets a ride home using an outside vendor.	**Step 5:** HR is notified of the emergency ride. **Step 7:** Employee rider/driver is reimbursed for the emergency ride if needed.
Alternate Courses:	**Alt-Step 1:** The rider can elect to find their own ride home outside of the application.	
Conclusion:	The use case concludes when the driver/rider requests an emergency ride and selects the Emergency Ride button and chooses their option.	
Postcondition:	After the employee rider/driver selects emergency ride, HR will be notified of the issues.	
Business Rules:	The employee must be an active employee at the participating company for the rideshare/emergency ride.	
Implementation Constraints and Specifications:	N/A	
Assumptions:	Driver/Rider should have an vendor account for an emergency ride payment	
Open issues:	N/A	

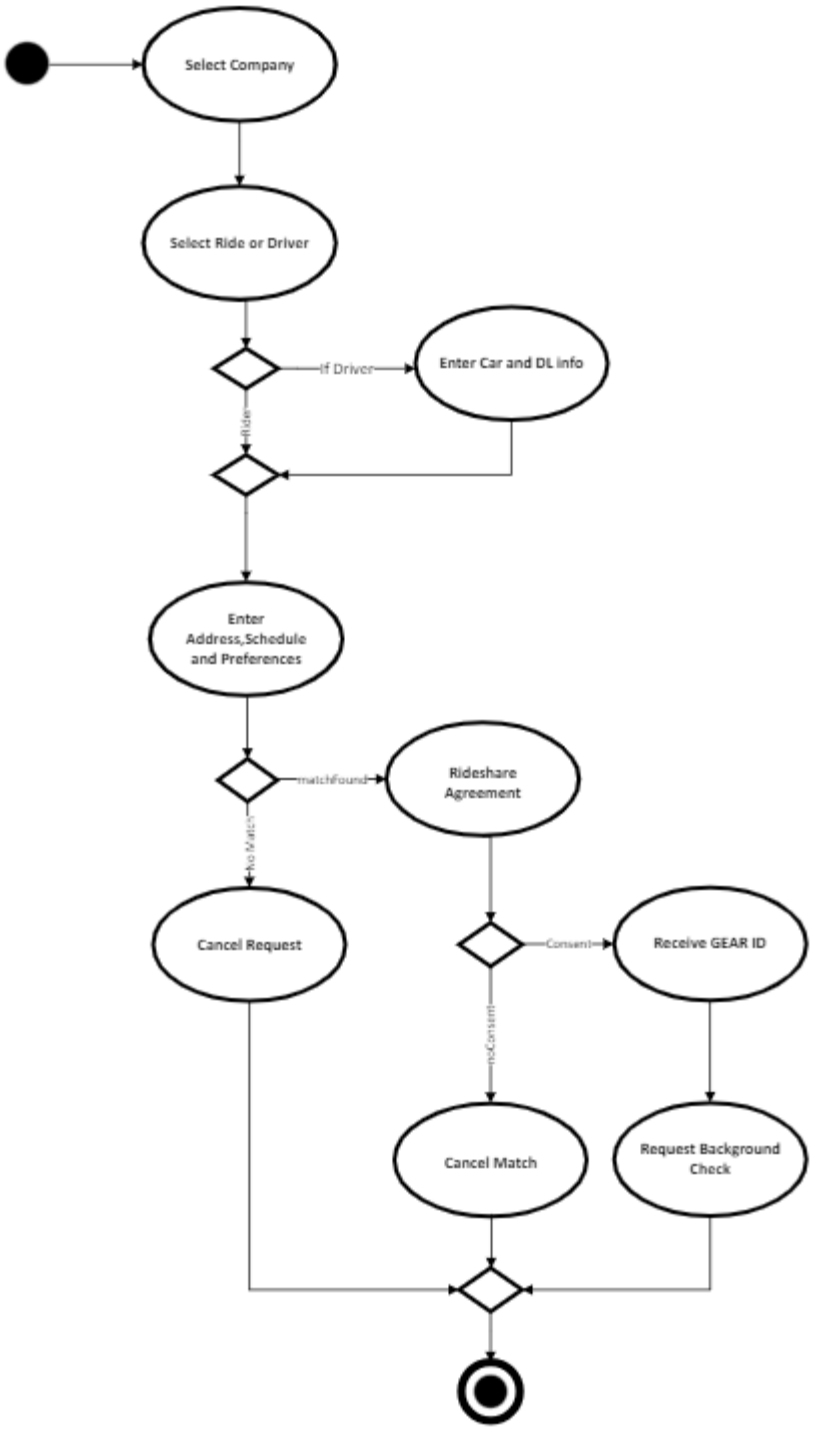
Author(s): __Keerthi Kumar Pasupula/Desiree Brinn-Rodriguez_____		**Date: __3/6/2022** **Version: _1_____**
Use-Case Name :	Release Rewards	**Use - Case Type Business Requirements :□** **System Analysis: □**
Use-Case ID :	GEARS05	
Priority :	High	
Source:	User	
Primary Business Actor:	HR Coordinator	
Other Participating Actors:	Driver, Rider	
Other Interested Stakeholders:	N/A	
Description:	This use case is provided to the users who use the rides regularly. They can use these rewards for gas reimbursement (if driver), company sponsored rewards, such as meal vouchers.	
Precondition:	The user who wants to use these rewards must be Riders & drivers of the same company of existing riders and drivers.	
Trigger:	This use case is initiated when the HR Coordinator receives a response of a successful trip.	
Typical Course of Events:	**Actor Action**	**System Response**
	Step 1: The HR Coordinator logs into GEARS system to manage rewards.	**Step 2:** The system provides a list of successful trips with driver and rider information.
	Step 3: The HR Coordinator confirms employee eligibility for rewards based on trip success and company policy.	**Step 4:** The system updates the driver and rider GEARS profiles with reward code.
	Step 5: Riders and Drivers can access the rewards to use.	
Alternate Courses:	**Alt-Step 3:** Employees who are no longer active or no longer eligible for the rideshare program are marked ineligible for rewards.	
Conclusion:	The use case concludes that rewards are uploaded in driver/rider's GEARS profile.	
Postcondition:	The Riders or drivers would get access to use these rewards only when they utilize the app on regular basis.	
Business Rules:	The employee must be active to use these rewards and not terminated from the company or on suspension.	
Implementation Constraints and Specifications:	GUI mobile application for employee.	
	The users will have full privilege to use these rewards	
Assumptions:	GEARS ID will transfer to HR department with employee information to initiate a Rewards	
Open issues:	N/A	

6.2.4 Event Table. (Event Diagrams)

Event Table						
Event	**Event Type**	**Trigger**	**Source**	**Use Case**	**Response**	**Destination**
Employee elects to be a rider or driver on GEARS application	External	GEARS profile rideshare creation	User	**Set Rideshare**	GEARS ID created/Rideshare Match	Human Resource (HR) Coordinator
HR Coordinator checks employee's eligibility	State	Background Check	HR Coordinator	**Check Eligibility**	Confirmation of rider/driver eligibility	GEARS database
Driver starts trip	External	Notification of work start/end time	User	**Start Trip**	Notification to pickup	Rider
Rider requests alternate ride	External	Emergency circumstance	User	**Emergency Ride Home**	GEARS rideshare match or display link to ride-hail application	User
Driver and rider successfully complete rideshare round trip (home-to-work and work-to-home)	State	Successful trip logged	GEARS Trip data store	**Release Rewards**	Generate benefit release	HR Coordinator

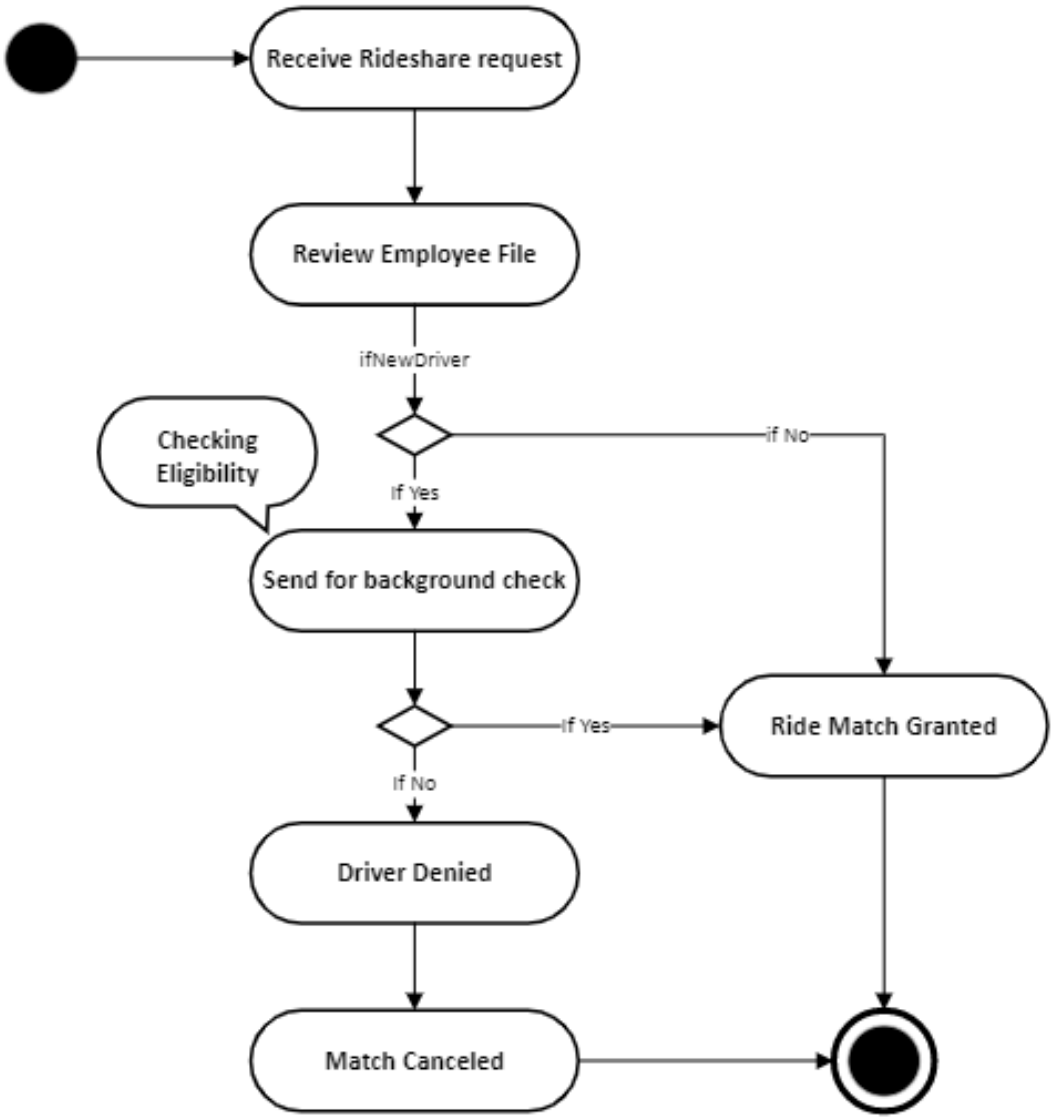
6.2.5 Activity Diagram

Set Rideshare Use Case

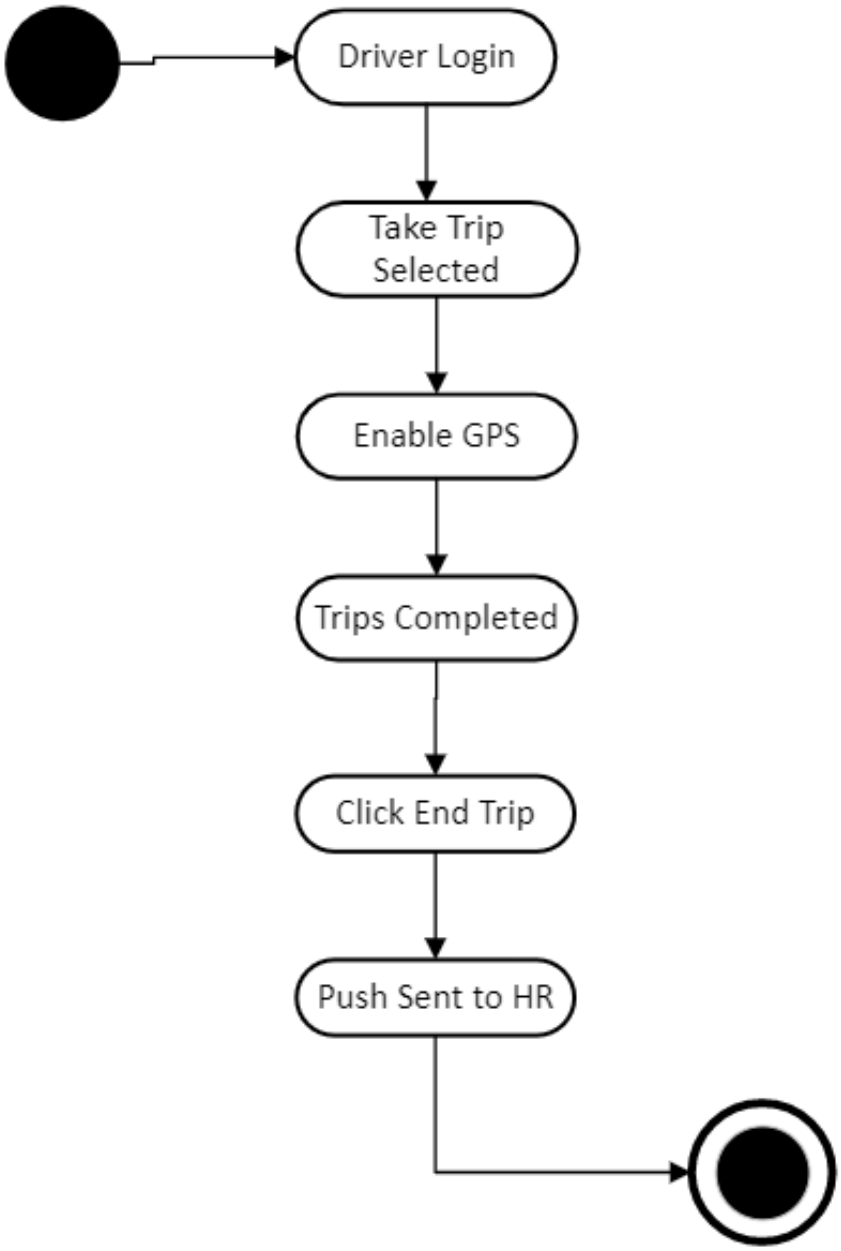


Published by DigitalCommons@SHU, 2022

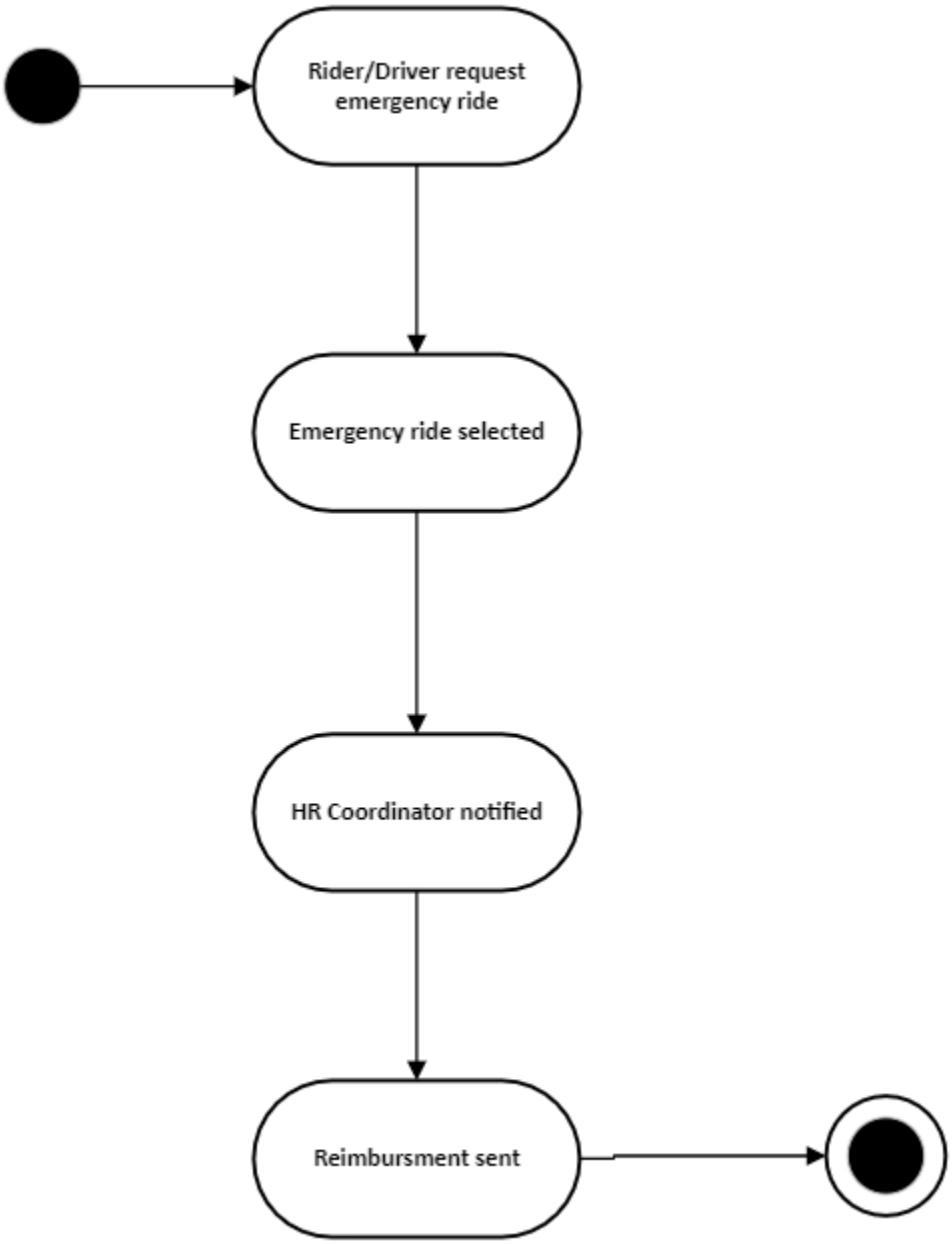
Check Eligibility Use Case



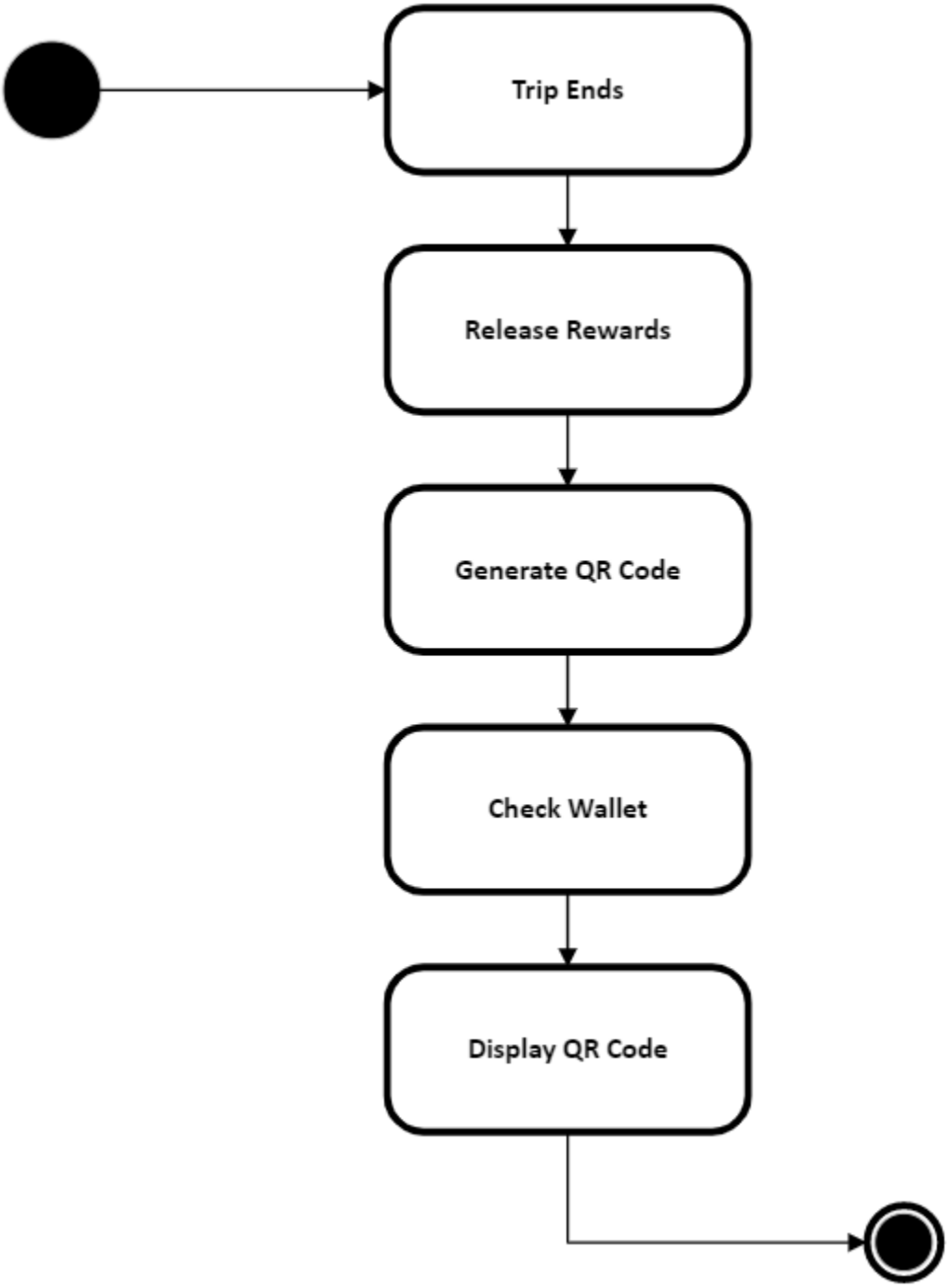
Take Trip Use Case



Emergency Ride Home Use Case:

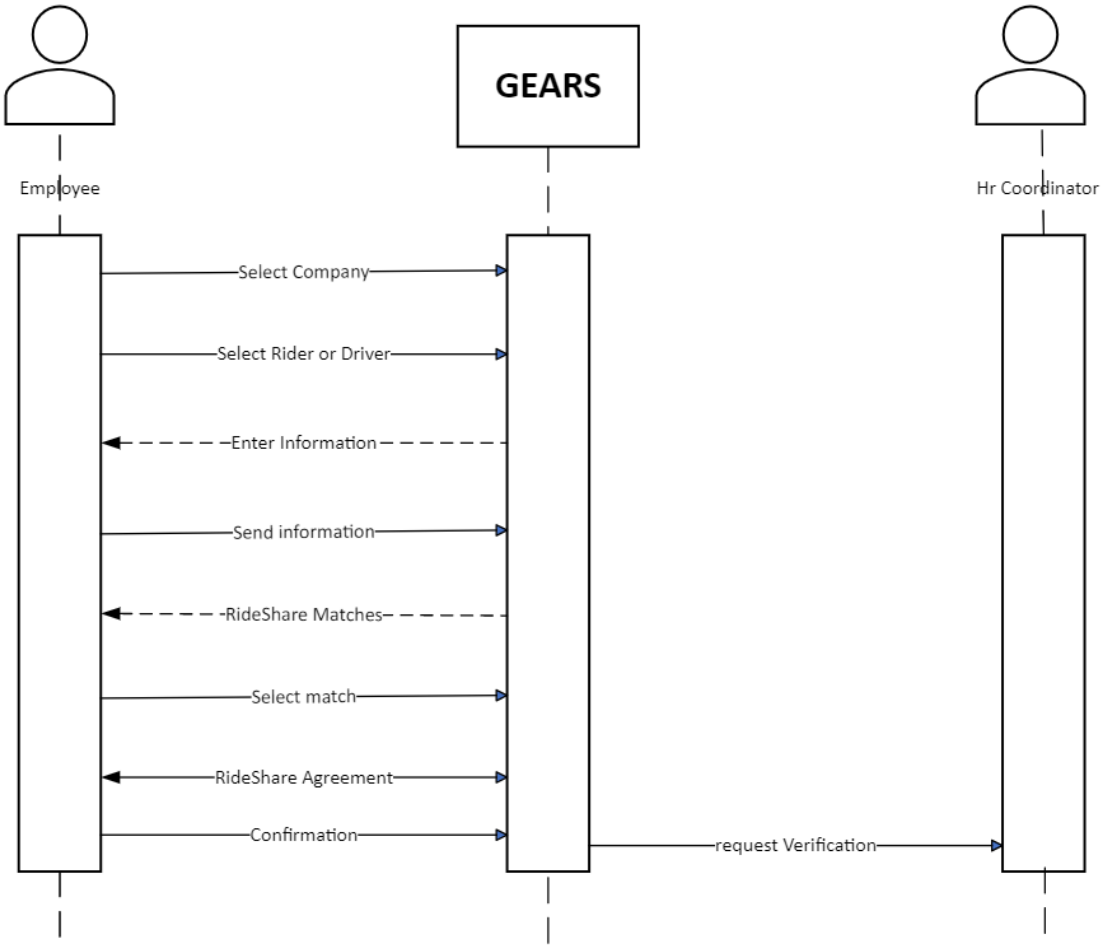


Release Rewards Use Case

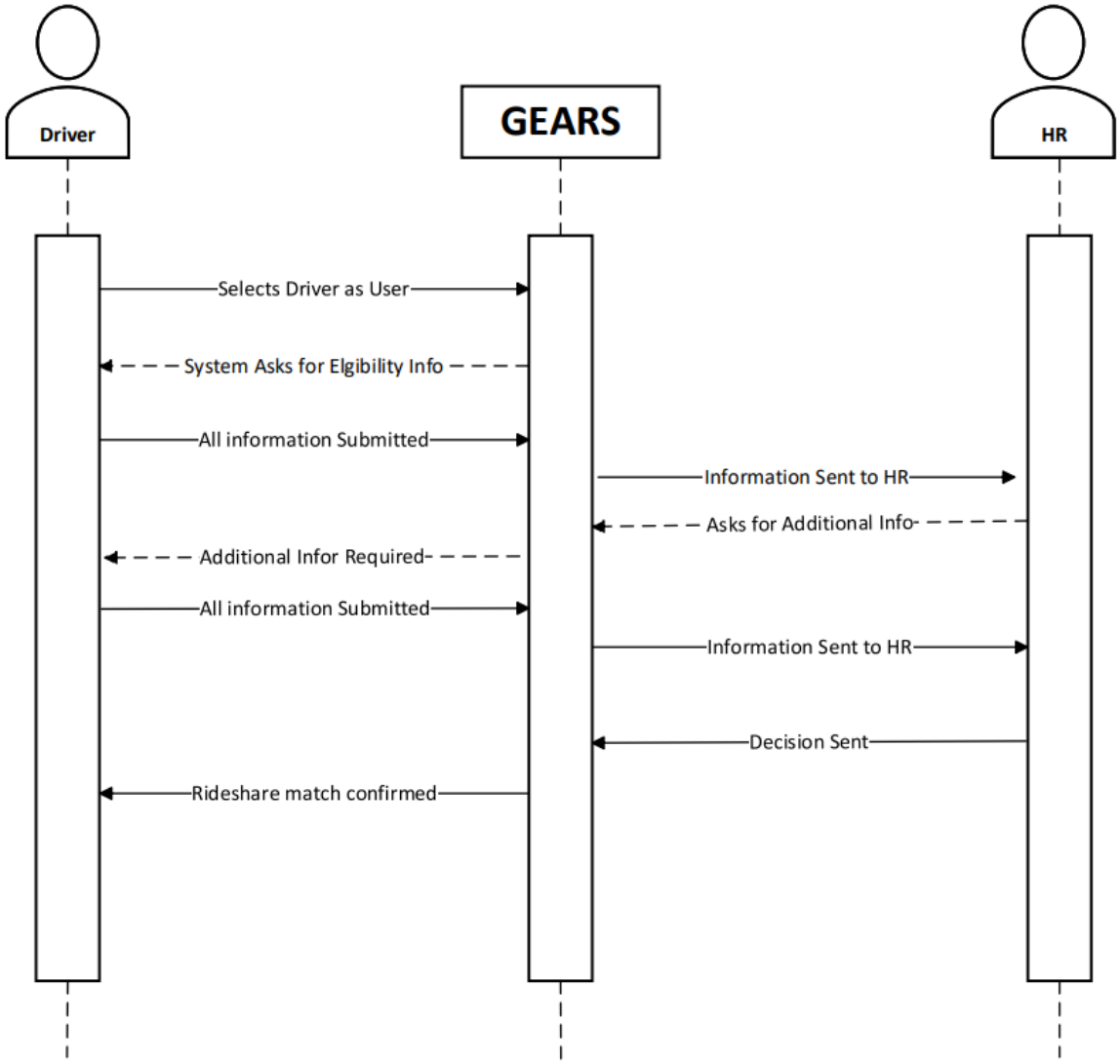


6.2.6 Systems Sequence Diagram for Use Cases

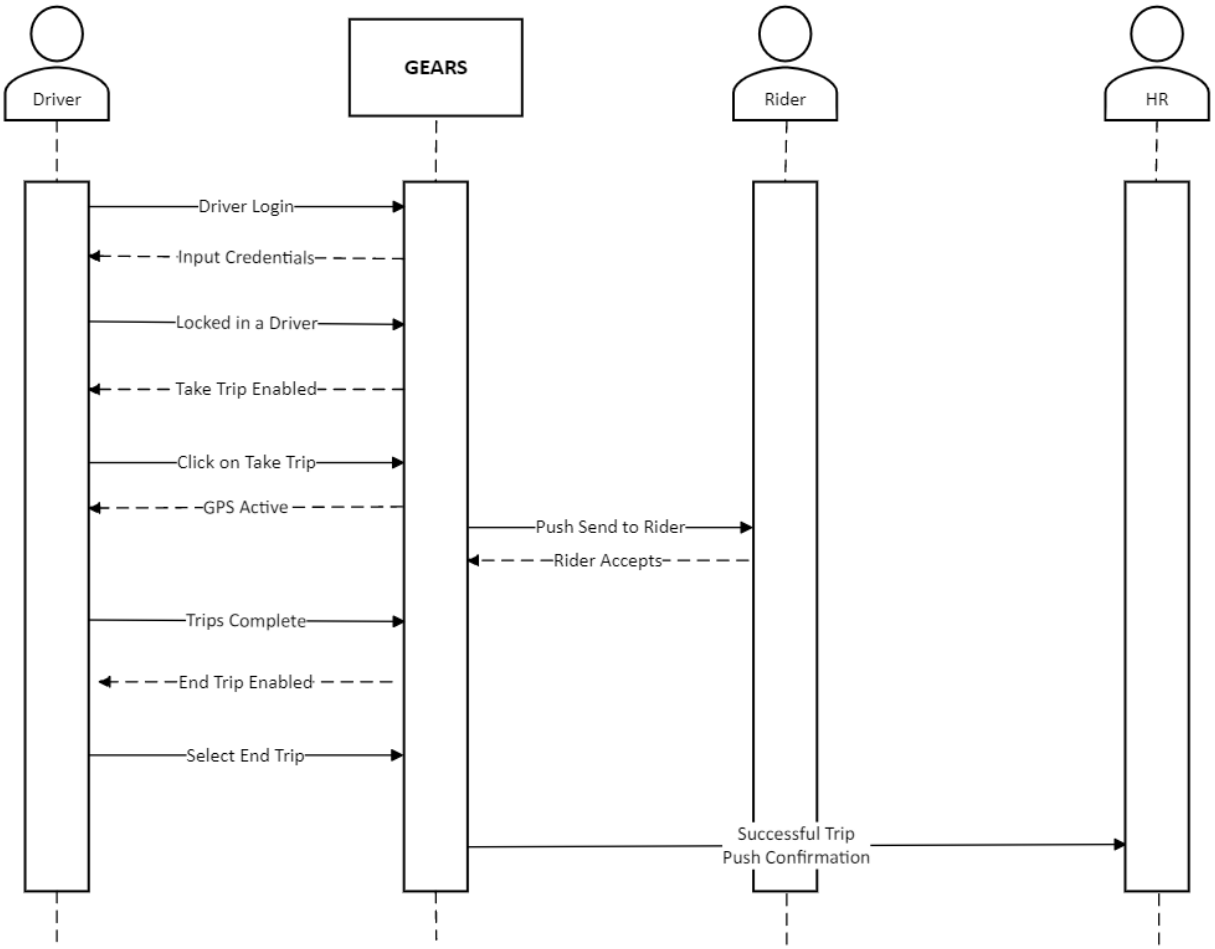
Set Rideshare Use Case



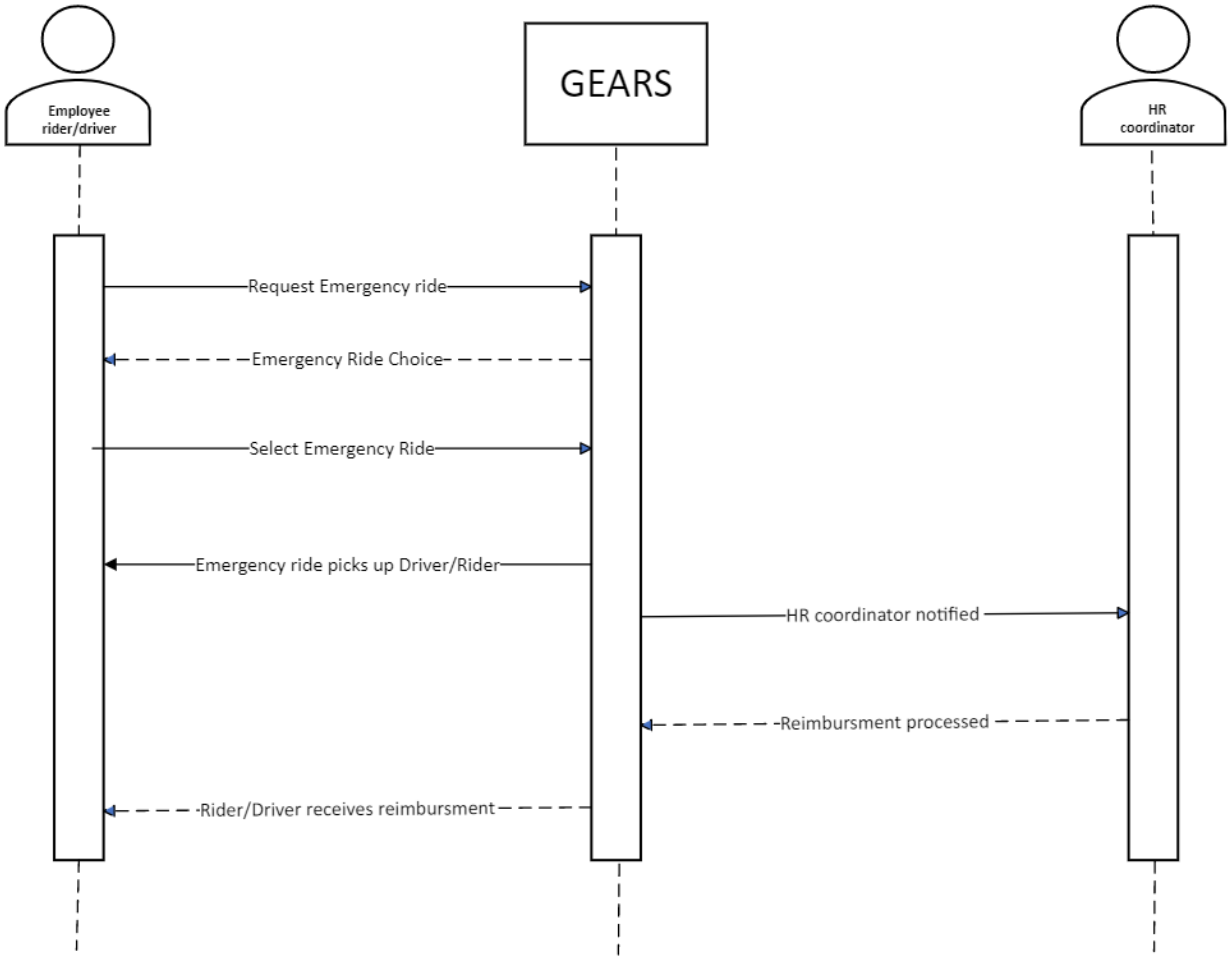
Check Eligibility Use Case



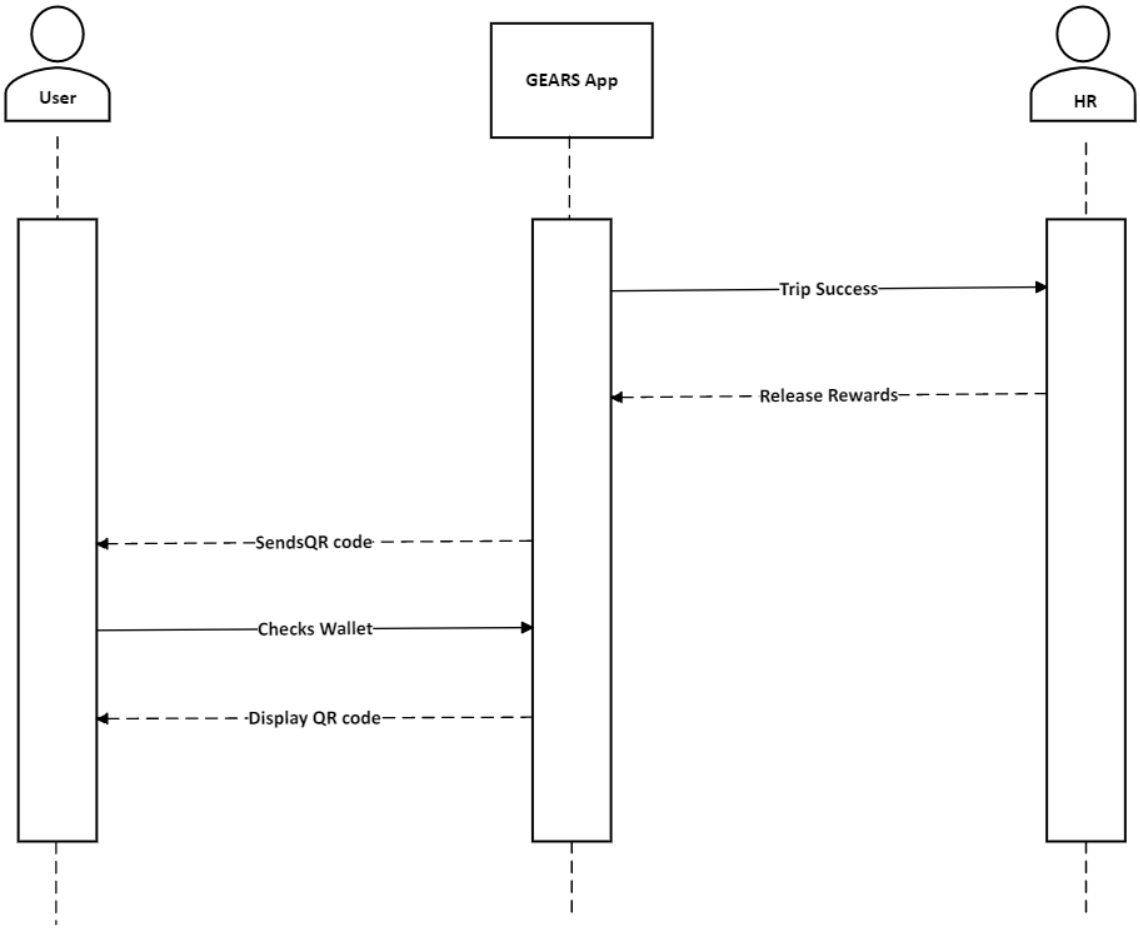
Take Trip Use Case



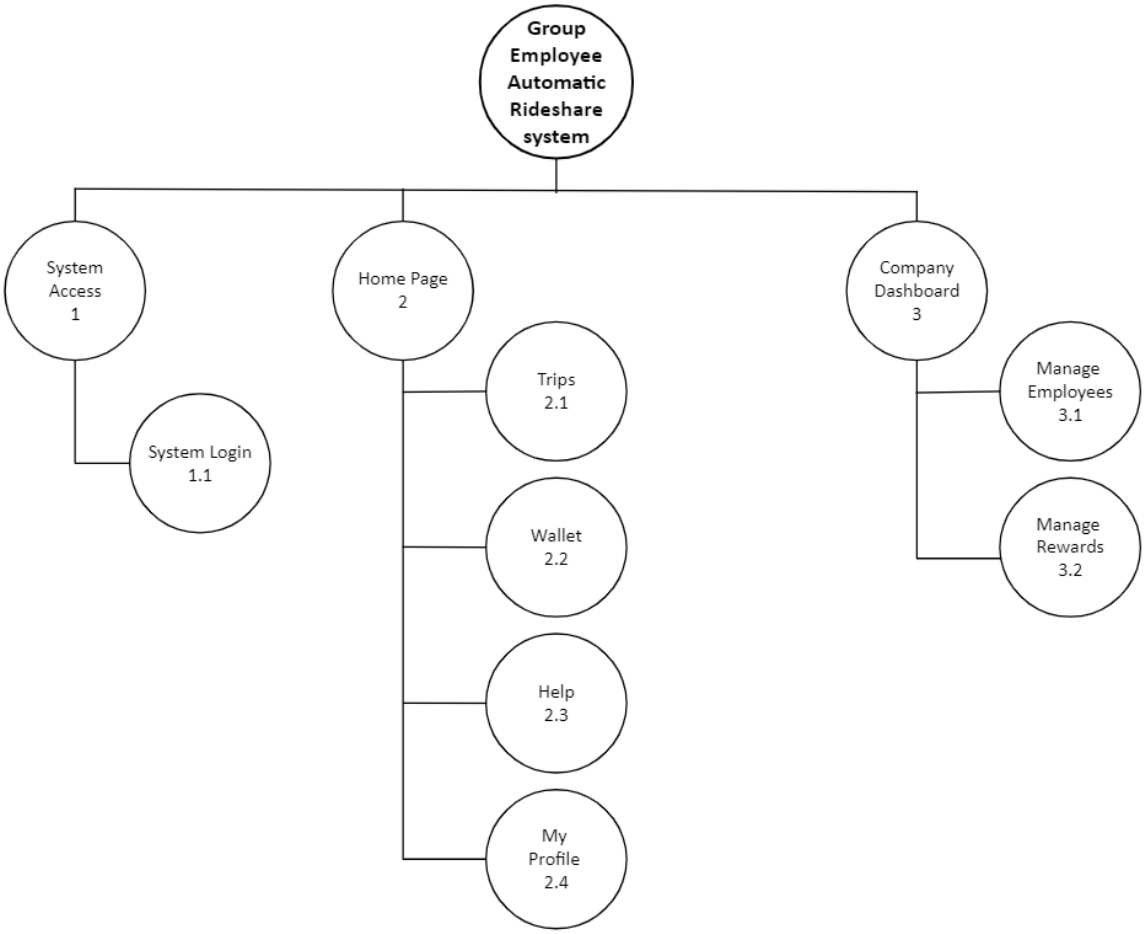
Emergency Ride Home Use Case



Release Rewards Use Case

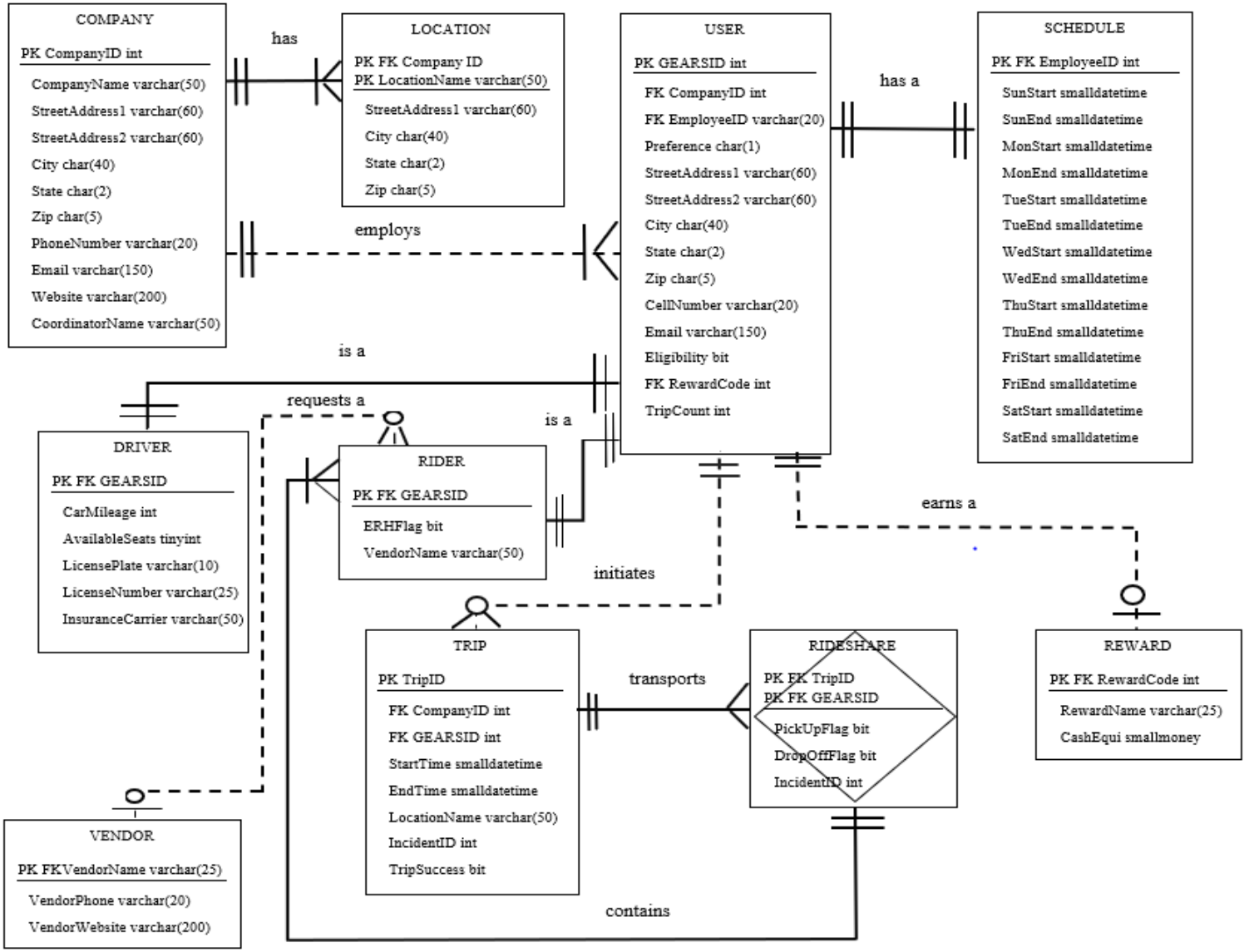


6.2.7 Software Structure Chart Showing Module Hierarchy



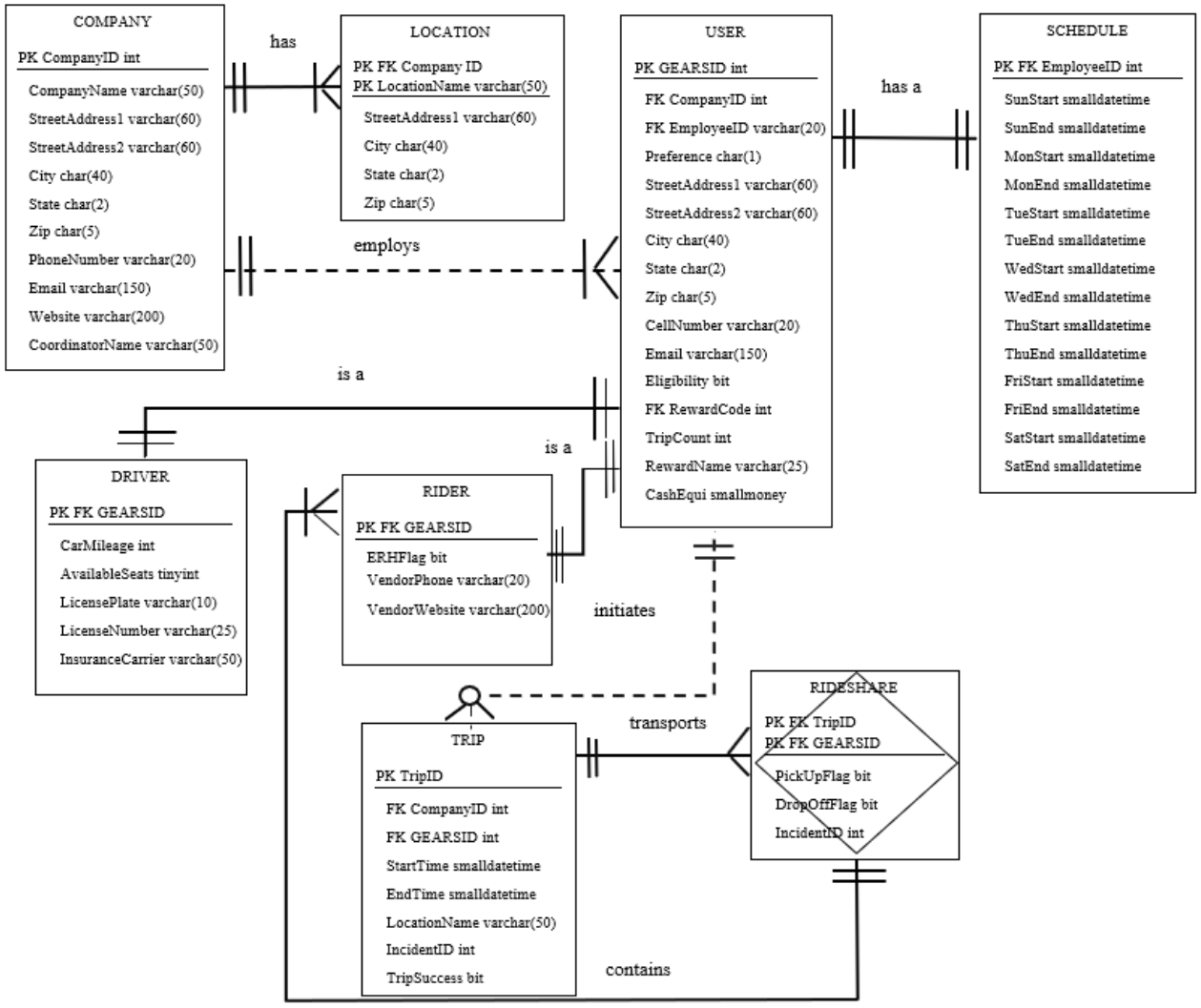
6.3 Design the System Database

6.3.1 Detailed Entity Relationship (ER) Diagram


COMPANY
PK CompanyID int
CompanyName varchar(50)
StreetAddress1 varchar(60)
StreetAddress2 varchar(60)
City char(40)
State char(2)
Zip char(5)
PhoneNumber varchar(20)
Email varchar(150)
Website varchar(200)
CoordinatorName varchar(50)
has
LOCATION
PK FK Company ID
PK LocationName varchar(50)
StreetAddress1 varchar(60)
City char(40)
State char(2)
Zip char(5)
employs
USER
PK GEARSID int
FK CompanyID int
FK EmployeeID varchar(20)
Preference char(1)
StreetAddress1 varchar(60)
StreetAddress2 varchar(60)
City char(40)
State char(2)
Zip char(5)
CellNumber varchar(20)
Email varchar(150)
Eligibility bit
FK RewardCode int
TripCount int
has a
SCHEDULE
PK FK EmployeeID int
SunStart smalldatetime
SunEnd smalldatetime
MonStart smalldatetime
MonEnd smalldatetime
TueStart smalldatetime
TueEnd smalldatetime
WedStart smalldatetime
WedEnd smalldatetime
ThuStart smalldatetime
ThuEnd smalldatetime
FriStart smalldatetime
FriEnd smalldatetime
SatStart smalldatetime
SatEnd smalldatetime
is a
DRIVER
PK FK GEARSID
CarMileage int
AvailableSeats tinyint
LicensePlate varchar(10)
LicenseNumber varchar(25)
InsuranceCarrier varchar(50)
requests a
is a
RIDER
PK FK GEARSID
ERHFlag bit
VendorName varchar(50)
earns a
initiates
TRIP
PK TripID
FK CompanyID int
FK GEARSID int
StartTime smalldatetime
EndTime smalldatetime
LocationName varchar(50)
IncidentID int
TripSuccess bit
transports
RIDESHARE
PK FK TripID
PK FK GEARSID
PickUpFlag bit
DropOffFlag bit
IncidentID int
REWARD
PK FK RewardCode int
RewardName varchar(25)
CashEqui smallmoney
VENDOR
PK FKVendorName varchar(25)
VendorPhone varchar(20)
VendorWebsite varchar(200)
contains

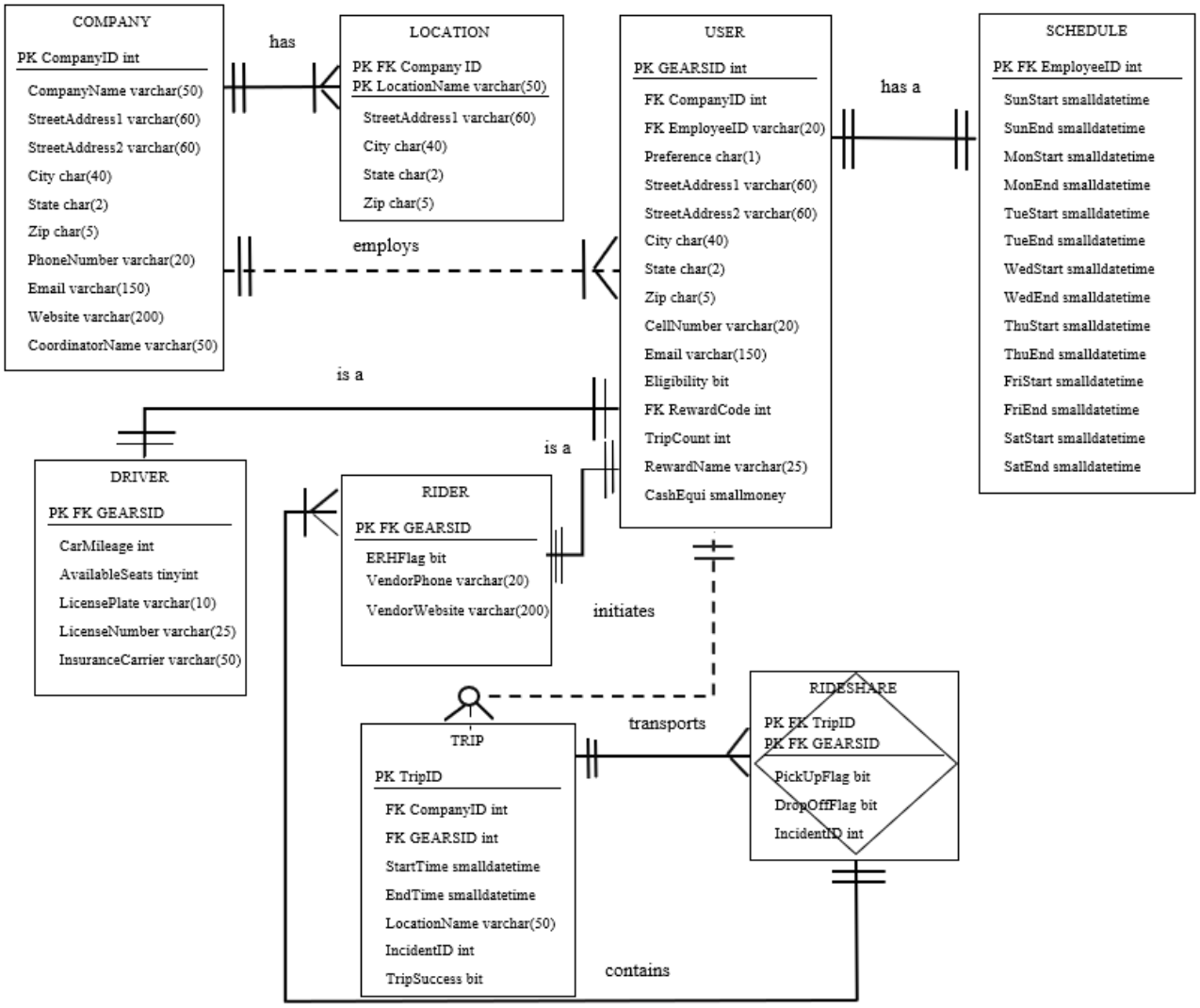
6.3.2 Perform the 3 Normalization forms, Listing Dependencies

First Normal Form

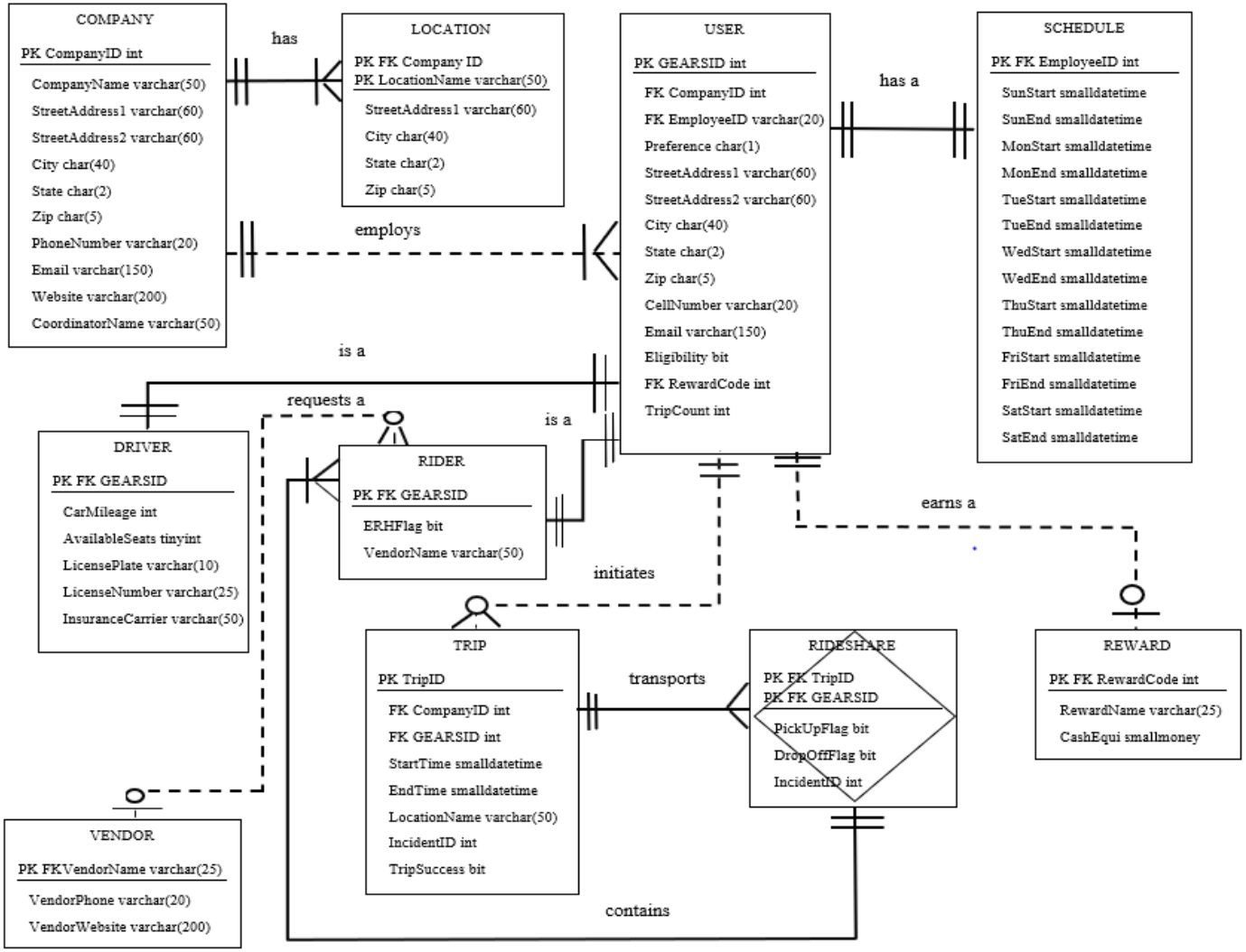


Published by DigitalCommons@SHU, 2022

Second Normal Form



Third Normal Form



Published by DigitalCommons@SHU, 2022

6.3.3 Chart Entities, Attributes, Domain, Primary keys and Foreign keys

These items are included in the data dictionary.

6.3.4 Data Dictionary of All the Attributes

Table	Attributes	Data Type	Primary Key	Foreign Key	Allows Null	Description
COMPANY	CompanyID	int	Y	N	N	Company's Identification Number
	CompanyName	varchar(50)	N	N	N	Company's Name
	StreetAddress1	varchar(60)	N	N	N	Company's Primary Address
	StreetAddress2	varchar(60)	N	N	Y	Company's Secondary Address
	City	char(40)	N	N	N	Company's City
	State	char(2)	N	N	N	Company's State
	Zip	char(5)	N	N	N	Company's Zip Code
	PhoneNumber	varchar(20)	N	N	N	Company's Phone Number
	Email	varchar(150)	N	N	N	Company's Contact Email
	Website	varchar(200)	N	N	N	Company's Website
	CoordinatorName	varchar(50)	N	N	N	HR Coordinator's Name
LOCATION	CompanyID	int	Y	Y	N	Company's Identification Number
	LocationName	varchar(50)	Y	N	N	Location Name For Work Destination
	StreetAddress1	varchar(60)	N	N	N	Department Address
	City	char(40)	N	N	N	Department City
	State	char(2)	N	N	N	Department State
	Zip	char(5)	N	N	N	Department Zip Code
SCHEDULE	EmployeeID	varchar(20)	Y	Y	N	Employee's Identification Number with Company
	SunStart	smalldatetime	N	N	Y	Sunday Start Time in 24 Hour Format
	SunEnd	smalldatetime	N	N	Y	Sunday End Time in 24 Hour Format

	MonStart	smalldatetime	N	N	Y	Monday Start Time in 24 hour Format
	MonEnd	smalldatetime	N	N	Y	Monday End Time in 24 Hour Format
	TueStart	smalldatetime	N	N	Y	Tuesday Start Time in 24 Hour Format
	TueEnd	smalldatetime	N	N	Y	Tuesday End Time in 24 Hour Format
	WedStart	smalldatetime	N	N	Y	Wednesday Start Time in 24 Hour Format
	WedEnd	smalldatetime	N	N	Y	Wednesday End Time in 24 Hour Format
	ThuStart	smalldatetime	N	N	Y	Thursday Start Time in 24 Hour Format
	ThuEnd	smalldatetime	N	N	Y	Thursday End Time in 24 Hour Format
	FriStart	smalldatetime	N	N	Y	Friday Start Time in 24 Hour Format
	FriEnd	smalldatetime	N	N	Y	Friday End Time in 24 Hour Format
	SatStart	smalldatetime	N	N	Y	Saturday Start Time in 24 Hour Format
	SatEnd	smalldatetime	N	N	Y	Saturday End Time in 24 Hour Format
USER	GEARSID	int	Y	N	N	GEARS User Identification Number
	CompanyID	int	N	Y	N	Company's Identification Number
	EmployeeID	varchar(20)	N	Y	N	Employee's Identification Number with Company
	Preference	char(1)	N	N	N	User's GEARS Preference (R - Rider, D - Driver)
	StreetAddress1	varchar(60)	N	N	N	User's Primary Address
	StreetAddress2	varchar(60)	N	N	Y	User's Secondary Address
	City	char(40)	N	N	N	User's City
	State	char(2)	N	N	N	User's State
	Zip	char(5)	N	N	N	User's Zip Code
	CellNumber	varchar(20)	N	N	N	User's Mobile Phone Number
	Email	varchar(150)	N	N	Y	User's Contact Email
	Eligibility	bit	N	N	N	User's Rideshare Eligibility
	RewardCode	int	N	Y	Y	User's Reward
	TripCount	int	N	N	N	User's Successful Trip Count - Lifetime
DRIVER	GEARSID	int	Y	N	N	GEARS User Identification Number

	CarMileage	int	N	N	N	Driver's Odometer Reading
	AvailableSeats	tinyint	N	N	N	Remaining Available Seats for Riders in Driver's Car
	LicensePlate	varchar(10)	N	N	N	Driver's License Plate Number
	LicenseNumber	varchar(25)	N	N	N	Driver's State-issued License Number
	InsuranceCarrier	varchar(50)	N	N	N	Driver's Insurance Carrier Name
RIDER	GEARSID	int	Y	Y	N	GEARS User Identification Number
	ERHFlag	bit	N	N	Y	Emergency Ride Home Flag
	VendorName	varchar(50)	Y	Y	N	Emergency Ride Home Vender Preference
TRIP	TripID	int	Y	N	N	Trip Identification Number
	CompanyID	int	N	Y	N	Company Identification Number
	GEARSID	int	N	Y	N	Driver GEARS Identification Number
	StartTime	smalldatetime	N	N	N	Start Time of Trip in 24 hour Format
	EndTime	smalldatetime	N	N	Y	End Time of Trip in 24 hour Format
	LocationName	varchar(50)	N	Y	N	Department Name for work destination
	IncidentID	int	N	N	Y	Incident Occurrence ID
	TripSuccess	bit	N	N	N	Overall Trip Success Flag
RIDESHARE	TripID	int	Y	Y	N	Trip Identification Number
	GEARSID	int	Y	Y	N	Rider GEARS Identification Number
	PickUpFlag	bit	N	N	Y	Successful Pickup Flag
	DropOffFlag	bit	N	N	Y	Successful Dropoff Flag
	IncidentID	int	N	N	Y	Incident Occurrence ID
REWARD	RewardCode	int	Y	N	N	Benefit Code for Identification
	RewardName	varchar(25)	N	N	N	Name of Benefit
	CashEqui	smallmoney	N	N	Y	Cash Equivalent of Benefit

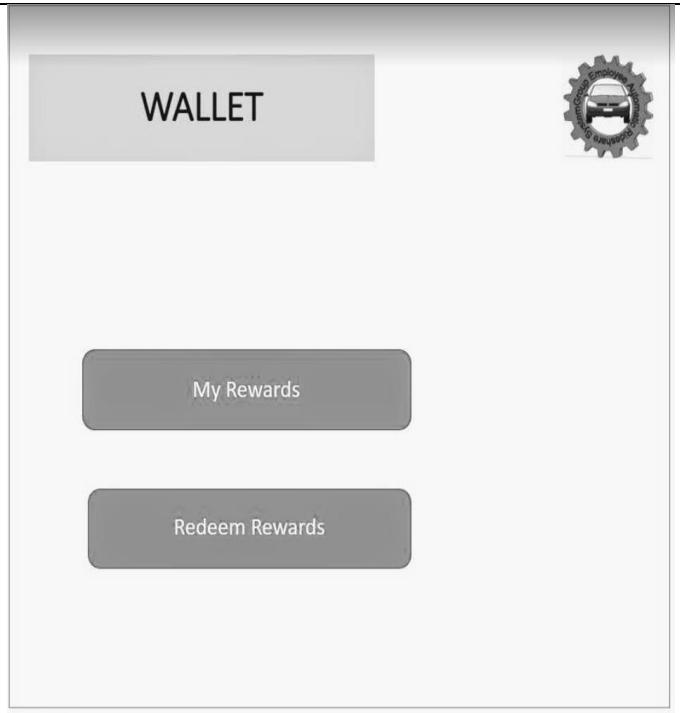
VENDOR	VendorName	varchar(25)	Y	N	N	Emergency Ride Home Vendor Name
	VendorPhone	varchar(20)	N	N	N	Emergency Ride Home Vendor Phone Number
	VendorWebsite	varchar(200)	N	N	N	Emergency Ride Home Vendor Website

6.4 System Interface

Module Name	**GEARS Login**
Parameters Passed & Meaning	Email/Phone Number: The email/Phone number are essentially the username which are user specific. Password: Password is the password created by user and associated with username.
Description of Module Function	The module is used to gain access to the GEARS system. User will input their username and password.
Input	Click: Sign in
Output	Access to GEARS system if credentials are valid. Deny access if invalid credentials.
Called Modules	Dashboard.
Report/ Screen Layout	
Story	Once the user submits credentials, they will either be granted or denied to the GEARS system based on the credentials provided.
Error Message	If invalid credentials, prompt user of invalid credentials and denied access.

Module Name	**Homepage – GEARS**
Parameters Passed & Meaning	No parameters passed.
Description of Module Function	This is the home page of the GEARS system. From here user can access the different functions of the system using the tabs in the bottom.
Input	Click: “TRIPS”, “WALLET”, “HELP”, “MY PROFILE” and “MORE” to explore those functionalities.
Output	According to what is “clicked”, the tab will expand to display sub tabs.
Called Modules	“TRIPS”, “WALLET”, “HELP”, “MY PROFILE” and “MORE”
Report/ Screen Layout	
Story	Once access to system is granted, User can define himself as a Driver or the Rider and use the functionalities based of on the selected option.

Module Name	**TRIPS**
Parameters Passed & Meaning	TRIPS will enable only when the user is signed in as a Driver.
Description of Module Function	This tab displays the upcoming and completed trips by the Driver. Also, when the Driver selects the next trip button, GPS will be activated and is defaulted to the first rider pickup address.
Input	Click "TRIPS" tab available at the bottom of the screen.
Output	Display the Completed and Upcoming trips for the driver.
Called Modules	
Report/ Screen Layout	
Story	To access the TRIPS tab and see the upcoming and completed trips by the Driver.

Module Name	**WALLET**
Parameters Passed & Meaning	WALLET to display the total reward points earned through the completed trips
Description of Module Function	HR team upon a successful validation on the completed trips gives the rewards to the employee which they can redeem anytime by selecting any of the available gift coupons.
Input	Select “My Rewards” button.
Output	To display the total rewards earned through successful completion of the trips.
Called Modules	
Report/ Screen Layout	
Story	Upon selecting the Wallet tab, the user should see the total rewards earned through successful completion of the trips and also show the pending rewards(HR verification).

Published by DigitalCommons@SHU, 2022

Module Name	**COMPANY DASHBOARD**
Parameters Passed & Meaning	COMPANY DASHBOARD is used for the Human Resource Coordinator to manage employee participation in GEARS
Description of Module Function	The Human Resource Coordinator uses the module to check employee eligibility and to release rewards for successful trips.
Input	Select “Manage Employees” or “Manage Rewards” after GEARS login.
Output	To display the total rewards earned through successful completion of the trips.
Called Modules	
Report/ Screen Layout	
Story	The Human Resource Coordinator logs into the GEARS application and can access two options on the Company Dashboard to manage employee participation.

7.0 Construction Phase

Section 7 is to be completed.

8.0 Implementation Phase

Section 8 is to be completed.

9.0 Glossary

Carpool, Carpooling: Two or more parties occupying the same motor vehicle to travel at a specified time to the same destination or on the same route.

Cloud-based database: A database hosted online as opposed to on local servers.

Driver: The individual who operates the vehicle and initiates the rideshare. A driver must pass a background check, attest to appropriate insurance coverage, and maintain a clean driving record. Drivers are the start point for any rideshare trip into the workplace. They are responsible for picking up riders.

ERH: Short for Emergency Ride Home. This is an option in GEARS for a rider to request alternative service outside of the normal pickup routine. This is to be used in cases where the driver cancels a trip or if a rider needs to leave the workplace early.

Essential Employees: Employees of a company who are required to be on-site at the company to perform their job duties and functions. Essential employees are ineligible for remote work.

Geolocation API: An application programming interface that can be used as an intermediary to connect applications to geolocation features, such as maps and directions.

Rider: A passenger who gets matched with a driver based on home address proximity and work schedule.

Rideshare, Ridesharing: Traditional carpooling of a driver and one or multiple riders to the same destination.

Ride-hailing Application: A mobile application used to summon a ride, such as a taxi or from service. Ride-hailing summons a ride, which is usually paid for by the rider under an agreement between the driver, cab owner, or parent ride-hailing company.

9.1 Index

10.0 Bibliography

Bhagat, S. (2014). Why Do Venture Capitalists Use Such High Discount Rates? *The Journal of Risk Finance, 15*(1), 94-98. doi:DOI 10.1108/JRF-08-2013-0055

CT Department of Transportation. (2014, February 11). *CTrides Offers Connecticut Commuters Rewards For Greener Trips*. Retrieved January 31, 2022, from CT.gov: https://portal.ct.gov/DOT/News-from-the-Connecticut-Department-of-Transportation/2014/CTrides-OFFERS-CONNECTICUT-COMMUTERS-REWARDS-FOR-GREENER-TRIPS

CT Department of Transportation. (2022). *About*. Retrieved January 31, 2022, from CTrides: https://ctrides.com/about/

CT Department of Transportation. (2022). *Commuting Options*. Retrieved January 31, 2022, from CTrides: https://ctrides.com/commuters/commuting-options/

CT Department of Transportation. (2022). *Find Rides*. Retrieved 31 January, 2022, from CTrides: https://ctrides.agilemile.com/

CT.gov. (2022, February 25). *About Us*. Retrieved March 5, 2022, from CTDOT Organization Chart: https://portal.ct.gov/-/media/DOT/documents/dexec/Commissioners-Org-Chart.pdf

Google. (n.d.). *Pricing Plans and API Costs*. Retrieved March 1, 2022, from Google Maps Platform: https://mapsplatform.google.com/pricing/

Iacurci, G. (2021, August 26). *Pandemic Pushes Hunt for Remote Jobs Up 460%*. Retrieved March 5, 2022, from CNBC: https://www.cnbc.com/2021/08/26/covid-pandemic-pushes-hunt-for-remote-jobs-up-460percent.html

International Energy Agency. (2022, March 18). *A 10-Point Plan to Cut Oil Use*. Retrieved March 2022, 19, from IEA: https://www.iea.org/reports/a-10-point-plan-to-cut-oil-use

Uber Technologies Inc. (2022, February 27). *FAQs*. Retrieved from Uber Movement: https://movement.uber.com/faqs?lang=en-US

Uber Technologies Inc. (2022). *How Does Uber Work?* Retrieved February 27, 2022, from https://help.uber.com/riders/article/how-does-uber-work?nodeId=738d1ff7-5fe0-4383-b34c-4a2480efd71e

11.0 Contacts

11.1 Contact Information and Expertise of Stakeholders

Name	Email	Expertise
Desiree Brinn-Rodriguez	brinn-rodriguezd2@mail.sacredheart.edu	Project Manager System Analyst Cost Analyst Database Administrator Quality Assurance
Keerti Kumar Pasupula	pasupulak@mail.sacredheart.edu	System Analyst Interface Design Quality Assurance
Christopher Sikorski	sikorskic@mail.sacredheart.edu	System Architect System Analyst Quality Assurance
Jagdeep Singh	singhj2@mail.sacredheart.edu	System Analyst Interface Design Quality Assurance