Report 1

System Specification

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Part 1

1. Statement of Work (Customer Problem Statement)

a. Problem Statement

Introduction

Oklahoma Trucks Direct Transport, LLC is a car transport company located in Norman, Oklahoma. It started business providing limited automobile transport services for used car dealers in Oklahoma, North Texas and Western Arkansas by utilizing a three car hauler and a Ford F450 pickup truck. The jobs were generally one-time runs for an individual vehicle or an LTL (less than truckload) set of vehicles. Due to the popularity of the business, it quickly expanded to full truck loads and purchased several semi-trucks and six car haulers.

Given its roots, the company is still using paper to track and invoice its jobs. This has presented several problems for the company. The problems are as follows:

- No way to track a job from start to finish;
- Invoices are not always easy to read;
- There have been lost invoices;
- It is difficult to track paid and unpaid invoices;
- It is difficult to track customers;
- It is difficult to get a handle on the total amount of jobs; and
- It is impossible to track the vehicles that are being shipped.

Essentially, this manual process has created a tremendous amount of paper and is difficult to track. A computerized system should resolve all these issues and allow the company to further expand in the future.

Current Work Flow

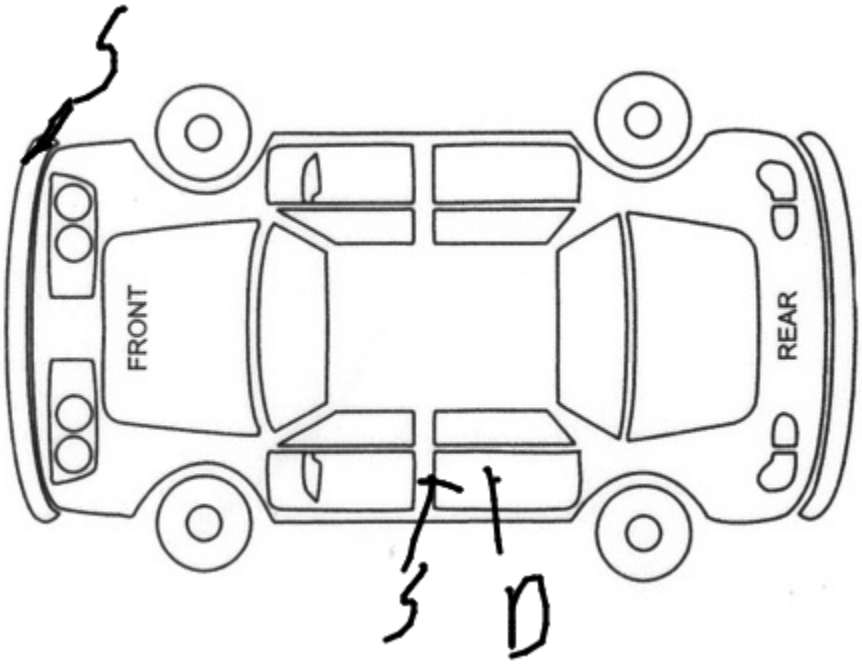
The following is a breakdown of the process from the order though payment on the invoice:

Initially, an order is received by a dispatcher. The dispatcher enters the name of the customer, the date, the date the items need to be delivered, the location of the vehicles to be shipped, the location that they are to be delivered, and then, if available, information about the vehicles to be shipped, including the year, make, model, color, last

5 of the VIN, and any notes about the vehicle. In addition, the dispatcher takes any notes about the particular job.

After collecting the information, a bill of lading is prepared and the price for shipping each vehicle is determined. Once that is prepared the jobs are scheduled by assigning them to a particular driver.

The driver then obtains the bill of lading and heads to the pickup location. At that site, the driver inspects the vehicle and notes all damage on a stick diagram of a vehicle. The damage is noted using the following codes: B=Bent; CR=Cracked; PC=Paint Chip; D=Dented; L=Loose; SS=Surface Scratch; BR=Broken; M=Missing; C=Cut; FF=Foreign Fluid; S=Scratched. The drawing looks like the following:



After completing the inspection, it is reviewed by the manager at the shipping location. The manager signs the bill of lading confirming the condition and release of the vehicles. The vehicles are then loaded on the truck. There is no way to know if a driver has loaded a truck and is en route to the delivery location.

At times, there are vehicles that are added or removed from the shipment at the shipper's location. These are handled by either adding a new vehicle to the form or by scratching out a vehicle. In addition, the driver obtains any additional information about the vehicles that are shipped if the information was not provided to the dispatcher.

During transportation, the driver must maintain the bill of lading. It is necessary if the driver is stopped by the Federal Department of Transportation to confirm the items the driver is carrying.

Once arriving at the location, the driver then unloads the vehicles. The delivered vehicles are inspected by the manager to determine if they are received in the same condition when they left the shipping location. If the shipment is satisfactory, the manager signs the bill of lading. A copy is left with the manager. There is no way to know once a delivery is completed until the bill of lading is returned to the dispatcher.

The driver then returns the bill of lading to the dispatcher. The dispatcher then converts the bill of lading to an invoice. Copies of the invoices are mailed to the customer for payment. The invoices are placed in an accounts receivable folder for each customer.

Once payment is received, the payment information is recorded on the invoice and the invoice is moved to a paid folder.

Periodically, the dispatcher reviews the files to determine the invoices that have not been paid to send reminders to the customers.

In addition, the payments and the invoices are forwarded to the bookkeeper for deposit and recording in the financial records of the company.

At times, a customer calls and asks where a particular vehicle was shipped from or delivered to. The dispatcher then reviews the invoices to find the vehicle. The problem is that many times a vehicle may be shipped to several different locations. Thus, there are several invoices that have to be pulled. Moreover, the invoices have to be put in order to determine where the last place the vehicle was delivered.

Necessary Changes

Thus, it is obvious where our issue with this company's success lies: our invoicing system. We need a system that relays accurate information in a timely manner.

- To increase efficiency and not duplicate work, our truckers should be able to obtain any necessary information regarding a job straight from dispatch.

- Our drivers should also very rarely have to enter any information on an invoice; however, they should be able to correct any information that the customer deems incorrect.

Our system must also be incredibly secure, to guarantee the data integrity, our customers' privacy, as well as data security.

- We need a secure database to hold all customer and driver information, that also holds all of our past and current jobs.

When our customers contact us regarding their delivery, dispatch should be able to easily find all the information they need, without having to contact the driver.

- Thus, after the driver generates the invoice, it should be immediately available to dispatch to view.
- Additionally, it would be helpful if our customers were emailed a copy of the invoice for their own records.

Our system needs to be able to have dispatch be able to search our database to find jobs.

- There should be a filter that narrows down the list of jobs by using the customer name, invoice number, and the driver name and/or number.

Finally, our drivers should also be allowed to use the search and filter feature of our system, in order to search for their jobs as well.

- This would be beneficial to the drivers to assist the customers that they deliver to, if needed.
- Our drivers should only see their jobs and not the jobs of other drivers.
- They should also be able to see their previous jobs that they completed.

See the email thread below of the possible predicament that occurs when using paper invoices instead of digital ones:

Emails Outlining the Problem

To: Oklahoma Trucks Direct Transport
From: Lisa Lindenburg
Subject: Charged Incorrectly on Invoice

Hello,

My name is Lisa Lindenburg, and I recently had my black 2022 Ford F-350 shipped from my previous home in Norman, Oklahoma, to my new one in Little Rock, Arkansas. I am contacting you because the price of the shipping cost was far greater than what was promised when my truck was being evaluated for transport.

According to Brendan Baker, who came by my house to evaluate the transporting cost, the price would be approximately $2,238.96. However, when I received my invoice, it looked like I owed $3,532.28, far more than what I was willing to spend.

I would be incredibly grateful if you could assist me with this situation.

Thank you,

-Lisa Lidenburg

To: Oklahoma Trucks Direct Transport Invoicing Office
From: Oklahoma Trucks Direct Transport
Subject: Lindenburg, Lisa 2022 Ford F-350 - Potential Incorrect Charge

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Hey Jordan,

I have received word from Lisa Lindenburg that she was charged an incorrect amount for the transporting of her vehicle. She is saying she was charged $3,532.28 on an invoice that was estimated to cost $2,238.96.

I figured I would pass this along,

- Mandy Middleton

To: Brendan Baker
From: Jordan Jackson
Subject: Lindenburg, Lisa 2022 Ford F-350 - Potential Incorrect Charge on Invoice #4751

Hello Brendan,

I wanted to confirm your transporting cost estimation for Lisa Lindenburg's vehicle. Based on our records, she had the vehicle shipped on 4/9/22, so your evaluation must have been some time before then. Would you mind getting back to me on this?

Thank you,

- Jordan Jackson, Invoicing Clerk

To: Jordan Jackson
From: Brendan Baker
Subject: Lindenburg, Lisa 2022 Ford F-350 - Potential Incorrect Charge on Invoice #4751

Hey Jordan,

It took some time to go through the past invoices to find this particular job, but at the time, my estimation for Lisa Lindenburg's 2022 Ford F-350 was $2,238.96. I hope this helps!

- Brendan

To: Sammie Smith
From: Jordan Jackson
Subject: Lindenburg, Lisa 2022 Ford F-350 - Potential Incorrect Charge on Invoice #4751

Hello Sammie,

There has been an error with invoice #4751. The vehicle's owner has reached out, saying she has been overcharged. I can confirm this has been the case, as Brendan Baker, who assessed the vehicle, had a significantly lower estimation ($2,238.96) than the actual cost ($3,532.28). I have looked in the records for this particular invoice, and there are no signs of anything during the loading and transporting of the vehicle that could increase the price of the transporting cost *that* much.

I am passing this information on to you since I need to know our next action plan.

Thank you,

- Jordan Jackson, Invoicing Clerk at Oklahoma Trucks Direct Transport

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To: Nolan Nebick
From: Sammie Smith
Subject: Lindenburg, Lisa 2022 Ford F-350 - Potential Incorrect Charge on Invoice #4751

Hi Nolan,

I have received word that the vehicle you transported's owner has been overcharged an obscene amount. I am figuring out the cause of this; could you find the original

document for invoice #4751 in your office files? We would like to know if there has been a misinput in our system.

Thank you!

- Sammie Smith, Invoicing Supervisor at Oklahoma Trucks Direct Transport

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To: Sammie Smith
From: Nolan Nebick
Subject: Lindenburg, Lisa 2022 Ford F-350 - Potential Incorrect Charge on Invoice #4751

Hey Sammie,

I went ahead and faxed you the original document. I charged Lisa $2,332.28, so it must have been an invoicing mistake. I couldn't read the drivers notes and took a best guess at the price.

I hope this helped,

- Nolan Nebick, Driver for Oklahoma Trucks Direct Transport

To: Lisa Lindenburg
From: Sammie Smith
Subject: Lindenburg, Lisa 2022 Ford F-350 - Incorrect Charge on Invoice #4751

Hello Ms. Lindenburg,

My name is Sammie Smith, and I sincerely apologize for the inconvenience of this matter with your invoice. There seems to be a mistake with your invoice. Your previous

invoice will be voided. Your new invoice would be $2,332.28; however, for your trouble, we will be crediting you $93.32.

Again, I apologize for our mistake. If you have any further concerns, please contact me personally, and I will be happy to assist in any way I can!

- Sammie Smith, Invoicing Supervisor at Oklahoma Trucks Direct Transport

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b. Decomposition into Sub-Problems

The company needs a new invoicing system that maintains accurate data

1. The authentication system must be made available for all users
    a. Users need to be created to access program
        i. The program will start with a single admin user
            1. User name and password will be provided by developers
        ii. That admin user can create admin and driver users
        iii. Admin will provide user names for new users.
            1. Every user must have their own unique user name in order to login and use the invoicing system
        iv. All users will be able to edit their account Password
            1. Newly created users will have access to create their own passwords for their respective accounts to ensure cyber safety
                a. The authentication system must allow new users to create their own passwords
            2. All current users have the ability to change their passwords in case they forgot their previous ones or prefer to use something else
                a. The authentication system must allow its users to change their current password
            3. Each user can alter their own account information such as, name, gender, date of birth, marital status, race, citizenship

status, military service status, and payment and contact information
    a. The invoicing system should have fields for the users to fill out personal information
4. All user accounts will have a one year lifetime with their passwords
    a. The authentication system will prompt the user to change their password when they login when a year has passed since they have changed their password.
    b. Until the password is changed, a user will not be able to access the account

v. Any admin users can delete/edit other users
    1. When another admin or driver user leaves the company, they will be removed from the invoicing system. The admin users can also edit other users' information such as, employee ID, name, contact information, job title, and/or disabilities and injuries
        a. The invoicing system should have some fields in a user's personal information that <u>only</u> an admin user can alter
vi. Non-admin users will not be able to delete their accounts or edit particular items
    1. If a non-admin user wants their account to be deleted (aka they want to quit their job), they must contact an admin user to do it
        a. Admin users shall be able to delete drivers' accounts
        b. The invoicing system should not allow non-admin users to delete their account
    2. If the non-admin user wants to change their employee ID, job title, or disabilities/injuries, then admin must be informed
        a. The invoicing system should have some fields in a driver's personal information that they <u>cannot</u> alter

2. Users need to access pertinent data and share data with pertinent users
    a. Admin users can access all job data
        i. The invoicing system should allow <u>only</u> admin users to see <u>all</u> current and past transports, as well as each individual vehicle and its owner
    b. Admin can assign and reassign jobs to driver users

        i. The invoicing system should allow admin users to assign drivers to their corresponding jobs
    c. Driver users can access only jobs that have been assigned to them
        i. The invoicing system should not allow non-admin users to see all jobs in the transporting company
3. Users need to add and edit data
    a. Users can add missing data
        i. Admin shall be able to create and update job data.
        ii. The invoicing system should highlight any missing data fields so the user is aware they need to fill said field
    b. Admin and driver users can edit incorrect data
        i. The invoicing system should allow data to be changed
        ii. Previous changes will be able to be seen by admins
4. Admin shall be able to quickly determine the current status of a job.
    a. Users shall be able to update job status (Pending, Loaded, En route, Arrived, Unloaded, Complete)
5. Jobs should be filterable
    a. Jobs should be filterable by
        i. VIN so users can quickly find jobs related to a specific car.
        ii. date so users can get the most recent jobs.
        iii. Status so users can quickly tell the status of any given job
6. Invoices need to be generated using completed data
    a. Once a job is complete, anyone with access to that job can click to generate an invoice
        i. The invoicing system will generate the corresponding invoice immediately upon completion of a job
    b. Invoices must have pertinent information
        i. Date of delivery
        ii. Invoice number
        iii. Transport company
            1. Name, address, phone number
        iv. Shipper
            1. Name, address, phone number
        v. Receiver
            1. Name, address, phone number
        vi. Car details
            1. Year, make and model
            2. Last 8 of Vin
            3. Color
            4. Cost of transportation

5. Stick drawing for each car

vii. Driver's signature

7. Digital drawing must be available to diagram any damages to the vehicles.
    a. Each job shall have one stick drawing per car included in the job.
    b. Users shall be able to alter the drawing by adding marks and codes to represent the types of damage to the car.
    c. Users should be able to take and upload pictures of damage
8. The Bill of Lading shall have pertinent information
    a. Invoice number
    b. Date
    c. Shipper details
        i. Name, address, phone number
    d. Receiver details
        i. Name, address, phone number
    e. Details for each car
        i. Year
        ii. Make
        iii. Model
        iv. Color
        v. Last 8 digits of VIN
        vi. Price
        vii. Digital stick drawing
    f. Signature section
        i. Driver
        ii. Shipper
        iii. Receiver

c. Glossary of terms

- Admin - A user who has full access to the jobs in the program.
- Bill of Lading **-** A legal document issued by a transportation company to a shipper that details the type, quantity, and destination of the goods being carried. A bill of lading also serves as a shipment receipt when the carrier delivers the goods at a predetermined destination.
- Dispatch - See Admin.
- Driver - A user who has access to only their own jobs. A driver represents an actual driver of the car hauler.
- Jobs - Loads a particular driver has assigned. Is unique to each driver.
- Load - The vehicles on a car hauler that a driver will be taking to a particular destination. A maximum equal to the largest trailer.

- Non-admin user - See Driver.
- Receiving Manager - The person who manages the cars after being unloaded by the driver. Signs off on the state of the cars after receiving them from the driver.
- Shipping Manager - The person who manages the car prior to loading by the driver. Is responsible for signing off on the current state of the cars.
- User(s) - Often refers to both drivers and admins.

2. Requirements (Goals, Requirements, and Analysis)

a. Business Goals

b. Enumerated Functional Requirements

Req #	Priority	Requirement
REQ1	5	Admin shall be able to create and update job data.
REQ2	5	The invoicing system shall allow admin users to assign drivers to their corresponding jobs
REQ3	5	The invoicing system should not allow non-admin users to delete their account
REQ4	5	Users shall be able to update job status (Pending, Loaded, En route, Arrived, Unloaded, Complete)
REQ5	5	The invoicing system will generate the corresponding invoice immediately upon completion of a job
REQ6	5	Invoices shall have pertinent invoice and user information, including: The date of delivery; the invoice number; the transport company’s name, address, and number; the shipping manager’s name, address and number; the receiving manager’s name, address and number; and the signature of the driver
REQ7	5	Invoices shall have pertinent car information, including: Year, make, model, color, last 8 digits of VIN, cost of transportation, and a stick drawing to represent current damages.

REQ8	5	Bills of Lading shall have pertinent invoice and user fields, including: The date of delivery; the invoice number; the shipping manager's name, address, and phone number; the receiving manager's name, address, and phone number; the signatures of the driver, shipping manager, and receiving manager.
REQ9	5	Bills of Lading shall have pertinent car fields, including: Year, make, model, color, last 8 digits of VIN, cost of transportation, and a stick drawing to represent current damages.
REQ10	4	Each job shall have one stick drawing per car included in the job.
REQ11	4	Users shall be able to alter the drawing by adding marks and codes to represent the types of damage to the car.
REQ12	4	The invoicing system should allow data to be changed
REQ13	4	When the program is first used, there shall be an admin user created in the system with a username and password provided by the developers.
REQ14	4	That admin user can create admin and driver users
REQ15	4	Every user must have their own unique username in order to login and use the invoicing system
REQ16	4	The invoicing system should allow only admin users to see all current and past transports, as well as each individual vehicle and its owner
REQ17	4	Driver users can access only jobs that have been assigned to them. The invoicing system should not allow non-admin users to see all jobs in the transporting company
REQ18	3	The authentication system should allow new users to create their own passwords
REQ19	3	The authentication system should allow its users to change their current password

REQ20	3	The invoicing system should have fields for the users to fill out personal information
REQ21	2	Jobs should be filterable by VIN so users can quickly find jobs related to a specific car.
REQ22	2	Jobs should be filterable by date so users can get the most recent jobs.
REQ23	2	Jobs should be filterable by Status so users can quickly tell the status of any given job
REQ24	2	Jobs should be filterable by invoice number, customer's name, customer's phone number
REQ25	2	The invoicing system should have some fields in a driver's personal information that they cannot alter
REQ26	2	The invoicing system should have some fields in a user's personal information that only an admin user can alter
REQ27	1	Admin users should be able to delete drivers' accounts.
REQ28	1	The authentication system will prompt the user to change their password when they login when a year has passed since they have changed their password.
REQ29	1	Until the password is changed, a user will not be able to access the account
REQ30	1	The invoicing system should highlight any missing data fields so the user is aware they need to fill said field
REQ31	1	Users should be able to take and upload pictures of damage
REQ32	1	Previous changes should be able to be seen by admins
REQ33	1	Users should be able to edit their versions of the stick drawings in case of mistakes.

c. Enumerated Nonfunctional Requirements

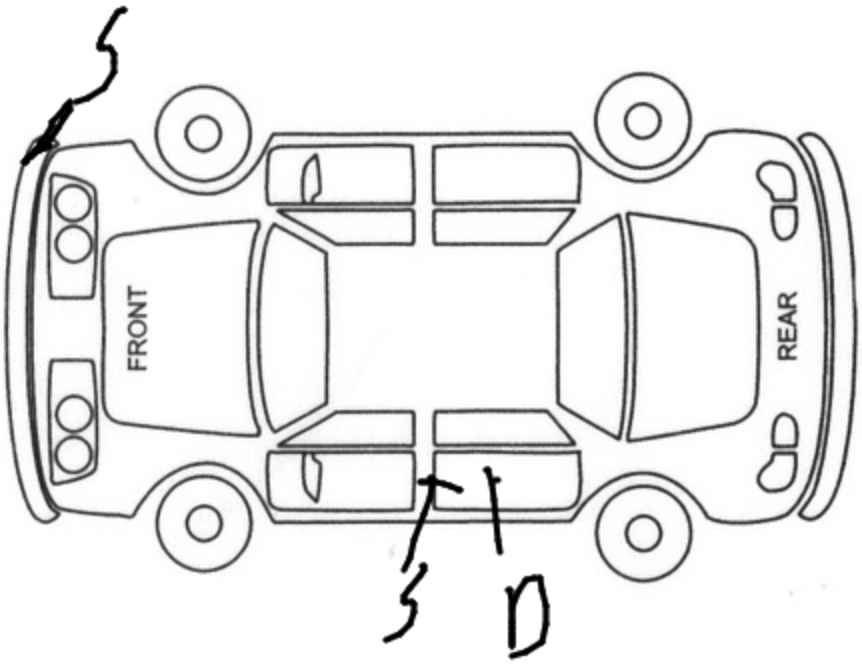
1. Functionality
    a. Each user will have a separate login account
    b. New users should create and edit their own password for their account login, staying within the system's password guidelines
    c. Only admin will be able to edit their login information except for password
    d. Every user should have fields to fill out their personal information
    e. A driver shall not be able to alter some fields in their personal information, such as job title or employee ID
    f. Admins can edit all fields in a user's personal information
    g. If there is any missing data fields in a user's personal information, it will be highlighted and the information will not be saved until the user altering the fields fills in said missing information
    h. Drivers cannot delete their own account
    i. If any user has been fired or quits, admins should be able to delete their account from the database
    j. Admins can see all jobs, while drivers can only see the jobs that they are assigned to
    k. Admins should be able to assign and reassign jobs to the drivers
    l. Drivers cannot assign themselves (or other drivers) jobs
    m. Admins should be able to view information on each individual vehicle, such as the vehicle's model or owner
    n. Drivers can view information on each individual vehicle, as long as one of their jobs had been assigned to said vehicle
    o. If a job has missing fields, the form will highlight said missing fields and not save until the driver fills it in
    p. The data fields for jobs should be able to be altered, such as the shipping location, in case of errors or changes, and those previous changes will be able to be seen by admins
    q. After all data for a job has been filled in and saved, the program must generate the invoice
    r. Database should be updated intermittently so admin can have access to the most up-to-date information.(**probably when job status is updated)**
2. Usability
    a. The UI for the program should be easily navigable. It should fit well on a tablet device, such as an iPad. The user should not need to zoom in or out in order to see information.
    b. The program should be accessible and follow all WCAG standards.
3. Reliability

   a. Data integrity must be kept. For example, dates should always be in the same format when posting to the database.Validation should be done before any posting to the database occurs.
   b. The program should be able to recover the previous version of an altered form, in case a form has been altered incorrectly.
4. Performance
   a. To ensure a robust program that could be used as a company grows and fulfills an increased number of jobs, developers should try to prevent any time complexities of O(n^2) or slower. Developers should consider using map data types in place of doubly-nested for-loops.
   b. Developers should also ensure the database does not unnecessarily hold redundant data.
5. Supportability
   a. Testability
   b. Adaptability
   c. maintainability
   d. compatibility
   e. configurability
   f. Installability
   g. Scalability
   h. localizability

d. User Interface Requirements

The software must be accessible on tablet devices.
Each job will list the cars that are a part of that job. Drivers can add or remove cars from a job, up to the maximum number of cars their trailer can hold.

This diagram should be used to mark damages to the vehicles. Diagram -



Part 2

3. Use Cases

a. Stakeholders

- Drivers
- Dispatchers (admin)
- Shipping managers
- Receiving managers

b. Actors and Goals

Initiating Actors

- Driver
- Dispatcher

Participating Actors

- Shipping Manager
- Receiving Manager
- Database

Actor's Goals

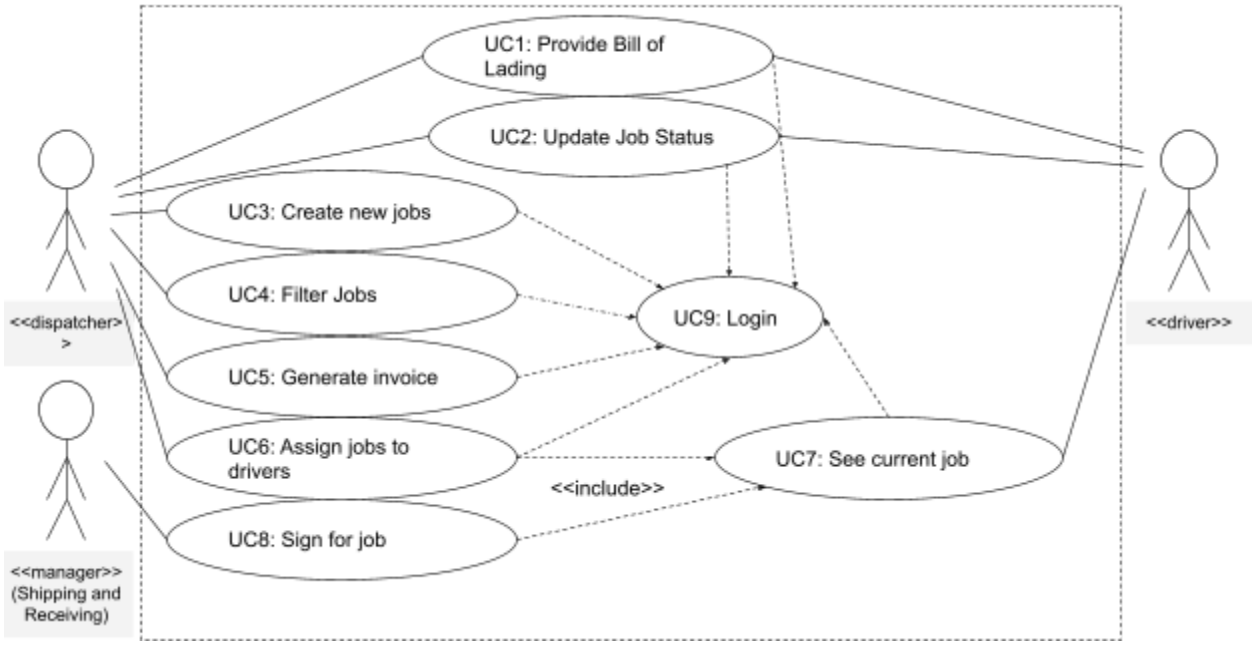
Actor	Actor's Goal	Use Case Name
Dispatcher & Driver	Provide Bill of lading	UC1
Dispatcher & Driver	Update status of job	UC2
Dispatcher	Create new jobs	UC3
Dispatcher	Filter and find jobs	UC4
Dispatcher	Generate Invoice for any completed jobs	UC5
Dispatcher	Assign jobs to drivers	UC6
Driver	Find driver's jobs	UC7
Shipping Manager	Sign off on job before transport	UC8
Receiving Manager	Sign off on job after transport	UC8
Dispatcher & Driver	Login to account	UC9

c. Use Cases

i. Casual Description

The dispatcher can create new jobs and assign those jobs to drivers. The details of those jobs can be edited after creation by both the dispatcher and the driver. Dispatchers can filter jobs in order to more easily find a specific job. After a job is completed, the dispatcher can generate an invoice of the job. The driver can see all jobs assigned to them. The driver can update the status of the job. The driver can provide a bill of lading at all times with all the details of their current job. Both the shipping manager and the receiving manager can write in their signatures to accept the details of the job.

Ii. Use Case Diagram



Iii. Traceability Matrix

Req't	**PW**	UC1	UC2	UC3	UC4	UC5	UC6	UC7	UC8	UC9
REQ1	5		X	X						
REQ2	5			X						
REQ3	5									X
REQ4	5		X		X					
REQ5	5					X				
REQ6	5					X				
REQ7	5					X				
REQ8	5	X						X	X	
REQ9	5	X						X	X	
REQ10	4	X						X	X	
REQ11	4	X						X	X	

REQ12	4					X		X	X	
REQ13	4									X
REQ14	4			X				X		
REQ15	4						X	X		X
REQ16	4				X					
REQ17	4							X		
REQ18	3									X
REQ19	3									X
REQ20	3									X
REQ21	2				X					
REQ22	2				X					
REQ23	2				X					
REQ24	2				X					
REQ25	2									X
REQ26	2									X
REQ27	1									X
REQ28	1									X
REQ29	1									X
REQ30	1			X				X		
REQ31	1	X						X		
REQ32	1									X
REQ33	1	X								
Max PW		5	5	5	5	5	4	5	5	5
Total PW		20	10	15	17	19	4	36	22	29

Use Case UC3: Create New Jobs

Related Requirements: REQ 6, REQ 7, REQ 24, REQ 25
Initiating Actor: Dispatcher
Actors Goal: Create new job in system
Participating Actors: Database
Precondition: New job from client
Postcondition: Sufficient information to allow the new job to be assigned to a driver

Flow of events for Main Success Scenario:

-> 1. The dispatcher receives a contact for a new transport order.
-> 2. The dispatcher creates a new job.
<- 3. The system generates a list of former clients and opens an input form to record information
-> 3. The dispatcher searches the list of former client and selects the client or enters new information.
-> 4. Dispatcher enters information about the job including pickup location and delivery location
5. System checks for valid input
<- 6. The system creates new job and updates database.

Use Case UC4: Filter and Find Jobs

Related Requirements: REQ 4, REQ 6, REQ 7, REQ 20, REQ 21, REQ 22, REQ 23
Initiating Actor: Driver or Dispatcher
Actors Goal: Filter and find jobs
Participating Actors: Database
Precondition: Need to find a particular job to determine status or update information
Postcondition: Found job

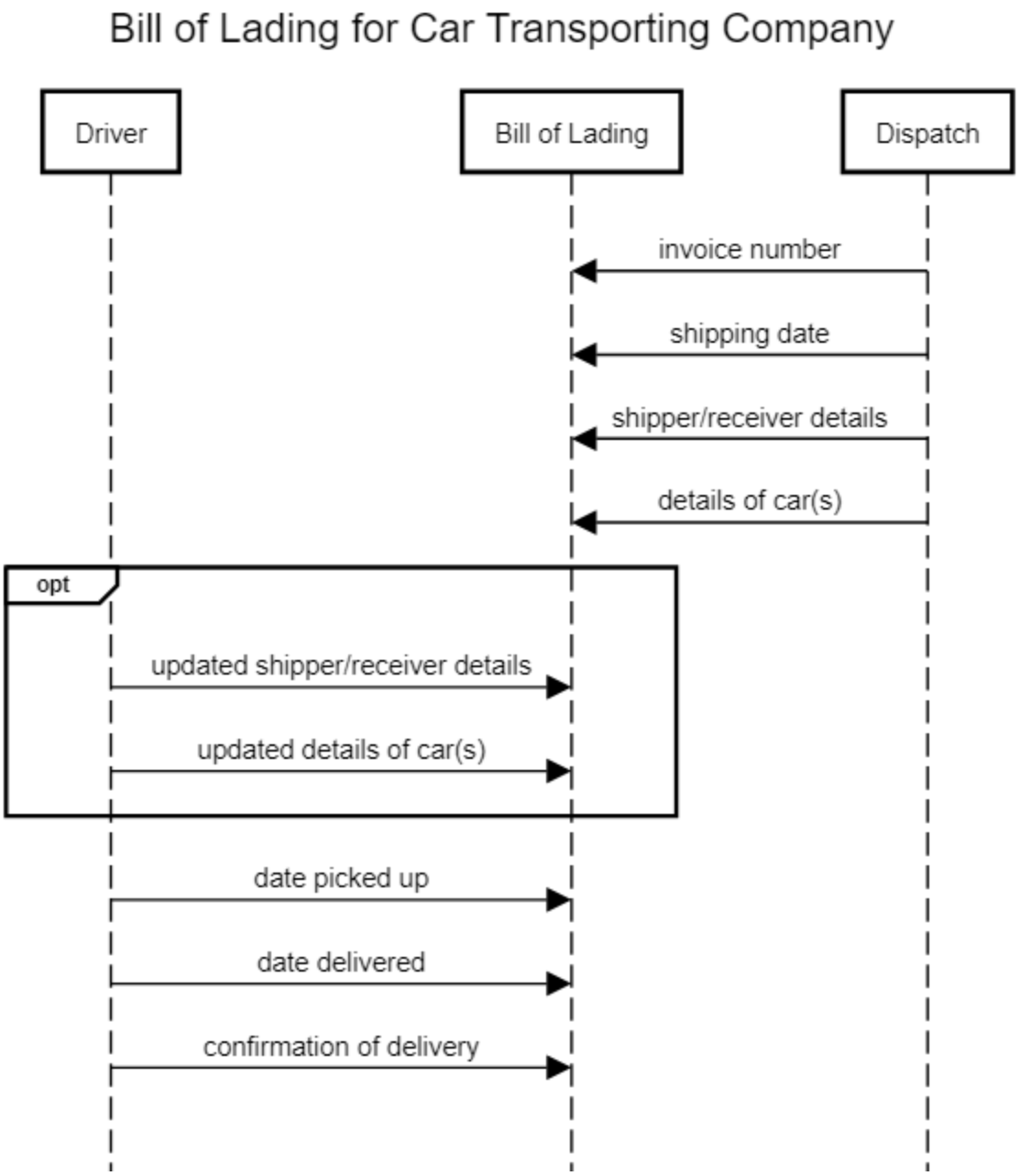
Flow of events for Main Success Scenario:

1. Request for a specific job or vehicle.
-> 2. Input information obtained regarding the job that should include one of the following including status, name of shipper, name of client, name of destination, VIN, or other information.
-> 3. System requests information from the database for matching jobs.
<- 4. Database returns job information.
-> 5. User selects job
6. System submits selected job to database.
<- 7. Database returns job information.
-> Initiating actor edits information or adds job information if necessary.
-> System submits updated information to database

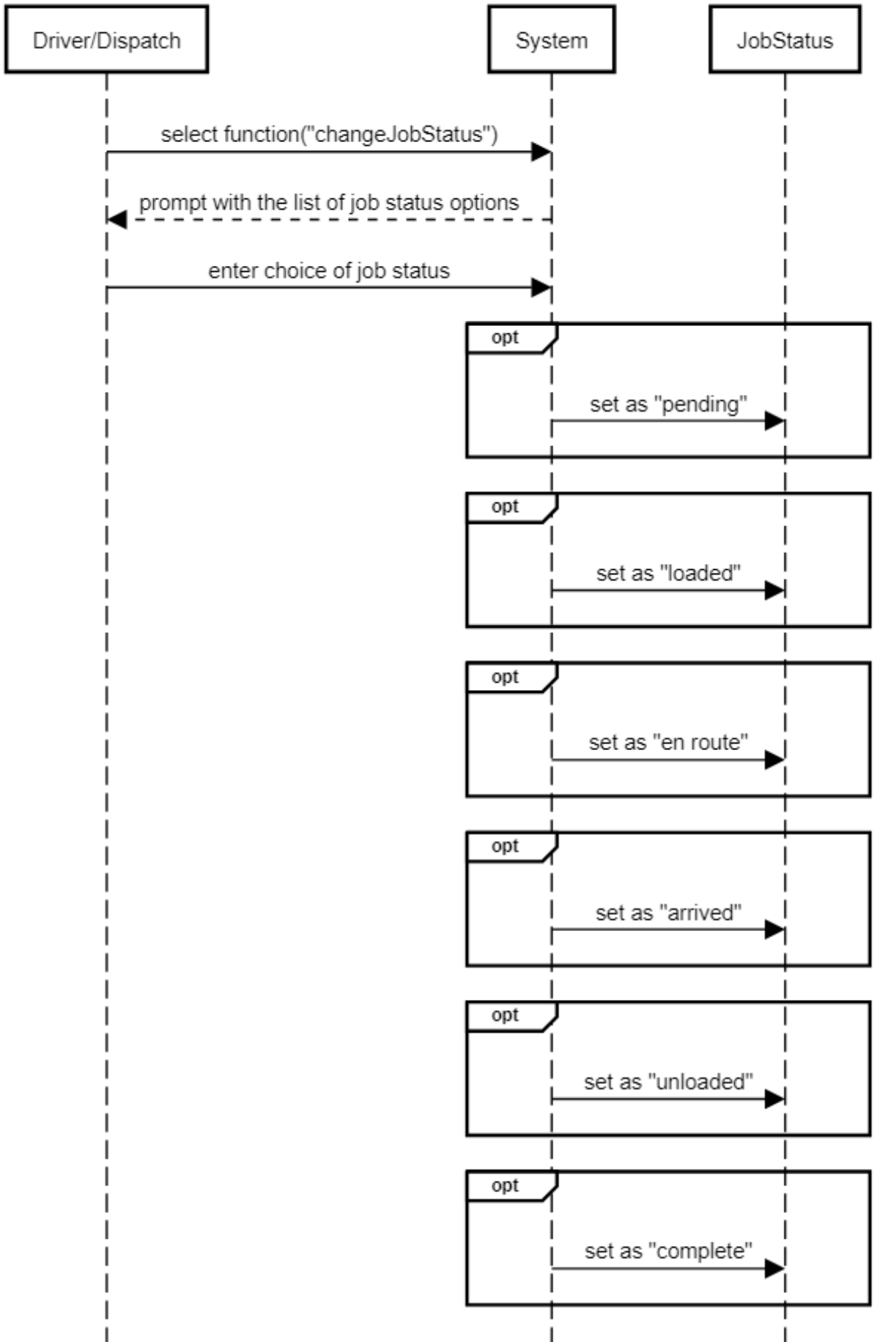
<- Database confirms submission.

d. System Sequence Diagrams

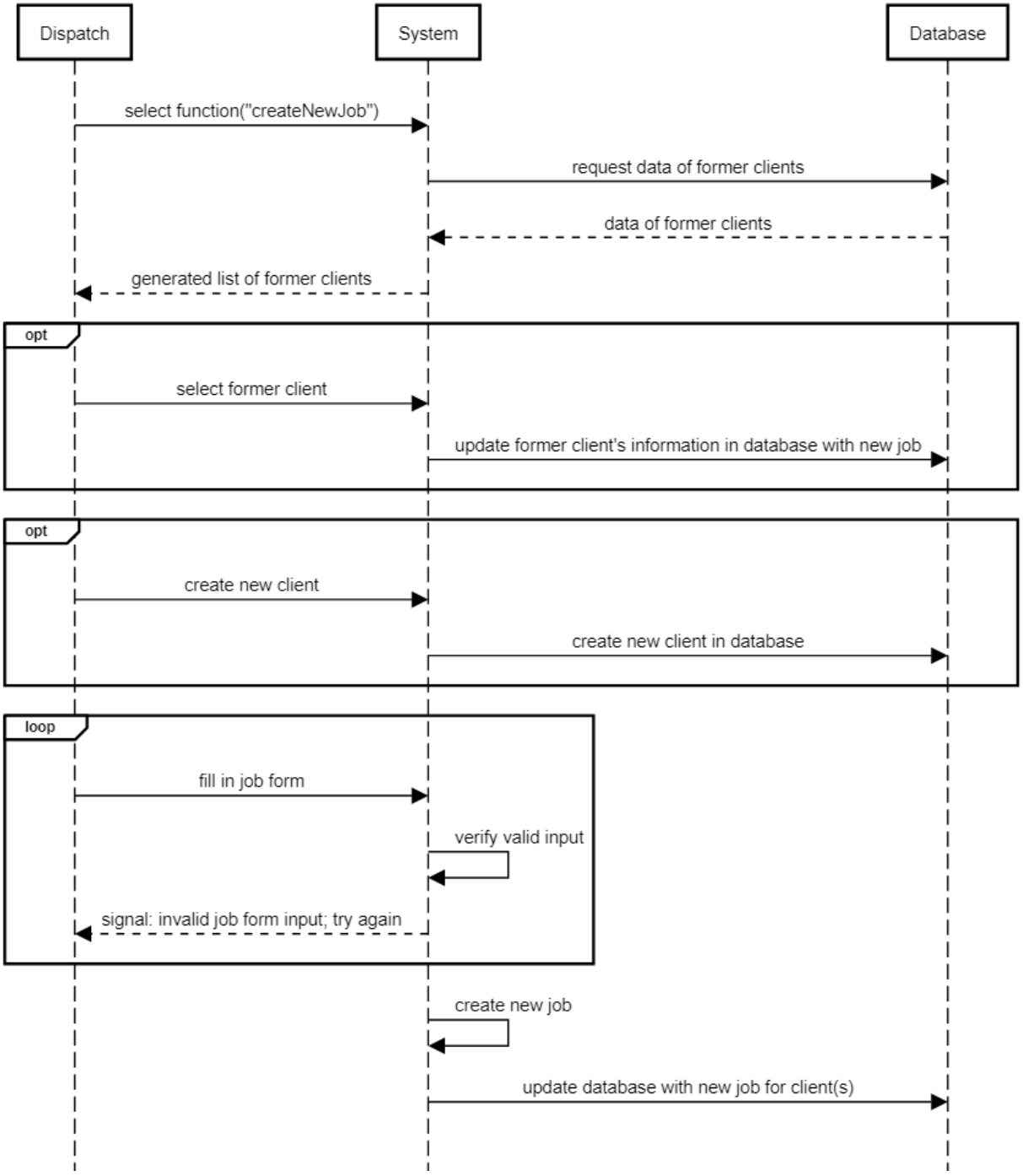
- UC1 Bill of Lading
- UC2 Update Job Status
- UC3 Create New Jobs
- UC9 Login

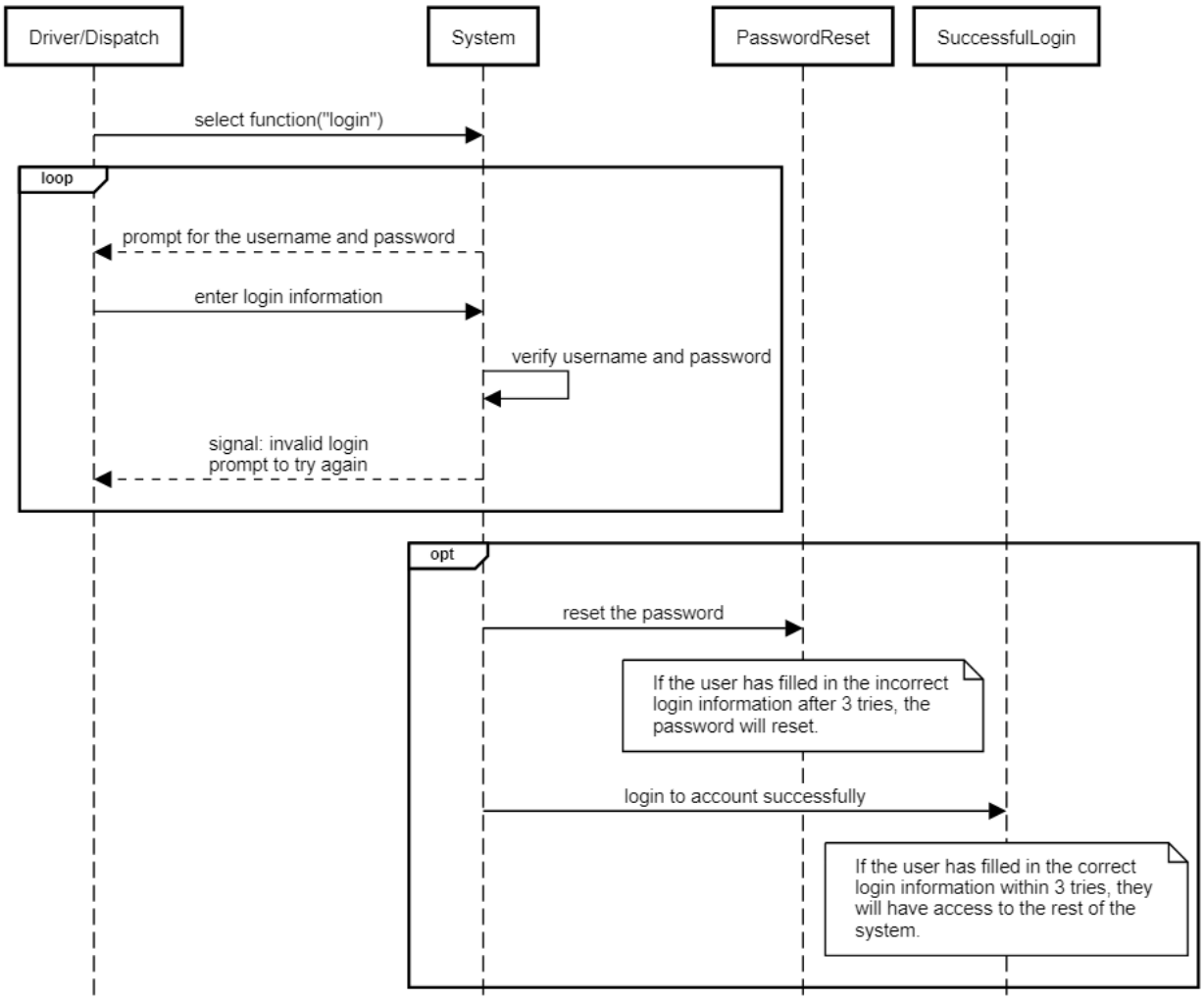

Bill of Lading for Car Transporting Company
Driver
Bill of Lading
Dispatch
invoice number
shipping date
shipper/receiver details
details of car(s)
opt
updated shipper/receiver details
updated details of car(s)
date picked up
date delivered
confirmation of delivery

Update Job Status in the Car Transporting Company's System



Create New Jobs in the Car Transporting System

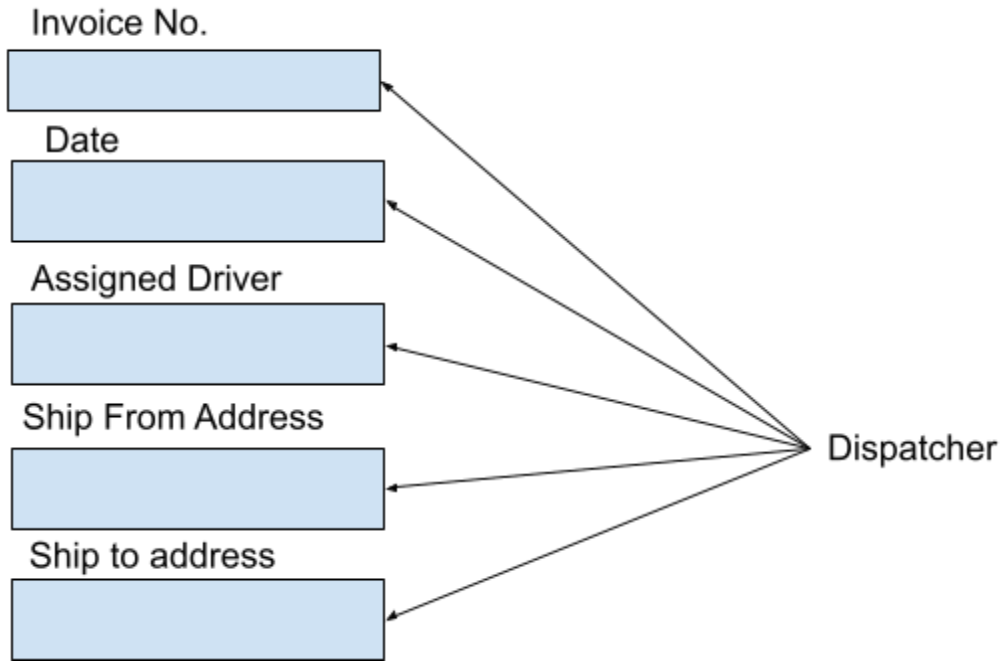




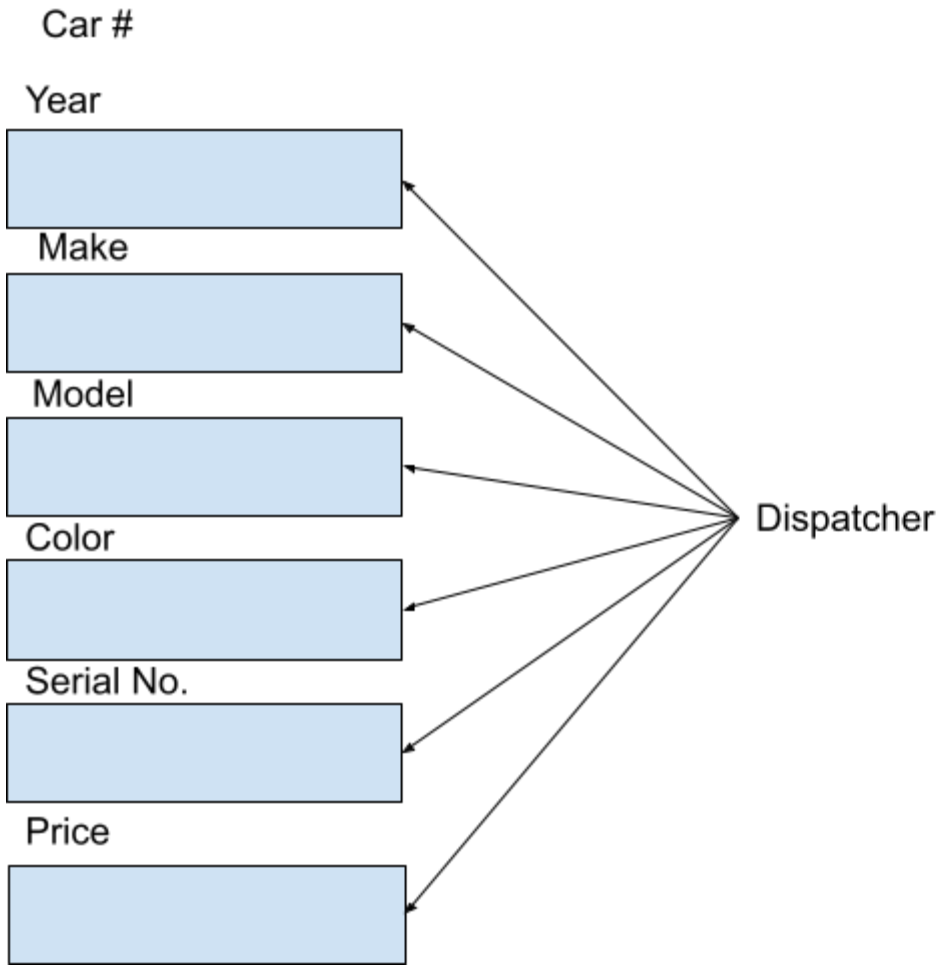
4. User Interface Specification

a. Preliminary Design

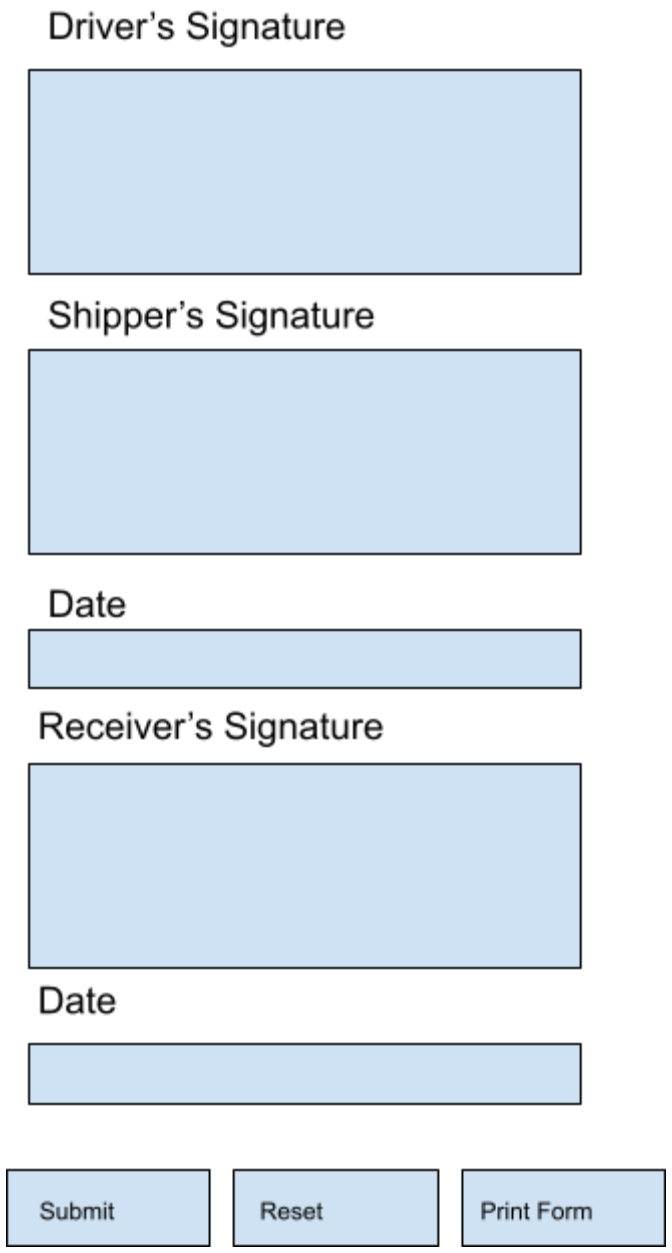
- When a dispatcher opens the app and signs in, they can generate and assign jobs to drivers. The dispatcher will create the job with a forum of fields. They will add the date, the assigned driver, the shipping location, and where it is being shipped to.



- In the next section they will enter how many cars they are hauling for the job. Next, each car's year, make, model, color, Serial No., and the cost of hauling that car. Then, the dispatcher / driver will draw and mark if the car has previous damage (see pg 18). The dispatcher / driver also has an option to enter any extra notes needed for the car. This process will repeat until the entirety of the trailer of cars is completed.



- At the end of the form the driver will add their signature, the shipper’s signature, and the receiver's signature. Then the current date will be added. The driver can submit the form, reset it if there are errors, and to print the form.



b. User Effort Estimation

- Scenario 1: A dispatcher is creating a job for a driver. They are going to create the location of where it is being shipped from to where it will be delivered.
    - Navigation: total of 2 clicks
        - Click create job on the header
          --- *after completing data entry as shown below —*
        - Click the submit button to finish
    - Data Entry: 11 clicks and at least 6 keystrokes, since locations and names can have different lengths
        - Click date, and then click the current date from the small popup

        - Click assigned driver, and then click the current driver
        - Click name and then enter the name of location of where it is being shipped from
        - Click Address and then enter the address of location of where it is being shipped from
        - Click City/State/Zip and then enter the City/State/Zip of location of where it is being shipped from
        - Then we will repeat this process of the previous 3 steps for where it is being shipped to.
        - Then the dispatcher will click the submit button to complete the forum
- Scenario 2: A driver is going to edit the details of a car since the year on the forum was incorrect.
    - Navigation: total of 3 clicks
        - Click on my jobs button on the header
        - Click on the button with the correct invoice number for the job
          --- *after completing data entry as shown below —*
        - Click on the submit button to finish the changes
    - Data Entry: total of 2 clicks and at least 1 keystroke
        - Click on the year and then make the edit to the year
        - Then the driver will click on the submit button to complete the edit

Part 3

5. System Architecture

a. Architecture Styles

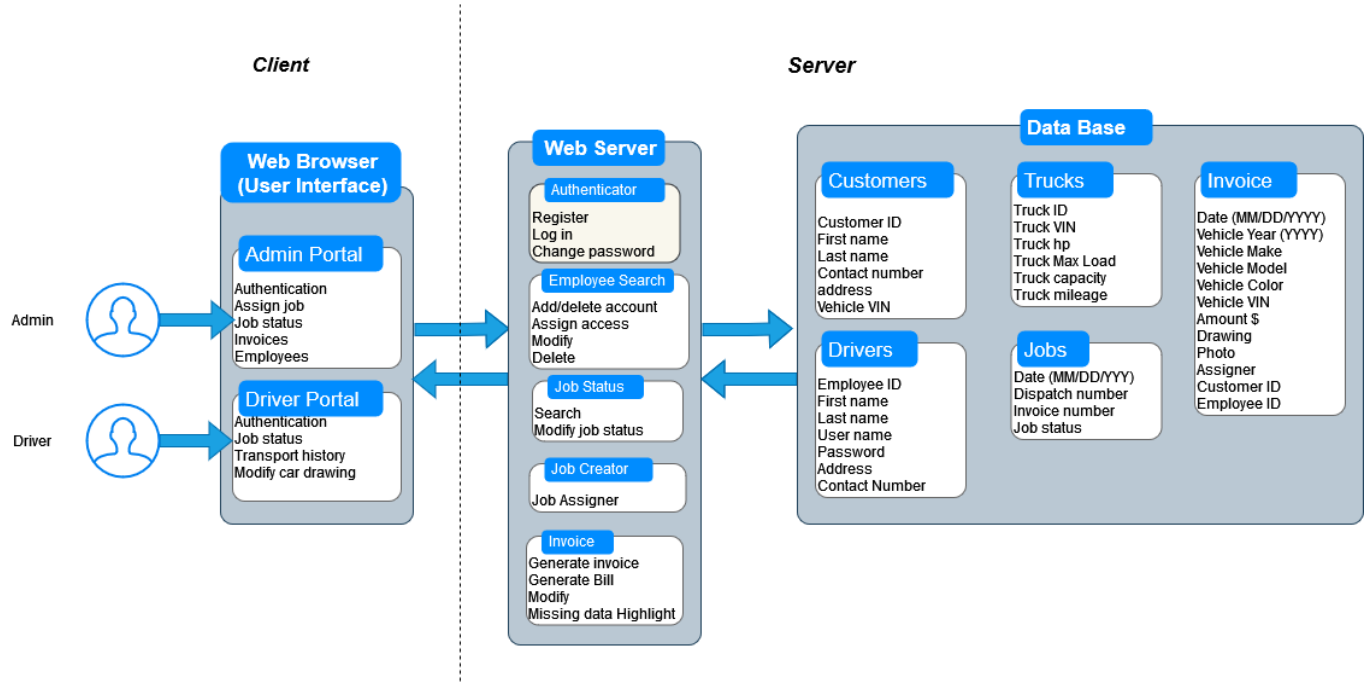
This project will implement a client-server software architecture using a web-based client. The architecture will be split between client-side and server-side, with the client-side software running on the end-user's device, such as a computer, smartphone, or tablet, and the server-side software running on one or more servers.

In this architecture, the client will initiate requests to the server and receive responses from it. The server will provide services or resources to the client, primarily data in text and image formats. The client software will interact with the server software via the internet.

The client-side software will be responsible for the user interface, displaying data to the user, accepting user input, and sending requests to the server. Meanwhile, the server-side software will process client-side requests, perform the invoicing system functions, generate invoices, and store all data related to jobs, customers, drivers, and invoices. Then it will return the data to the client.

To implement this architecture, HTML, CSS, and React will be used as programming languages, while MySQL will be used as the relational database management system. This architecture is designed to be scalable, maintainable, and accessible, providing an effective solution for such invoicing system.

b. Identifying Subsystems



- **Job Management Subsystem:** This subsystem includes functionalities related to job creation, updates, and status tracking. It allows admin users to create and update job data and allows users to update job status. It also includes filters to search for jobs based on VIN, date, and status.

- **Invoicing Subsystem:** This subsystem includes the functionalities related to generating invoices and bills of lading for completed jobs. It generates invoices with relevant invoices and user information, including the date of delivery, invoice number, transport company's name, address, and contact number, shipping manager's name, address, and contact number, receiving manager's name, address, and contact number, and the signature of the driver. It also generates bills of lading with the same information, plus the signatures of the driver, shipping manager, and receiving manager. Additionally, it includes pertinent car information, including year, make, model, color, last eight digits of VIN, cost of transportation, and a stick drawing to represent current damages.

- **User Management Subsystem:** This subsystem includes functionalities related to user authentication, personal information management, and account management. It allows the creation of admin and driver users, ensures that every user has a unique username

and password, and enables users to change their password. It also includes fields for users to fill out personal information, with some fields only an admin user can alter. This subsystem includes an authentication system that prompts the user to change their password every year since they last changed it, and until the password is changed, the user will not be able to access the account. Finally, it includes the ability to delete driver accounts.

- **Image Management Subsystem:** This subsystem includes the functionalities related to taking and uploading pictures of the damage. Users should be able to take and upload pictures of damage, and admins should be able to see previous changes made by users.

c. Mapping Subsystems to Hardware

There will be clients and the server. The clients will be the tablets that the drivers use as well as the computers that the admin staff uses to pull up the software. The web server will be a remote server.

d. Connectors and Network Protocols

Since it is a web app, it will use HTTP.

e. Global Control Flow

- Execution orderliness.
    - The app is procedure-driven. A job must first be created before it can be assigned to a driver. The driver must mark the correct statuses in sequential order, meaning a job cannot be marked complete until after it has gone through all the previous statuses.
- Time dependency:
    - No timers in system. It will be event-driven. The database will be updated as job statuses are updated. Then the users will access the latest database information every time they connect to the system.

f. Hardware Requirements

- Tablet
    - Operating system Android, OS
    - Browser Google Chrome, FireFox, or Safari
    - Display 601x962

- Minimum Computer Requirements:
    - Operating system Windows, macOS, Linux
    - Browser Google Chrome, FireFox, or Safari
    - Processor 1GHz

- Memory 4 GB of RAM
- Storage 80GB
- Display 1024x768
- Internet connection 10Mbps
- Back-up system 200GB

6. Project size estimation

(The guidelines say to use Use Case points which are covered in Chapter 4 and have not yet been covered in class.)

7. Plan of Work

The group is divided into the Front End team (Kylie Heiland, Justin Carlson) and the Back End team (Ashraf Alkhawaldeh, Alex Hampton). Eugene Bertman will take the role of Product Manager. In this role, Eugene will set the guidelines for this project and will assist both teams as needed.

Week 7: Feb 26 - Mar 4

- Back End - Design tables for database
- Front End - Develop base layout of pages

Week 8: Mar 5 - 11

- Back End - Develop tables in MySQL
- Front End - Develop interactive elements

Week 9: Mar 12 - 18

- Back End - Connect db to project
- Front End - Connect front end to db

Week 10

- Back End - Integrity checking
- Front End - Finish integration with db

Week 11

- Back End - Last changes for first demo
- Front End - Last changes for first demo

Week 12

- First demo of project

8. References

Marsic, Ivan, *Software Engineering,* Rutgers University, 2012.