fsoft_1DA_2: Iteration 1 - Technical Report Domain Model, Glossary, Functional and Non-Functional Requirements, System Sequence Diagram

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Abstract. In the following pages, the reader will be able to be informed about the application's domain model, glossary, functional and non-functional requirements, containing use cases, and their specifications, and system sequence diagrams (SSD).

Key words: Business, C++, Fleet Management, IPP, ISEP, Management, Programming, Software Development, Command-line Interface, Binary Storage, Expense Tracking.

1 Introduction

In the contemporary business landscape, the efficient management of automotive fleets has become a critical factor in organizational success. This programming project aims to develop a comprehensive Fleet Management System designed to streamline operations, optimize resource allocation, and enhance decision-making processes related to vehicle fleets.

We named the application, being developed in this project, "FleetManager".

The system's architecture incorporates four key stakeholder interfaces, each serving distinct but interconnected roles within the FleetManager's ecosystem:

- Fleet Manager: Responsible for overseeing the entire vehicle inventory, including adding vehicles, removing vehicles, see the whole list of vehicles, add storage locations, remove storage locations, consult storage locations and list all storage locations.
- Trip Manager: Focuses on journey planning and route optimization. There will be some functionalities associated such as adding trips, removing trips and listing all the trips in the log.
- Financial Manager: Concentrates on cost control and financial analysis related to the fleet. The functionalities associated to this profile will be to add expenses, remove expenses, and list all the expenses.

– Driver Manager: Handles all aspects related to driver administrations. It will be able to add drivers, remove drivers and list all the drivers inserted in the log.

The objective of FleetManager is to provide a solution that optimizes all operations related to corporate vehicle administration. So we interconnect the fields that are crucial to the success of this type of business.

The system will be developed in C++, which is the programming language taught in this class.

2 Domain Model

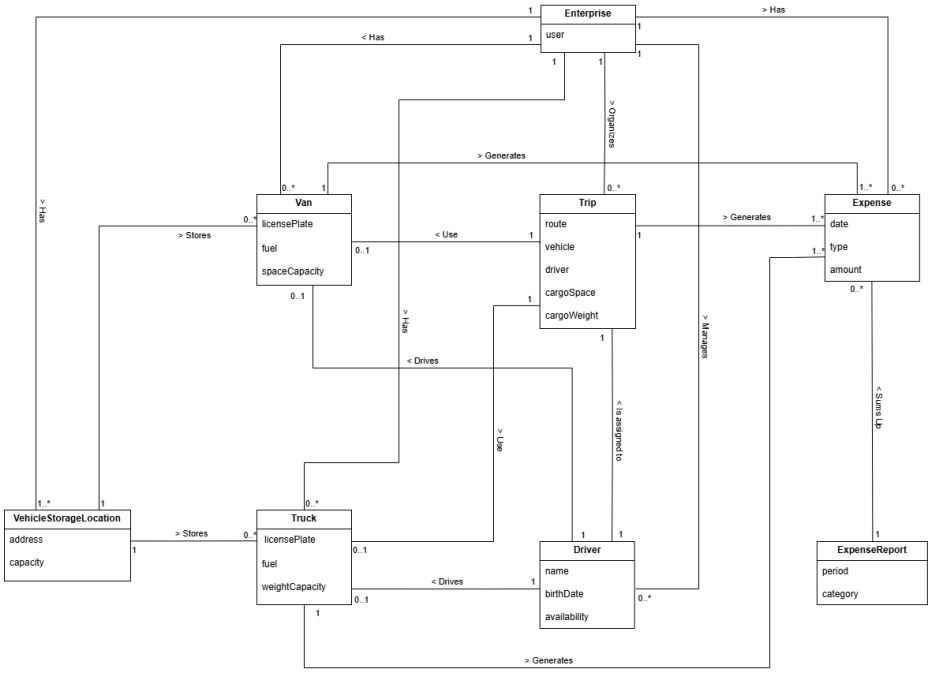

Fig. 1: FleetManager's Domain Model

3 Glossary

Term/Expression (EN)	**Termo/Expressão (PT)**	**Definition/Description**
Driver	Condutor	Employee who drives the vehicle and to whom is assigned a trip
Expense	Despesa	Amount of money spent. This includes fuel, tolls, fines, inspection and insurance expenses.
Expense Report	Relatório de Despesa	Expenses recorded in the system. These expenses can be separated by driver, trip, vehicle and time period.
Trip	Viagem	Route from the start to the end point. Specified by the fleet manager and carried out by a driver.
Truck	Camião	A type of vehicle used by the company. Preferentially used when big cargo space (or a big weight capacity) is needed.
Van	Carrinha	A type of vehicle used. Preferably employed when the cargo weight, and space, is not excessive and speed is a surplus value.
Vehicle	Veículo	Vehicle of the fleet, it can be either a truck or a van, that will be used by a driver to carry out a trip.
Vehicle Storage Location	Local de Armazenamento de Veículos	Locations where, after a trip, the drivers can park/store the vehicles they've used.

Table 1: FleetManager Glossary

4 Non-Functional Requirements

4.1 Usability

- Command-line based user interface
- Informative, yet simple, error messages
- Easy-to-use option menus

4.2 Reliability

- Data storage must be reliable
- System must be available at any time
- Validation of all user inputs

4.3 Performance

- Response time under 1 second

4.4 Supportability

- Full application support through GitHub page
- Recurrent application testing

4.5 Design Constraints

- Data persistent and kept in binary files

4.6 Implementation Constraints

- C++ programming language

4.7 Interface Constraints

- No

5 Functional Requirements

5.1 Actor: Fleet Manager

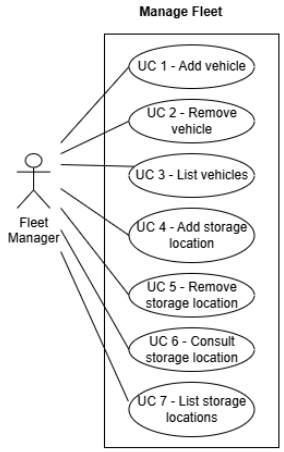

Fig. 2: Fleet Manager's Use Case Diagram

Use Case: Add vehicle (Specification)

Actor	Fleet Manager
Use case name	Add vehicle
Description	The user adds a vehicle to the system
Precondition	The "Fleet Manager" user must be selected
Post-condition	A vehicle is added to a log
Main flow	1. System displays a option menu 2. User selects "Add vehicle" 3. System displays an input space 4. User fills the input space with information 5. System will check if the information type is correct 6. Use case returns to step 3 until all of the vehicle's properties are filled 7. A vehicle is added to a log
Alternative path	5. - Information type is incorrect - User receives an error message - Use case resumes at step 3
Exceptions	If the user, at any point, wishes to cancel, the user can type "cancel operation" and the use case resumes at step 1

Table 2: Use Case: Add Vehicle

SSD: UC 1 - Add vehicle

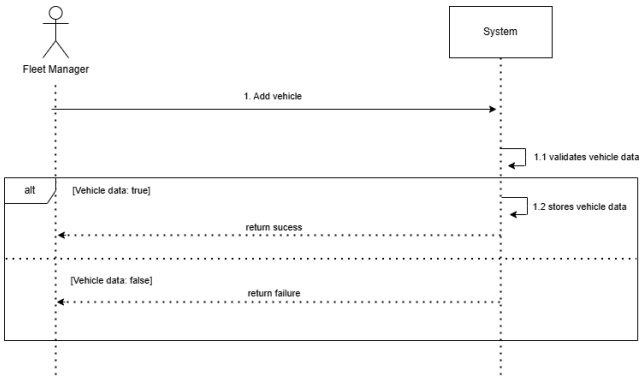

Fig. 3: SSD: Fleet Manager's UC 1

Use Case: Remove vehicle (Specification)

Actor	Fleet Manager
Use case name	Remove vehicle
Description	The user removes a vehicle from the system
Precondition	The "Fleet Manager" user must be selected and, at least, one vehicle must be logged in the system
Post-condition	A vehicle is removed from the log
Main flow	1. System displays a option menu 2. User selects "Remove vehicle" 3. System displays an input space 4. User inserts the vehicles license plate 5. System check if the license plate is associated to an existing vehicle 6. The vehicle is removed from the log
Alternative path	5. - License plate is not associated - User receives an error message - Use case resumes at step 3
Exceptions	If the user, at any point, wishes to cancel, the user can type "cancel operation" and the use case resumes at step 1

Table 3: Use Case: Remove Vehicle

SSD: UC 2 - Remove vehicle

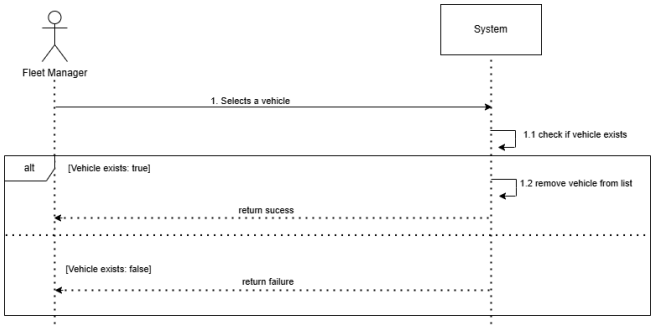

Fig. 4: SSD: Fleet Manager's UC 2

Use Case: List vehicles (Specification)

Actor	Fleet Manager
Use case name	List vehicles
Description	It's shown a list of all vehicles to the user
Precondition	The "Fleet Manager" user must be selected and, at least, one vehicle must be logged in the system
Post-condition	None
Main flow	1. System displays a option menu 2. User selects "List vehicles" 3. System checks if any vehicles are on the system 4. System displays a list of all vehicles logged in the system
Alternative path	3. - No vehicles are logged in the system - System sends a "No Vehicles" message - Use case resumes at step 1
Exceptions	None

Table 4: Use Case: List Vehicles

SSD: UC 3 - List vehicles

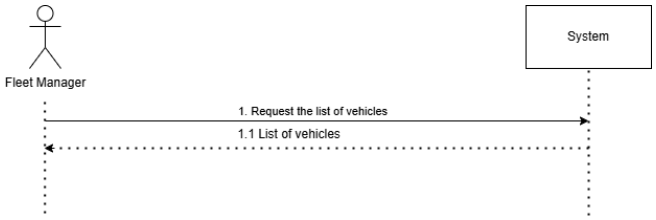

Fig. 5: SSD: Fleet Manager's UC 3

Use Case: Add storage location (Specification)

Actor	Fleet Manager
Use case name	Add storage location
Description	The user adds a storage location to the system
Precondition	The "Fleet Manager" user must be selected
Post-condition	A storage location is added to a log
Main flow	1. System displays a option menu 2. User selects "Add storage location" 3. System displays an input space 4. User fills the input space with information 5. System will check if the information type is correct 6. Use case returns to step 3 until all of the storage location's properties are filled 7. A storage location is added to a log
Alternative path	5. - Information type is incorrect - User receives an error message - Use case resumes at step 3
Exceptions	If the user, at any point, wishes to cancel, the user can type "cancel operation" and the use case resumes at step 1

Table 5: Use Case: Add Storage Location

SSD: UC 4 - Add storage location

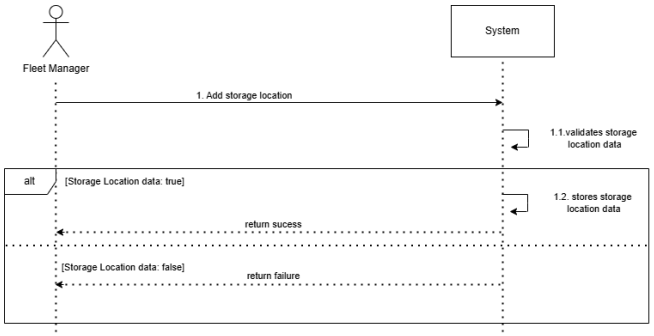

Fig. 6: SSD: Fleet Manager's UC 4

Use Case: Remove storage location (Specification)

Actor	Fleet Manager
Use case name	Remove storage location
Description	The user removes a storage location from the system
Precondition	The "Fleet Manager" user must be selected and, at least, one storage location must be logged in the system
Post-condition	A storage location is removed from the log
Main flow	1. System displays a option menu 2. User selects "Remove storage location" 3. System displays an input space 4. User inserts the storage location's ID number 5. System check if the ID is associated to an existing storage location 6. The storage location is removed from the log
Alternative path	5. - ID is not associated - User receives an error message - Use case resumes at step 3
Exceptions	If the user, at any point, wishes to cancel, the user can type "cancel operation" and the use case resumes at step 1

Table 6: Use Case: Remove Storage Location

SSD: UC 5 - Remove storage location

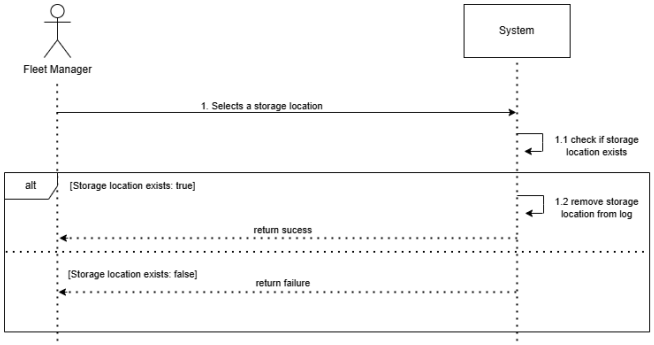

Fig. 7: SSD: Fleet Manager's UC 5

Use Case: Consult storage location (Specification)

Actor	Fleet Manager
Use case name	Consult storage location
Description	It's shown a list of all vehicles stored in a storage location to the user
Precondition	The "Fleet Manager" user must be selected and, at least, one storage location must be logged in the system
Post-condition	None
Main flow	- System displays a option menu - User selects "Consult storage location" - System checks if any vehicles are on the system - System displays an input space - User inserts the storage location's ID number - System check if the ID is associated to an existing storage location - System displays a list of all vehicles stored in the storage location
Alternative path	3. - No vehicles are logged in the system - System sends a "No Vehicles" message - Use case resumes at step 1 6. - ID is not associated to any storage location - User receives an error message - Use case resumes at step 4
Exceptions	If the user, at any point, wishes to cancel, the user can type "cancel operation" and the use case resumes at step 1

Table 7: Use Case: Consult Storage Location

SSD: UC 6 - Consult storage location

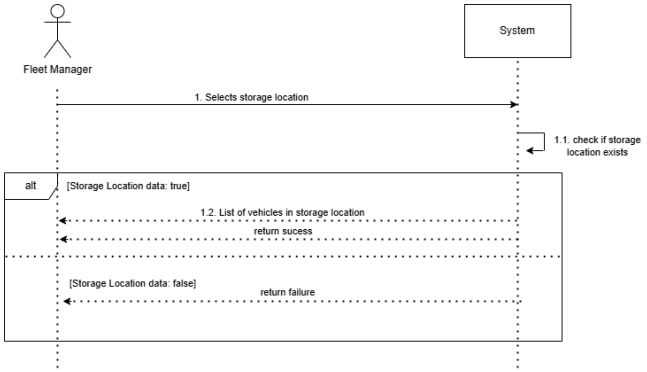

Fig. 8: SSD: Fleet Manager's UC 6

Use Case: List storage locations (Specification)

Actor	Fleet Manager
Use case name	List storage locations
Description	It's shown a list of all storage locations logged in the system to the user
Precondition	The "Fleet Manager" user must be selected and, at least, one storage location must be logged in the system
Post-condition	None
Main flow	1. System displays a option menu 2. User selects "List storage locations" 3. System check if there are any storage locations logged in the system 4. System displays a list of all logged storage locations
Alternative path	3. - No storage locations are logged in the system - System sends a "No Storage Locations" message - Use case resumes at step 1
Exceptions	None

Table 8: Use Case: List Storage Locations

SSD: UC 7 - List storage locations

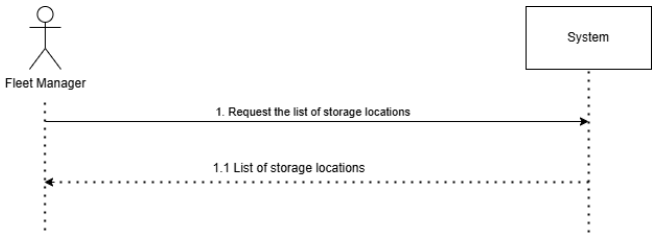

Fig. 9: SSD: Fleet Manager's UC 7

5.2 Actor: Trip Manager

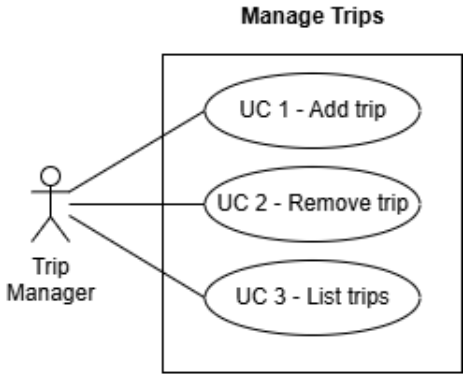

Fig. 10: Trip Manager's Use Case Diagram

Use Case: Add trip (Specification)

Actor	Trip Manager
Use case name	Add trip
Description	The user adds a trip to the system
Precondition	The "Trip Manager" user must be selected
Post-condition	A trip is added to the log
Main flow	1. System displays an option menu 2. User selects "Add trip" 3. System displays an input space 4. User fills the input space with information 5. System checks if the information type is correct 6. A trip is added to the log
Alternative path	5. Information type is incorrect - User receives an error message - Use case resumes at step 3
Exceptions	If the user, at any point, wishes to cancel, the user can type "cancel operation" and the use case resumes at step 1

Table 9: Use Case: Add Trip

SSD: UC 1 - Add trip

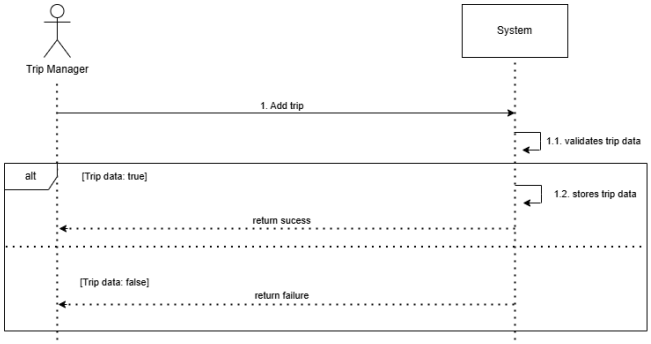

Fig. 11: SSD: Trip Manager's UC 1

Use Case: Remove trip (Specification)

Actor	Trip Manager
Use case name	Remove trip
Description	The user removes a trip from the log
Precondition	The "Trip Manager" user must be selected
Post-condition	A trip is removed from the log
Main flow	1. System displays an option menu 2. User selects "Remove trip" 3. System displays an input space 4. User fills the input space with information 5. System checks if the information type is correct 6. A trip is removed from the log
Alternative path	5. Information type is incorrect - User receives an error message - Use case resumes at step 3
Exceptions	If the user, at any point, wishes to cancel, the user can type "cancel operation" and the use case resumes at step 1

Table 10: Use Case: Remove Trip

SSD: UC 2 - Remove trip

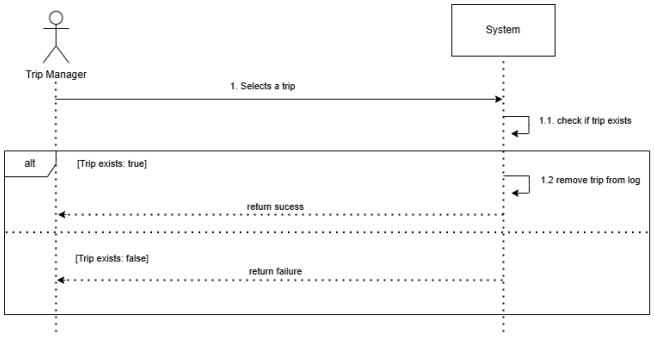

Fig. 12: SSD: Trip Manager's UC 2

Use Case: List trips (Specification)

Actor	Trip Manager
Use case name	List trips
Description	The user consults the trip's log
Precondition	The "Trip Manager" user must be selected
Post-condition	Lists all the trips in the system
Main flow	1. System displays an option menu 2. User selects "List trips" 3. System checks if any trips are on the system 4. System displays a list of all trips logged in the system
Alternative path	3. Information type is incorrect - User receives a "No Trips" message - Use case resumes at step 2
Exceptions	If the user, at any point, wishes to cancel, the user can type "cancel operation" and the use case resumes at step 1

Table 11: Use Case: List Trips

SSD: UC 3 - List trips

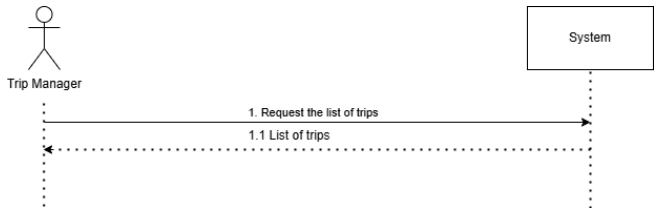

Fig. 13: SSD: Trip Manager's UC 3

5.3 Actor: Financial Manager

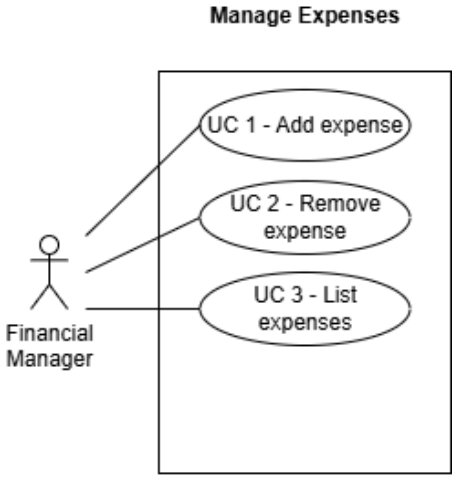

Fig. 14: Financial Manager's Use Case Diagram

Use Case: Add expense (Specification)

Actor	Financial Manager
Use case name	Add expense
Description	The user adds an expense to the system
Precondition	The "Financial Manager" user must be selected
Post-condition	An expense is added to a log
Main flow	1. System displays a option menu 2. User selects "Add expense" 3. System displays an input space 4. User fills the input space with information 5. System will check if the information type is correct 6. Use case returns to step 3 until all of the expense's properties are filled 7. An expense is added to a log
Alternative path	5. - Information type is incorrect - User receives an error message - Use case resumes at step 3
Exceptions	If the user, at any point, wishes to cancel, the user can type "cancel operation" and the use case resumes at step 1

Table 12: Use Case: Add Expense

SSD: UC 1 - Add expense

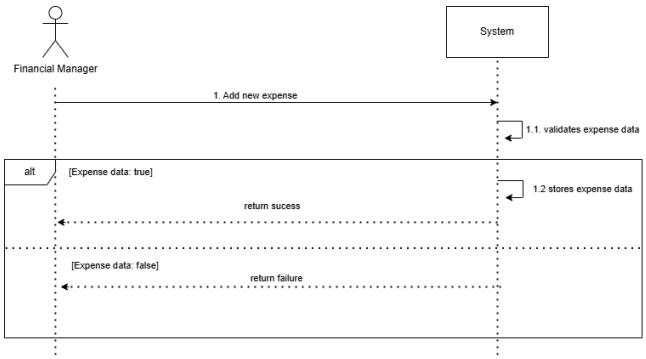

Fig. 15: SSD: Financial Manager's UC 1

Use Case: Remove expense (Specification)

Actor	Financial Manager
Use case name	Remove expense
Description	The user removes an expense from the system
Precondition	The "Financial Manager" user must be selected and, at least, one expense must be logged in the system
Post-condition	An expense is removed from the log
Main flow	1. System displays a option menu 2. User selects "Remove expense" 3. System displays an input space 4. User inserts the expense's ID 5. System check if the ID is associated to an existing expense 6. The expense is removed from the log
Alternative path	5. - ID is not associated - User receives an error message - Use case resumes at step 3
Exceptions	If the user, at any point, wishes to cancel, the user can type "cancel operation" and the use case resumes at step 1

Table 13: Use Case: Remove Expense

SSD: UC 2 - Remove expense

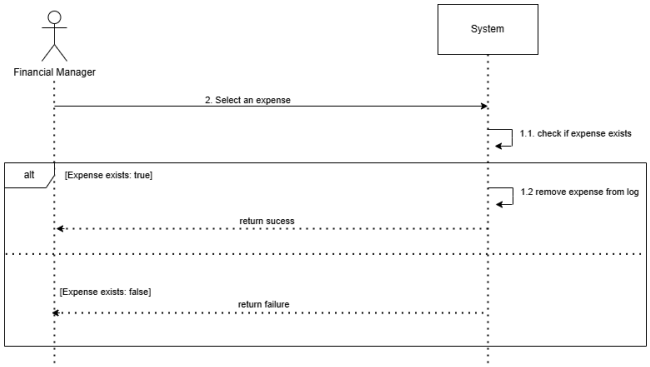

Fig. 16: SSD: Financial Manager's UC 2

Use Case: List expenses (Specification)

Actor	Financial Manager
Use case name	List expenses
Description	It's shown a list of expenses to the user
Precondition	The "Financial Manager" user must be selected
Post-condition	None
Main flow	1. System displays a option menu 2. User selects "List expenses" 3. System displays an input space 4. User inserts the expense's date 5. System displays an input space 6. User inserts the expense's category 7. System checks if there are any expenses with those parameters 8. System displays a list of expenses logged in the system
Alternative path	7. - No expenses with such parameters are logged in the system - System sends a "No Expenses" message - Use case resumes at step 4
Exceptions	If the user, at any point, wishes to cancel, the user can type "cancel operation" and the use case resumes at step 1. If the user types "all" on both input spaces, the program shows all expenses records on the system.

Table 14: Use Case: List Expenses

SSD: UC 3 - List expenses

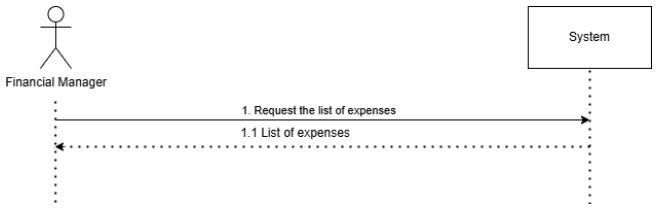

Fig. 17: SSD: Financial Manager's UC 3

5.4 Actor: Driver Manager

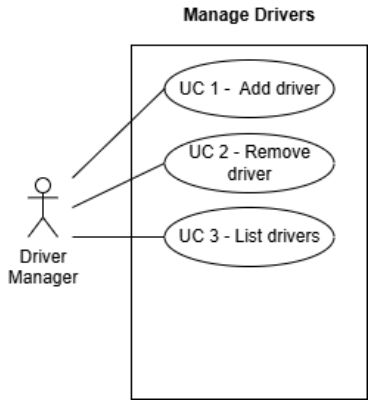

Fig. 18: Driver Manager's Use Case Diagram

Use Case: Add driver (Specification)

Actor	Driver Manager
Use case name	Add driver
Description	The user adds a driver to the system
Precondition	The "Driver Manager" user must be selected
Post-condition	A driver is added to a log
Main flow	1. System displays an option menu 2. User selects "Add driver" 3. System displays an input space 4. User fills the input space with information 5. System checks if the information type is correct 6. Use case returns to step 3 until all of the vehicle's properties are filled 7. A vehicle is added to a log
Alternative path	5. Information type is incorrect - User receives an error message - Use case resumes at step 3
Exceptions	If the user, at any point, wishes to cancel, the user can type "cancel operation" and the use case resumes at step 1

Table 15: Use Case: Add Driver

SSD: UC 1 - Add driver

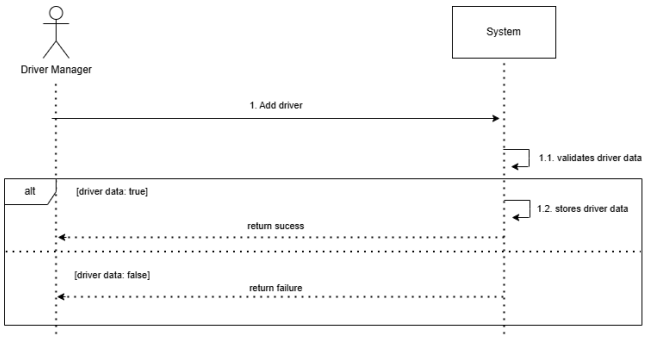

Fig. 19: SSD: Driver Manager's UC 1

Use Case: Remove driver (Specification)

Actor	Driver Manager
Use case name	Remove driver
Description	The user removes a driver from the system
Precondition	The "Driver Manager" user must be selected
Post-condition	A driver is removed from the log
Main flow	1. System displays an option menu 2. User selects "Remove driver" 3. System displays an input space 4. User fills the input space with information 5. System checks if the information type is correct 6. Use case returns to step 3 until all of the vehicle's properties are filled 7. A driver is removed from the log
Alternative path	5. Information type is incorrect - User receives an error message - Use case resumes at step 3
Exceptions	If the user, at any point, wishes to cancel, the user can type "cancel operation" and the use case resumes at step 1

Table 16: Use Case: Remove Driver

SSD: UC 2 - Remove driver

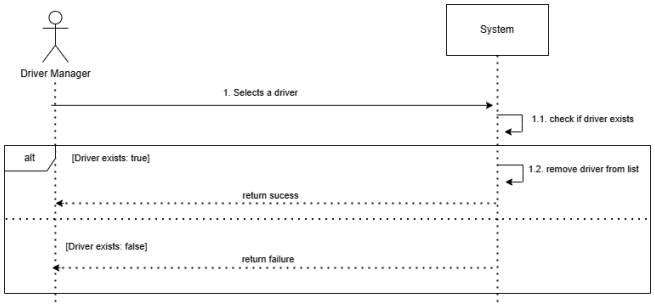

Fig. 20: SSD: Driver Manager's UC 2

Use Case: List drivers

Actor	Driver Manager
Use case name	List drivers
Description	The user consults all the drivers available
Precondition	The "Driver Manager" user must be selected
Post-condition	Shows the drivers inserted in the log
Main flow	1. System displays an option menu 2. User selects "List drivers" 3. System displays an input space 4. User fills the input space with information 5. System checks if the information type is correct 6. Shows all the drivers available
Alternative path	5. Information type is incorrect - User receives a "No Drivers" message - Use case resumes at step 3
Exceptions	If the user, at any point, wishes to cancel, the user can type "cancel operation" and the use case resumes at step 1

Table 17: Use Case: List Drivers

SSD: UC 3 - List drivers

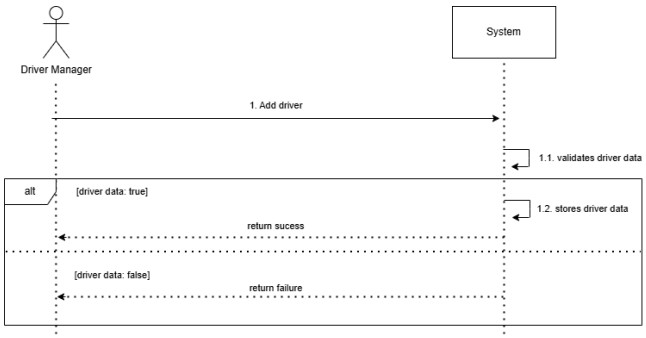

Fig. 21: SSD: Driver Manager's UC 3