System Analysis
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Lviv Electrotrans Asset Management

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Abstract

This project aims to study the real business domain and to learn how to design information systems reflecting the connections between its various components.

1 Introduction

Probably every Lviv resident has experienced using the public transport system at least once in his/her life. In cases when a person is unable to reach their destination on foot due to, for example, time constraints, public transport becomes the most economical way to get from one point to another. There are plenty of people who own their personal cars, but still prefer public transport for movement within the central part of Lviv, because, in this case, they do not need to worry about finding a free parking lot. In addition, the demand for such services increased significantly after the increase in fuel prices. As we can see, a lot of people rely on local passenger transportation companies, so this industry is critically important for the normal functioning of any city.

2 Target domain

Passenger transportation companies aim to make the client's trip comfortable and safe. Besides, it is important for the representatives of this industry to ensure a certain level of reliability, so that customers are confident that the company will get them to their destination. For these purposes, the company needs qualified employees, well-thought-out route planning and effective fleet and asset management. The latter is extremely important, since such companies are expected to have a large fleet, as they have an enormous number of customers per day. In addition, fleet and asset management determines the safety of the trip. This project aims to study the real business domain on the example of Lviv Electrotrans and to learn how to design information systems reflecting the connections between its various components.

Developing a Fleet Management system for passenger transportation companies in Lviv is crucial for multiple reasons. Firstly, it can increase the efficiency of transportation companies by optimizing routes, monitoring fuel efficiency, and keeping track of vehicle maintenance and repairs. Secondly, it can result in cost savings by effectively managing the vehicles, drivers, and resources of the company. Thirdly, it can improve customer satisfaction by ensuring a reliable and efficient fleet management system. Additionally, it can help in maintaining legal compliance and ensuring the safety of customers by monitoring compliance with regulations and laws. Lastly, it can also help in better allocation of resources, better maintenance and avoid vehicle breakdowns and accidents.

3 Personas

A Fleet Management system for passenger transportation companies in Lviv requires several key roles to ensure the efficient and effective operation of the company. One of the most important roles is the Maintenance Worker. This individual is responsible for the day-to-day maintenance of the company's vehicles, including performing regular check-ups, repairs, and ensuring that vehicles are in good working condition. The Maintenance Worker plays a critical role in ensuring the safety and reliability of the company's vehicles, and that the company is in compliance with regulations and laws.

Another important role in a Fleet Management system is the Fleet Manager. This individual is responsible for overseeing and coordinating the day-to-day operations of the company's fleet of vehicles, including scheduling, routing, and monitoring fuel efficiency. The Fleet Manager plays a crucial role in ensuring that vehicles are utilized effectively, and that the company is operating efficiently and maximizing profits.

The Executive Director is also an important role in a Fleet Management system. This individual is responsible for overall management and direction of the company, including budgeting, financial management, and ensuring compliance with regulations and laws. The Executive Director plays a vital role in ensuring that the company is running smoothly and that the company's goals are met.

The HR Manager is another important role in a Fleet Management system. This individual is responsible for the management of the company's human resources, including recruiting, hiring, and training employees. The HR Manager plays a key role in ensuring that the company has a qualified and trained workforce, which is essential for the safety and reliability of the company's operations.

Finally, the Maintenance Director plays a vital role in the Fleet Management system. This individual is responsible for the overall management and direction of the company's maintenance operations, including overseeing the maintenance of vehicles, managing the workshop operations, ordering spare parts, and monitoring fuel and oil supply. The Maintenance Director plays a critical role in ensuring that the company's vehicles are in good working condition, that the company is in compliance with regulations and laws, and that the company's maintenance operations are running smoothly.

In conclusion, the Fleet Management system for passenger transportation companies in Lviv requires several key roles to ensure the efficient and effective operation of the company. By including roles such as the Maintenance Worker, Fleet Manager, Executive Director, HR Manager, and Maintenance Director, the company can ensure that all aspects of the fleet and asset management are properly managed and that the company is operating efficiently and effectively.

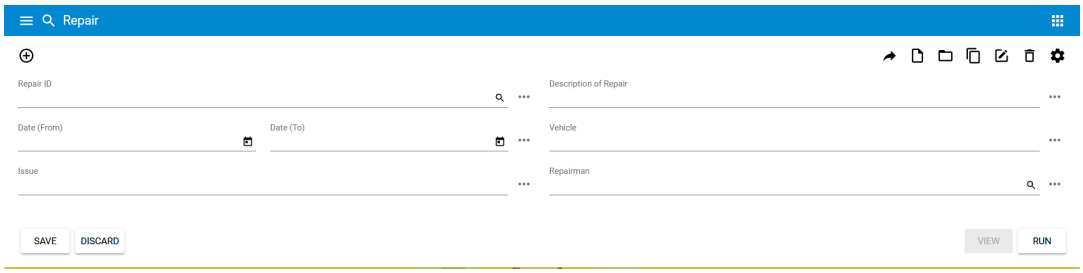
4 MVP expectations

The MVP represents should reflect all the relationships between the different concepts in the domain. It should be possible to add a new vehicle to the system, configure all its properties, and assign a person to it. Besides, it user should be able to specify the state of the vehicle and add a new route. In addition, the user may need the opportunity to create an entity that would represent the issue that happened at the enterprise.

5 Usage

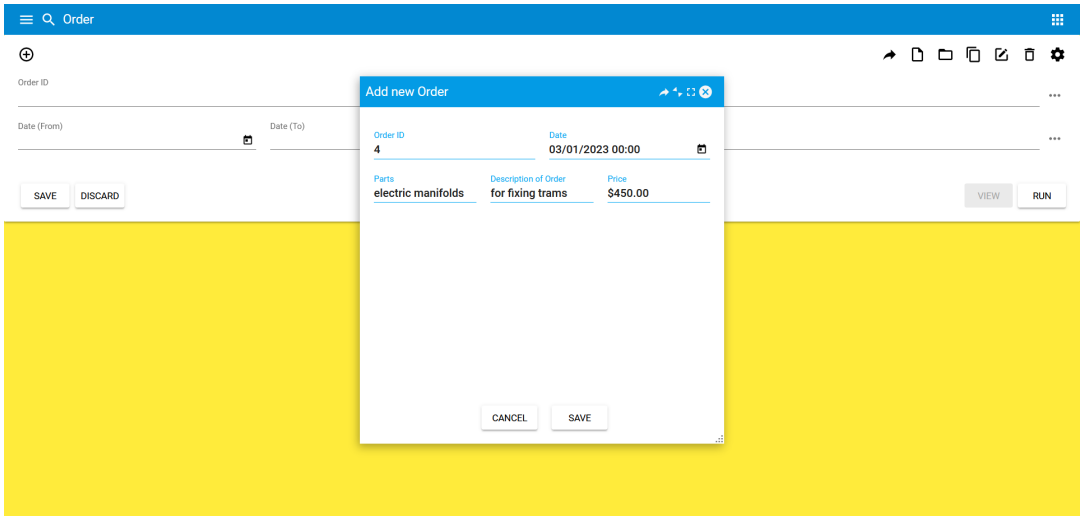
5.1. Repair

Entity **Repair** is responsible for the representation of history of various vehicle repairs that were conducted in the LvivElectroTrans park. It's necessity comes from the insight that the way the company keeps track of repairs is highly inefficient and outdated. This directly affects the efficiency of future work, where the access to issues which were addressed many times before is difficult, therefore the time and the quality of repairs may suffer. In our informational system each entry of the Repair entity contains information about the date of the repair, which vehicle was served by whom, what was the underlying issue.



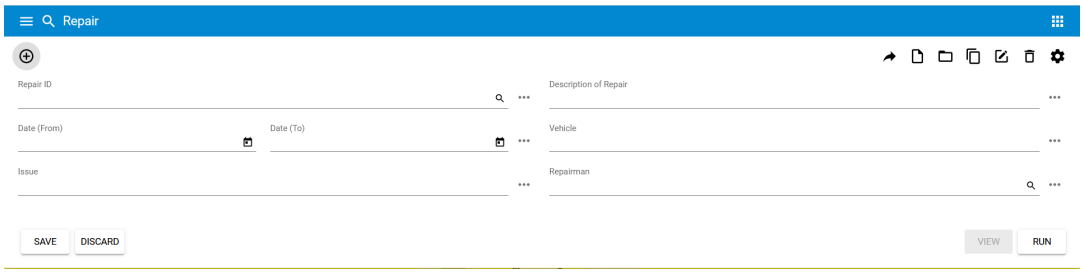
5.2. Order

Entity **Order** is created to represent the process of acquiring parts for vehicles. As we found out during our domain discovery, the waiting times for parts are often extremely long, which can delay vehicle repairs for large chunks of time. Considering this, it is crucial to provide the company with a way to efficiently see all the orders made, which parts they contain and the order description. This will provide the employees with the opportunity to streamline this process and therefore make the whole organization of vehicle repair and the maintenance stuff work quicker and more organized.



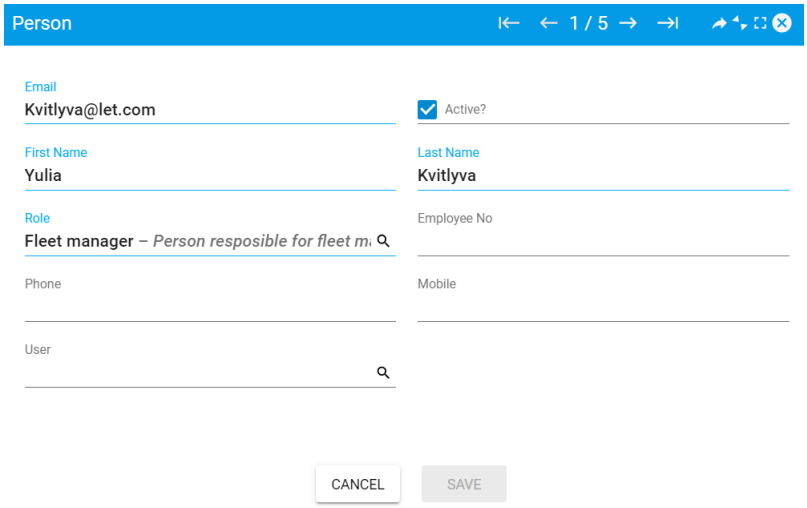
5.3. DriverReport

Through our conversations with the driving staff of LvivElectroTrans we found out, that a significant part of the drivers prefer to be involved to some extent in the maintenance process. Moreover, it is informative for the maintenance staff to receive inputs from drivers on their perceived state of the vehicle. That way, certain issues can be discovered at earlier stages, which leads to cheaper and simpler repairs, saving the company time and money. The entity **DriverRepair** was designed with that in mind, to provide drivers with an opportunity to structurally provide the maintenance staff with their thoughts and concerns about their vehicle.



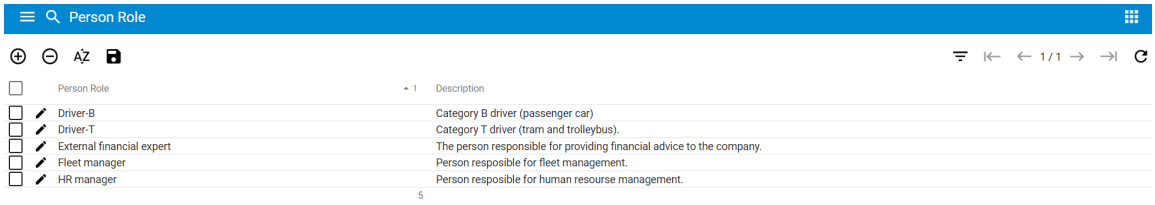
5.4. Person

It is important for the management of the company to be able to add new people who interact with the assets to the system. It does not necessarily have to be directly employed workers. These can be entrepreneurs who only provide their services. Therefore, it was decided to create a **Person** entity that would capture all this logic. Required properties are e-mail address, first name, last name and role of the person. In case this person is an employed worker of LvivElectroTrans, HR-manager will specify employee number. In addition, there is an opportunity to include another useful information such as phone and mobile. After a new person is added, he or she can be assigned, for instance to a specific vehicle as a driver.



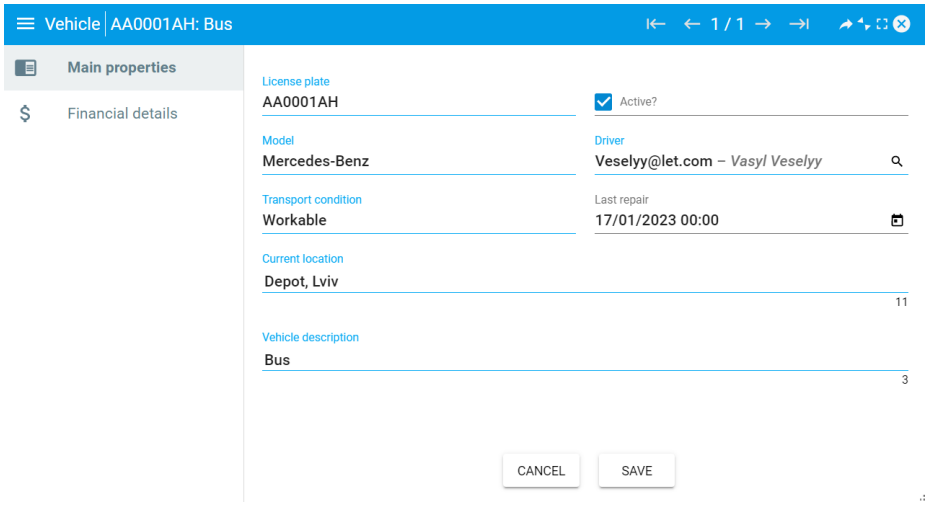
5.5. Person Role

The company can determine in advance which roles exist and specify their description in the Person Role entity. Each person in the company is associated with a specific role. This makes it possible to quickly and easily find all persons who have similar duties in the company. Besides, it provides a nice auto completer for role property when creating or editing Person.



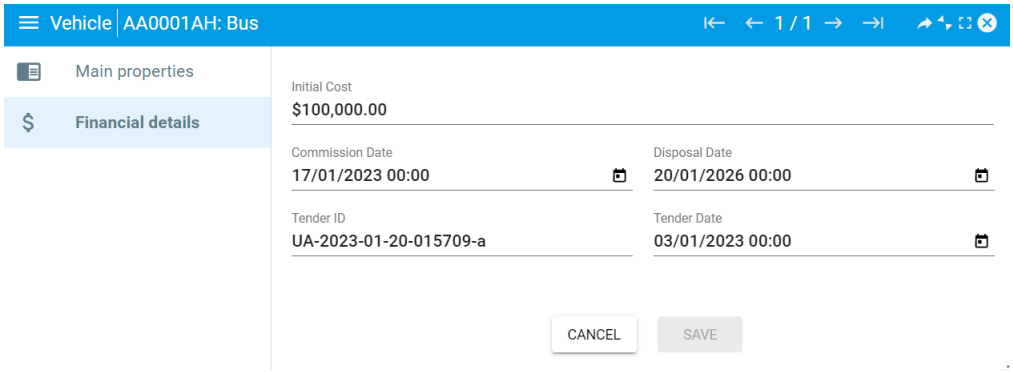
5.6. Vehicle

This class was designed to represent a concrete vehicle, that can be assigned to a route. It has several properties: the license plate(the unique vehicle identifier), model, desc(description), current location, driver, active, last repair(the date of the last repair), and transport condition. All of these properties are required, except property active. Also, it's important to mention that the transport condition is a property that is represented, by a separate class: **TransportCondition**; the same is with the property driver, it's represented by a class **Person**. Also for this class was generated the UI(master and centre), which can be seen on the screen below.



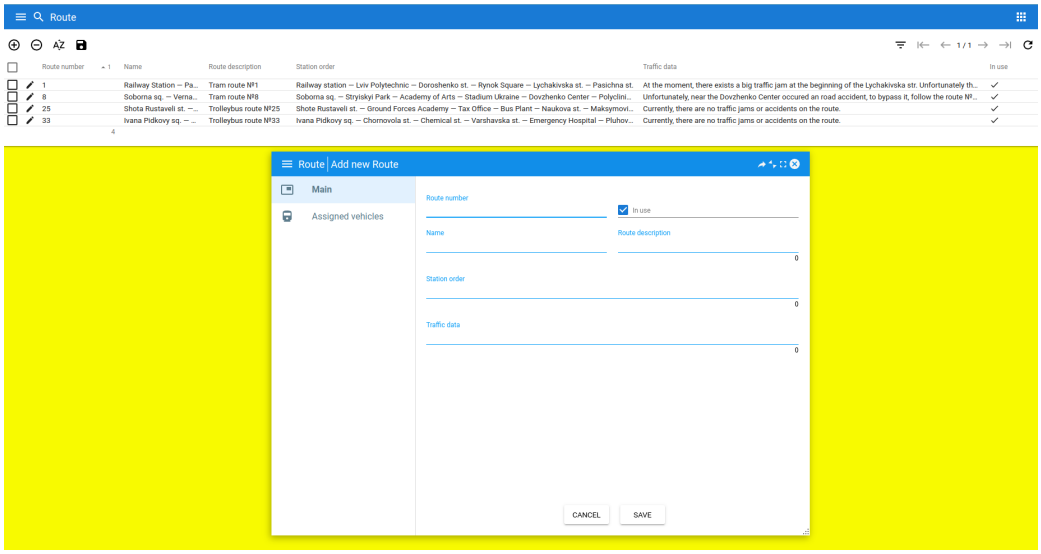
5.7. Vehicle Financial Details

It is important for the company's management to understand the details of the purchase of the vehicle. In addition, it is crucial that each vehicle is associated with a specific tender. Thus it was decided to create one-2-one relationship between Vehicle and VehicleFinDet. User can specify the initial cost, commission date, disposal date, tender's ID and the date of the tender when the selected vehicle was purchased.



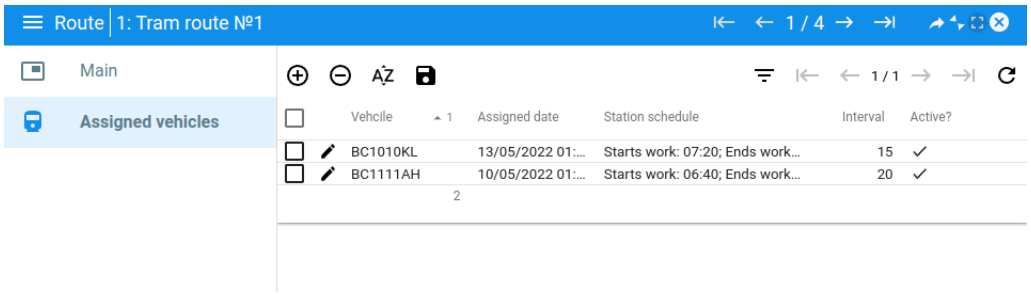
5.8. Route

When we talk about Lviv Electrotrans enterprise, we should understand that one of the most important concepts for this company is its routes. Actually, they are very complex and have a lot of different properties, that should be taken into account, among them station order, route number(the unique route's identifier), and assigned vehicles to this route. Also, we should understand that routes can be active(in use) or on the contrary inactive. All these properties were captured in the separate class **Route**. Required properties are route number, route name, station order, and inUse, which shows whether the route is active. Also, there is property traffic data(describes the traffic on the route, because on it can exist some traffic jams, which for example, can be bypassed), it becomes required only if **Route** is active(inUse is True). Also for this class was generated the compound UI(master and centre), which can be seen on the screen below.



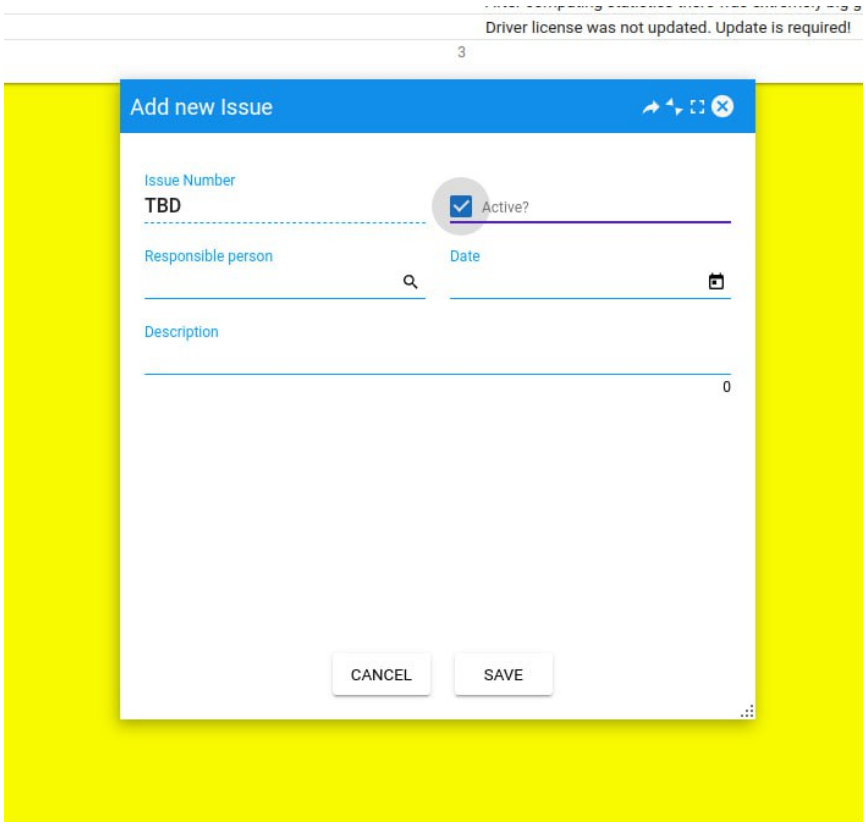
5.9. AssignedVehicle

This class was designed to represent an assigned vehicle to a specific route(one-to-many association). It has several properties: route, to which it's assigned; vehicle, assigned date, station schedule, active, and interval. It's important to mention, that all these properties are required for this class, except property active, which shows whether the assigned vehicle to the route is currently active(for example, it can have some breakdowns and cannot be used on the route). Also for this class was generated the compound UI(embedded UI into the **Route** UI), which can be seen on the screen below.



5.10. Issue

The **Issue** entity is an important part of any fleet management system as it allows the tracking and management of any issues that may arise with the vehicles or assets within the fleet. The **Issue** class is responsible for storing information about each individual issue, including a unique identifier, a detailed description, the date the issue was opened, identifier whether issue is still active, and the person responsible for addressing the issue. Overall, the **Issue** entity is critical for ensuring the effective and efficient management of fleet assets. It allows for the tracking and management of issues, which can result in cost savings, improved customer satisfaction, and increased safety. The Issue entity also plays a key role in maintaining legal compliance, as it allows for proper tracking and management of issues that may arise with the vehicles or assets within the fleet. The UI can be observed on the screen below.



6 Conclusion

Our team managed to thoroughly analyze the business domain, understand its specifics and reproduce all the concepts and connections between them in the information system. The most difficult part of the work was to choose such a structure that would convey all the nuances of the domain and would be understandable to end users. We gained important experience not only in software development, but also in conducting interviews with the client and analyzing his problems. We also learned how to organise the overall process of domain discovery and requirements engineering. The developed information system would significantly simplify many processes in the Lvivelectrotrans company and reduce the amount of inefficient work with paper reports.