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DIGITAL SOLUTION FOR A COMPANY OFFERING CAR WASH AND TOWING SERVICES

Independent work in the subject "Web Applications Based on C#"

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Author's Declaration of Originality

I hereby certify that I am the sole author of this paper. All the used materials, references to the literature and the work of others have been referred to. This paper has not been presented for examination anywhere else.

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Abstract

This paper presents the development of a customized digital solution aimed at enhancing the management of a car wash and towing services for a specific company. Currently reliant on Excel spreadsheets, the client faces challenges related to accessibility and data manipulation. To address these issues, a web-based application is proposed to streamline service input and management. The system encompasses functionalities for employee and customer management, vehicle and service machine mapping, and billing processes.

Additionally, it includes features such as user authentication, employee and manager dashboards as well as sorting, and filtering capabilities. The paper outlines the business logic, service details, functional and non-functional requirements, ERD and concludes initial MVP views.

This paper is written in English and is [number of pages in main document] pages long, including [number] chapters, [number] figures and [number] tables.

List of Abbreviations and Terms

API	Application Programming Interface
CRUD	Create, Read, Update, and Delete. Used for managing data.
ERD	Entity Relation Diagram
MVP	Minimum Viable Product refers to a basic version of a product that has enough features to satisfy early customers and provide feedback for future product development.

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1. Introduction

This project aims to develop a digital solution tailored to the needs of a specific company offering automatic car wash (manned) and towing services. The paper outlines a proposal for a Minimum Viable Product (MVP), with the flexibility to incorporate additional functionalities based on resource availability for development. Currently, the company relies on Excel spreadsheets for service documentation, resulting in frequent issues stemming from accessibility constraints and varying levels of Excel proficiency among users. This often leads to challenges in filtering, calculations, and other spreadsheet tasks.

Booking management is handled through a traditional calendar notebook, although the absence of a dedicated booking system poses challenges for future scalability. While the project does not initially encompass the development of a booking system, it acknowledges its necessity for future implementation. Initially, system access will be restricted to employees and company owners, with plans to eventually incorporate customer interactions into the database.

The project prioritizes requirements based on their significance, ensuring that functionalities deemed essential are included within the MVP framework. Through this approach, the project seeks to address immediate pain points while laying the groundwork for future enhancements in the company's operational efficiency and service delivery.

Related links:
ERD (Contact kailii@ttu.ee for access)
Figma (Contact kailii@ttu.ee for access)
GitLab (Contact kailii@ttu.ee for access)

2. Business logic

A simple MVP solution must provide CRUD functionalities for administrating different instances such as employees, customers, their representatives, and various types of vehicles (both for service and customer use).

The minimum viable product (MVP) should support roles for both employees and managers, each with their respective rights. Employees should have access to a dashboard allowing them to add car washes and towings to the database, search for existing towings and washes, and view customer information. Managers, beyond the employee's capabilities, should have their own dashboard enabling them to add employees and company vehicles.

Functions such as customer self-service, booking, and scheduling are not within the project's scope. Reservations will be accepted via phone or email. Corporate customers will receive monthly invoices, while individuals will pay for each service either in cash or card. Trusted corporate customers may opt for wire transfer payments. The MVP system won't handle payments directly but will generate bills for customers per service or monthly for trusted corporate clients.

2.1 Car Wash Services

Car wash services offer various wash types and optional extras, each with corresponding prices. The wash types include:

- Basic wash
- Medium wash
- Super wash

Additionally, customers can opt for extras such as:

- Bug removal spray
- Tar removal spray

Prices for wash types and extras are subject to change. Friends and family members are

eligible for complimentary car washes, while certain customers may qualify for discounts. Bills may include a combination of different service types. It's imperative for employees to document all events, including those that are free or discounted. Data for each event must be meticulously recorded, as outlined in Table 1.

Table 1. *A table with collected data of each car wash*

Nr	Field	Comment
1	Date	Date of the wash
2	Client	Can be an unknown customer
3	Representer	If invoiced to a corporate client
4	Payment type	
5	Vehicle	Make, model, licence plate etc
6	Service type and extras	
7	Employee	
8	Cost	
9	Discount	
10	Comment	
11	VAT	

This information is collected to provide documentation for accounting and further analysis of services. Car wash manager must have the possibility to sort and filter washes by date, type, customer and its representer, vehicle, payment type, employee, and invoice number.

2.2 Towing Services

Towing services can be towing, startup or car assistance. They can be combined with each other. Sometimes, towing fees are multiplied with a rate. This normally happens when towing is needed at night or during public holidays.

Table 2. *A table with collected data of each towing*

Nr	Field	Comment
1	Date	
2	Client	Can be an unknown customer
3	Representer	If billed to a corporate customer
4	Invoice number	
5	Vehicle	Make, model, licence plate etc
6	Service type	
7	Employee	
8	Route	
9	Mileage	
10	Cost	
11	Discount	Rates can also vary
12	Comment	
13	VAT	
14	Towing vehicle	
15	Payment type	

Each service vehicle has a maximum load capacity. This is currently not needed, but if in the future a planner is developed, it will become an important aspect because some machines are more expensive, so it is not so lucrative to use bigger machines where they are not necessary.

It must be possible to provide documentation for accounting and further analysis of services. Towing side business manager must have the possibility to sort and filter towings by date, type, customer and its representer, vehicle, payment type, employee, used machine, route, discount, mileage, comment, rate and invoice number. All employees must have the possibility to add towings for other employees too.

3. Functional and non-functional requirements

Functional requirements define what the system should do, while non-functional requirements specify how the system should perform, ensuring it meets quality standards and user needs effectively. Both types of requirements are crucial for guiding system development and ensuring project success.

3.1 Functional requirements

Requirements are categorized based on their priority level, which indicates their relative importance or urgency in relation to other tasks. This means that high priority functionalities must be covered by the MVP while medium and low priority tasks can be done later. See Table 3 for a breakdown of the functional requirements for this MVP.

Table 3. *A table with functional requirements*

ID	Requirement	Priority	Description
F1	User Authentication	High	The system should allow users to authenticate themselves using a username and password.
F2	CRUD services	High	The system should allow employees to input and manage data related to car wash and towing services. Future services can be added.
F3	CRUD vehicle	High	The system should allow CRUD operations (Create, Read, Update, Delete) on vehicle data.
F4	CRUD machines	High	The system should allow CRUD operations on machines.
F6	CRUD person	High	The system should allow CRUD operations on person-related data.
F7	CRUD bill	High	The system should allow CRUD operations on bill-related data.
F8	Sorting by data fields	High	The system should allow sorting of data based on various fields.
F9	Filtering by data fields	High	The system should allow filtering of data based on various fields.
F10	Employee dashboard	High	The system should provide a dashboard interface for employees.
F11	Manager dashboard	High	The system should provide a dashboard interface for managers. This means seeing all towings and washes in tables. Possibility to sum up earnings.

F12	Recognize future services	Medium	The system should be able to recognize and accommodate future services.
F13	CRUD service type	Medium	The system should allow CRUD operations on service type data. Meaning that it is possible to add new service types.
F14	CRUD discount	Medium	The system should allow CRUD operations on discount-related data. Meaning that it is possible to add new discounts.
F15	Booking system	Low	The system must enable online bookings.
F16	Customer self-service environment	Low	The system must enable creating a customer profile creation and a self-service environment for managing bookings.
F17	Employee and service machine scheduler	Low	The system must include a scheduler for employees and service machines.
F18	VAT	Low	The system must support that fact that VAT can change
F19	In-ADS integration	Low	In-ADS must be integrated for requesting existing addresses.
F20	Estonian Business register integration	Low	Estonian Business Register company information requesting service must be integrated
F21	Statistics	Low	The system should provide basic statistical data related to services, vehicles, etc.
F22	POA	Low	System checks the existence of a power of attorney

These priorities ensure that essential functionalities are included in the MVP, with less critical features being deferred for future development iterations.

3.2 Non-functional requirements

Nonfunctional requirements, also known as quality attributes or constraints, describe the attributes or qualities that a system or software application must have or adhere to, rather than specific behaviors or functions. See Table 4 for additional information on non-functional requirements of this MVP.

Table 4. *A table with non-functional requirements*

ID	Requirement	Priority	Description
NF1	User Interface Responsiveness	High	The system should ensure user interface responsiveness within 2 seconds.
NF2	Security	High	The system should ensure the confidentiality of user data and authentication security according to applicable standards.
NF3	Scalability	High	The system should be scalable and able to handle a large amount of data and users according to growing needs.
NF4	Compatibility	High	The system should be compatible with various web browsers and platforms, including Chrome, Firefox, Safari, etc.

These non-functional requirements are crucial for ensuring the overall quality, performance, and usability of the system, and they are prioritized as high to emphasize their criticality in achieving project success and meeting user expectations.

4.   Summary

Appendix 1 – ERD proposal for the required system
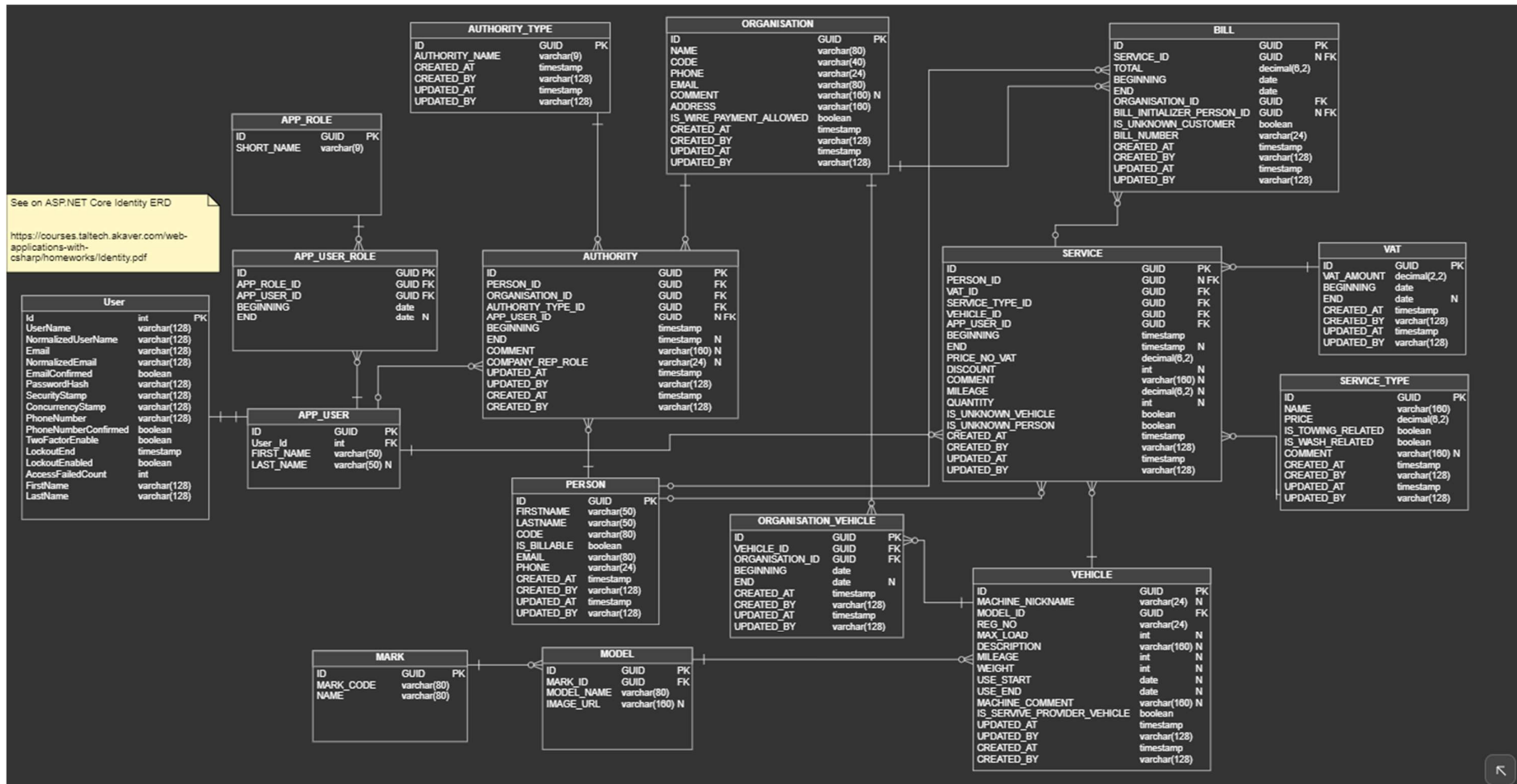
Appendix 2 – Initial views and comments

Employee dashboard includes an overview on recent car washes and towings. Search bar is used to look for texts across the site.

Filtering, sorting and adding can be made via buttons in the right corner of each table. Tables can also be closed by using the arrow button. Each item in the table can be modified and deleted by clicking on delete or modify icons on to right of each row.

When creating a service instance, some information must be entered. Existing customer or vehicle instances can be looked up by using the search icon on the text area. Anonymous customer is a specific instance that must be used when creating a bill for an unidentified person.

A bill is created after clicking on "Confirm". By clicking "Save", just one service is added and more can be added later on. More services can be added by clicking on "+" icon under "Add Service info". This is needed for corporate customers who receive monthly bills.

There is a possibility to see all customers as well as adding, sorting and filtering customers.

Singular customer view includes an overview on employees, vehicles, customer data and possibly customer statistics (currently not in MVP scope).
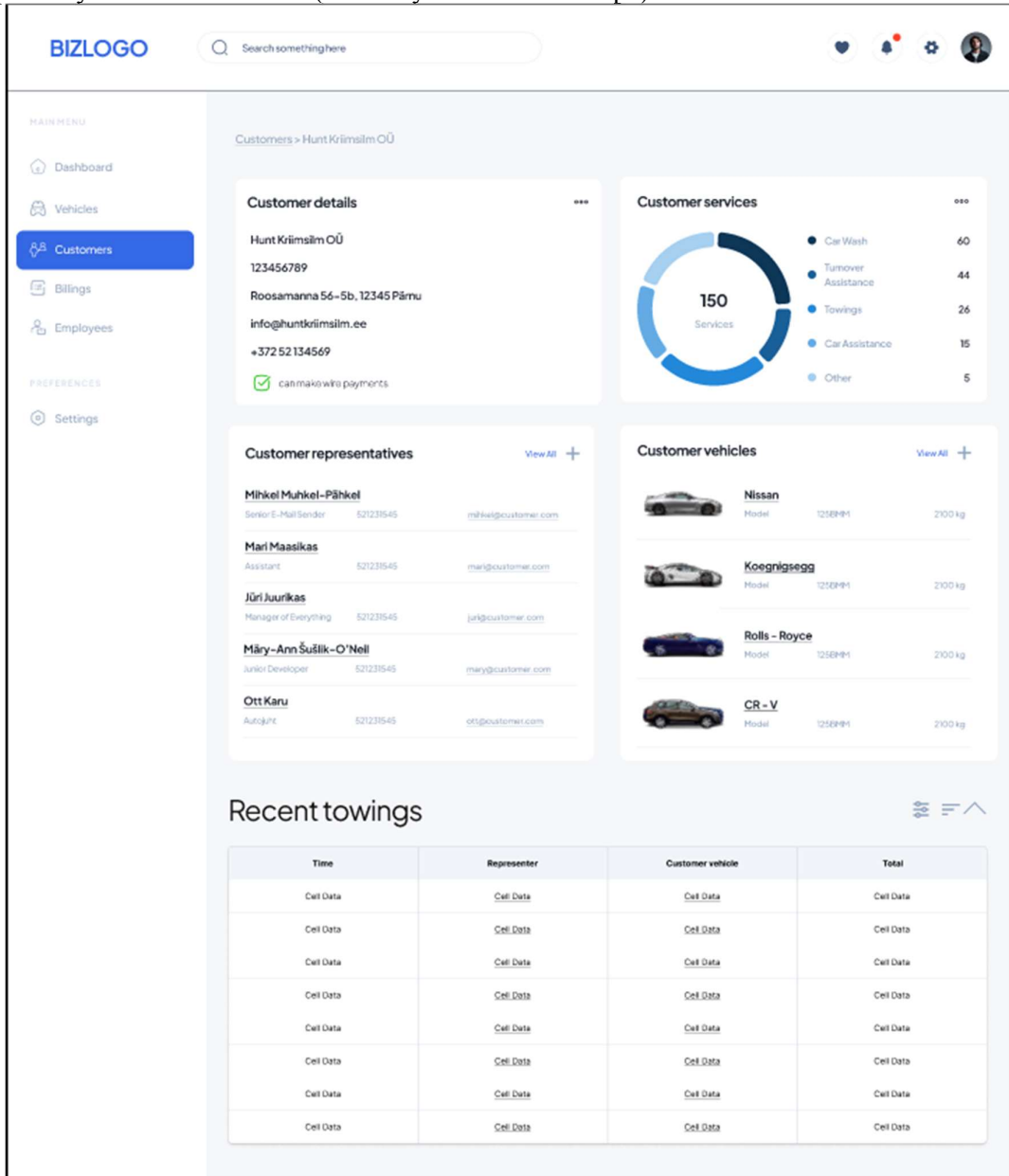
All bills view enables adding, sorting and filtering views.

Singular bill view enables looking into a singular bill and its services.