Universidad Tecnológica de Tijuana

SRS

Temperature Monitoring and Control System for Vaccine Transportation.

Career: TSU in Information Technology, Multiplatform Software Development Area.

Teacher: Ray Brunett Parra Galaviz

Members:
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Miramontes Gutiérrez Rodolfo Manuel

Group: 4B **Delivery date:**19/03/2025

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1. Introduction

This document contains a Software Requirements Specification (SRS) for a **Temperature Monitoring and Control System for the Transportation of Medications (VACCINES).** The document follows the guidelines of the IEEE 830 standard and describes the functional and non-functional specifications required for the system's development.

1.1 Purpose

The purpose of this document is to define the functional and non-functional specifications for developing a **Logistics System for Medical Products (Vaccines),** ensuring that medications are maintained in optimal conditions during transportation. This system will be designed for use by pharmaceutical companies, guaranteeing compliance with quality regulations and the safety of pharmaceutical products.

1.2 Range

The system will provide logistics and real-time monitoring of temperature conditions inside medication transport vehicles, allowing for:

- Immediate alerts if predefined limits are exceeded.
- Generation of reports on transportation conditions.
- Historical data logging for audits and regulatory compliance.
- Remote access to data through a web or mobile platform.
- Temperature control inside the vehicles.
- Route generation, including destination, date, estimated time, and assigned drivers.
- Incident reports (if any issues occurred).
- Suppliers.
- Pharmaceutical companies and hospitals.

The system is designed for pharmaceutical companies that need to ensure the quality of medications during transportation, from distribution centers to delivery points. Our project will not handle other quality aspects such as humidity or health risks. It will focus exclusively on medical vaccine products. Additionally, it will not manage logistics or product inventory, only the shipment of the package.

1.3 Personnel Involved

Name	Martinez Valenzuela Mariana Lizbeth
Role	Documenter, Data Analyst, Programmer
Professional Category	TSU-DSM
Responsibility	Project documentation and processes, system programming.
Contact	0323105956@ut-tijuana.edu.mx

Name	Sanchez Gomez Citlali Sarai
Role	Programmer, Designer, Data Analyst
Professional Category	TSU-DSM
Responsibility	System programming and its design
Contact	0323105963@ut-tijuana.edu.mx

Name	Ponce Zeferino Alann Eduardo
Role	Documenter, Designer
Professional Category	TSU-DSM
Responsibility	Project documentation and system design
Contact	0323106281@ut-tijuana.edu.mx

Name	Miramontes Gutiérrez Rodolfo Manuel
Role	Programmer, Documenter
Professional Category	TSU-DSM
Responsibility	Project programming and documentation.
Contact	0323105953@ut-tijuana.edu.mx

1.4 Definitions, acronyms and abbreviations

Name	Description
User	A person responsible for managing the monitoring and temperature control during the transportation of vaccines.
SRS	Software Requirements Specification

1.5 References

Title	Reference
Standard SRS 830 - 1998	SRS

1.6 Summary

This document consists of multiple sections. The first section provides an introduction to the project and an overview of the system specifications. The second section presents a product perspective, describing the system to understand its main functions and objectives.

2. General Description

2.1 Product outlook

The Temperature Monitoring and Control System is a compact and accessible solution designed for the logistics of shipping medications that require precise control of transportation conditions. Since medications are sensitive to temperature variations, even minor changes can affect their effectiveness. This system provides an efficient way to ensure that medications are transported in a controlled environment, meeting the minimum conservation standards.

2.2 User characteristics

User Type	System administrator
Training	Technician or systems engineer.
Activities	Initial system configuration, maintenance, user management, and technical support.

User Type	Logistics Manager
Training	Logistics or transportation specialist.
Activities	Route planning, driver assignment, truck management and real-time monitoring.

User Type	Conductor
Training	Driving license to transport goods and training in the use of the system.
Activities	Transportation of medications, recording of temperature conditions, and notification of incidents.

User Type	Client (Pharmaceutical Company/Hospital):
Training	Owner or authorized personnel.
Activities	Verification of temperature reports, transportation history and receipt of notifications.

2.3 Restrictions

Device Compatibility with IoT:

The system must be compatible with RFID readers and biometric sensors that support Wi-Fi or Bluetooth connectivity, considering the use of long-lasting batteries or appropriate power sources.

Software Constraints:

- **Standards and Protocols:** Compatibility with standards such as MQTT and HTTP for efficient and secure communication.
- **Operating System:** The application must be accessible on modern web browsers (Windows, Linux, macOS) and mobile devices (iOS, Android).
- **External Integration:** Potential connection with external systems, such as surveillance cameras, depending on protocol compatibility.

3. Specific requirements

3.1.Functional Requirements

Requirement Identification:	RF 01
Requirement Name:	Temperature data capture
Characteristics:	Temperature sensors, LCD screen, regular update.
Requirement Description:	The system must measure and display the temperature at 10-second intervals during the transport of packages and display the values in real time both in the driver's cabin and in the mobile application.
Priority of the Requirement	High

Requirement Identification:	RF 02
Requirement Name:	Temperature Logging:
Characteristics:	Generation of Detailed Reports in Graphs for Documentation:
Requirement Description:	The system must generate reports containing information about the temperatures recorded throughout the entire shipment journey, ensuring traceability of the package.
Priority of the Requirement	Medium

Requirement Identification:	RF 03
Requirement Name:	Automatic Temperature Regulation:
Characteristics:	HVAC Device Control, Relay Activation:
Requirement Description:	The system must activate a fan if the temperature inside the truck exceeds 25°C or a heater if it drops below 15°C, ensuring optimal conditions for the medications.
Priority of the Requirement	High

Requirement Identification:	RF 04
Requirement Name:	Temperature Alert Indicator:
Characteristics:	Visual Alert System with Lights:
Requirement Description:	The system must emit both a visual and audible alert when the temperature inside the truck is outside the established limits, activate automatic temperature regulation, and generate an incident report documenting the issue.
Priority of the Requirement	High

Requirement Identification:	RF 05
Requirement Name:	History
Characteristics:	Maintenance History Logging:
Requirement Description:	The system must include a maintenance history log, notifying the need for sensor cleaning and connection inspection every 6 months.
Priority of the Requirement	Low

Requirement Identification:	RF 06
Requirement Name:	Data History:
Characteristics:	Temporary Storage, Historical Analysis:
Requirement Description:	The system must be capable of temporarily storing temperature data from the last 7 days of the shipment, allowing for historical visualization for subsequent analysis and audits.
Priority of the Requirement	Medium

Requirement Identification:	RF 07
Requirement Name:	Fault Diagnosis:
Characteristics:	Automatic Verification, Error Messages:
Requirement Description:	The system must perform a diagnostic check of key components (such as temperature sensors) before starting the transportation, notifying any errors or malfunctions via messages in the mobile application or on the system screen.
Priority of the Requirement	High

3.2.Non-Functional Requirements

Requirement Identification:	RNF 01
Requirement Name:	Security
Characteristics:	The system will ensure the security of the information
Requirement Description:	The system will ensure the security of the information circulating within the program, preventing potential intruders from accessing it
Priority of the Requirement	High

Requirement Identification:	RNF 02
Requirement Name:	Scalability
Characteristics:	The system will be scalable
Requirement Description:	The system will have the ability to scale in size, designed to adapt to larger volumes of data and users
Priority of the Requirement	Medium

Requirement Identification:	RNF 03
Requirement Name:	Portability
Characteristics:	The system will be portable
Requirement Description:	The program will be able to run on different platforms
Priority of the Requirement	Low

Requirement Identification:	RNF 04
Requirement Name:	Efficiency
Characteristics:	The system will be efficient.
Requirement Description:	The program must be efficient, responding quickly to sensor readings, generating real-time reports, and avoiding failures or slowdowns that could impact temperature monitoring.
Priority of the Requirement	High

Requirement Identification:	RNF 05
Requirement Name:	Confiability
Characteristics:	The system will be Reliability
Requirement Description:	The program must be error-free, not prone to slowdowns or sudden crashes, ensuring continuous operation
Priority of the Requirement	High

Requirement Identification:	RNF 06
Requirement Name:	Usability
Characteristics:	The system will be user-friendly
Requirement Description:	The program must be easy to use and understand, maintaining a simple interface so that both the administrator and the client can use it without difficulties
Priority of the Requirement	High

4.Technologies to be used in the project

4.1. Hardware

- **Temperature sensors:** IoT sensors such as DHT22 or DS18B20 to measure the temperature inside the transport.
- **Microcontroller:** Arduino for data capture and transmission.
- **Communication module:** Wi-Fi, for sending information in real time.

4.2. Software

Programming languages:

- **Frontend:** HTML, CSS and JavaScript with React.js for the web interface.
- **Backend:** PHP for server management and system logic, and Node.js for data management and API.

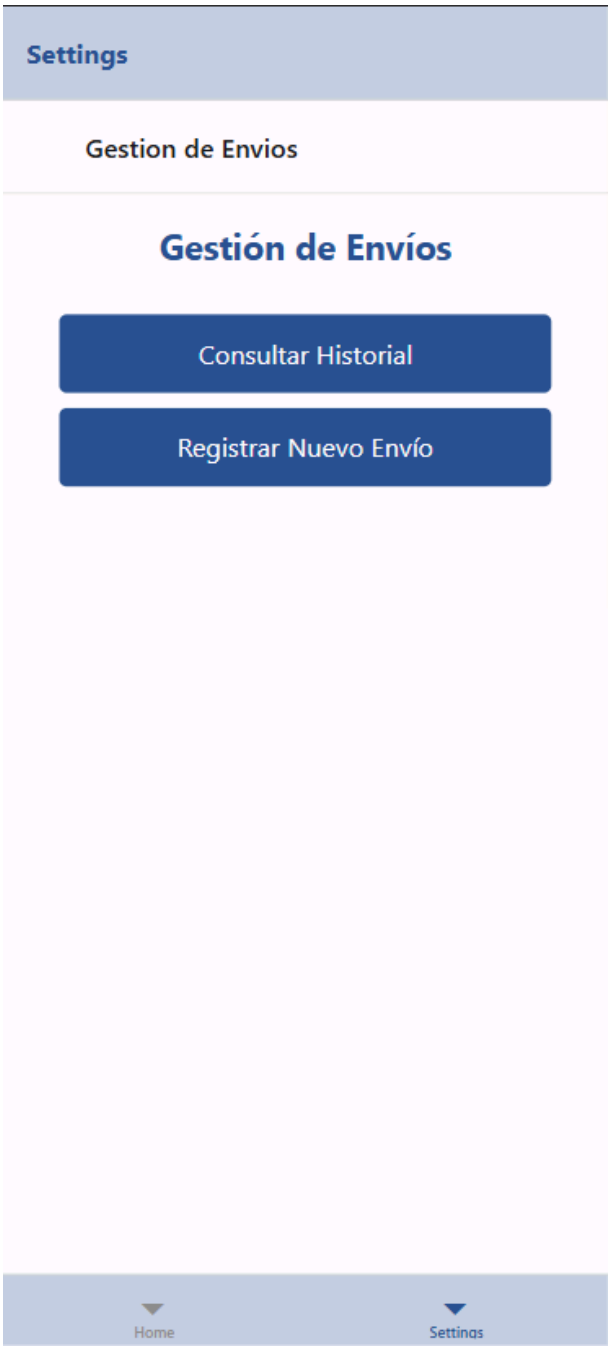
Databases:

- **SQL:** MySQL for historical data storage.
- **Storage Formats:** JSON for data management and transfer between backend and API services.

Interfaz de la App:

Home y Settings:

Consulta de información:

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Camión: Camión 101
Conductor: Juan González
Estado: En tránsito
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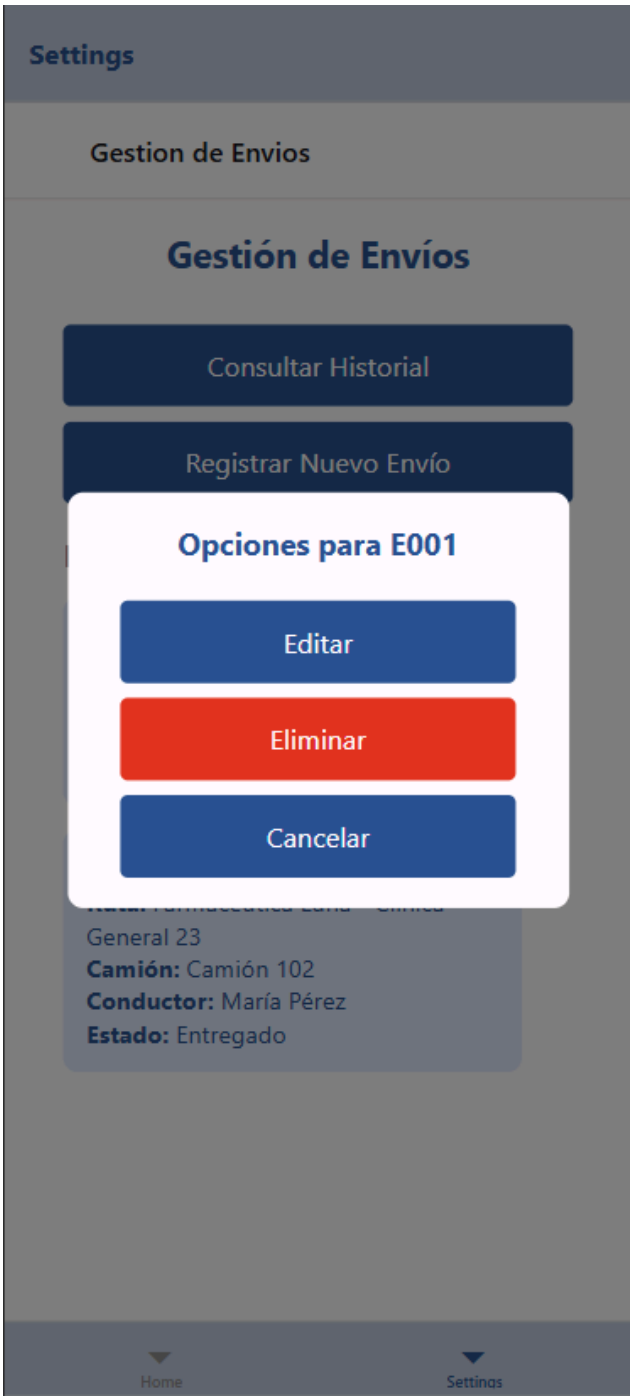
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Estado: Entregado
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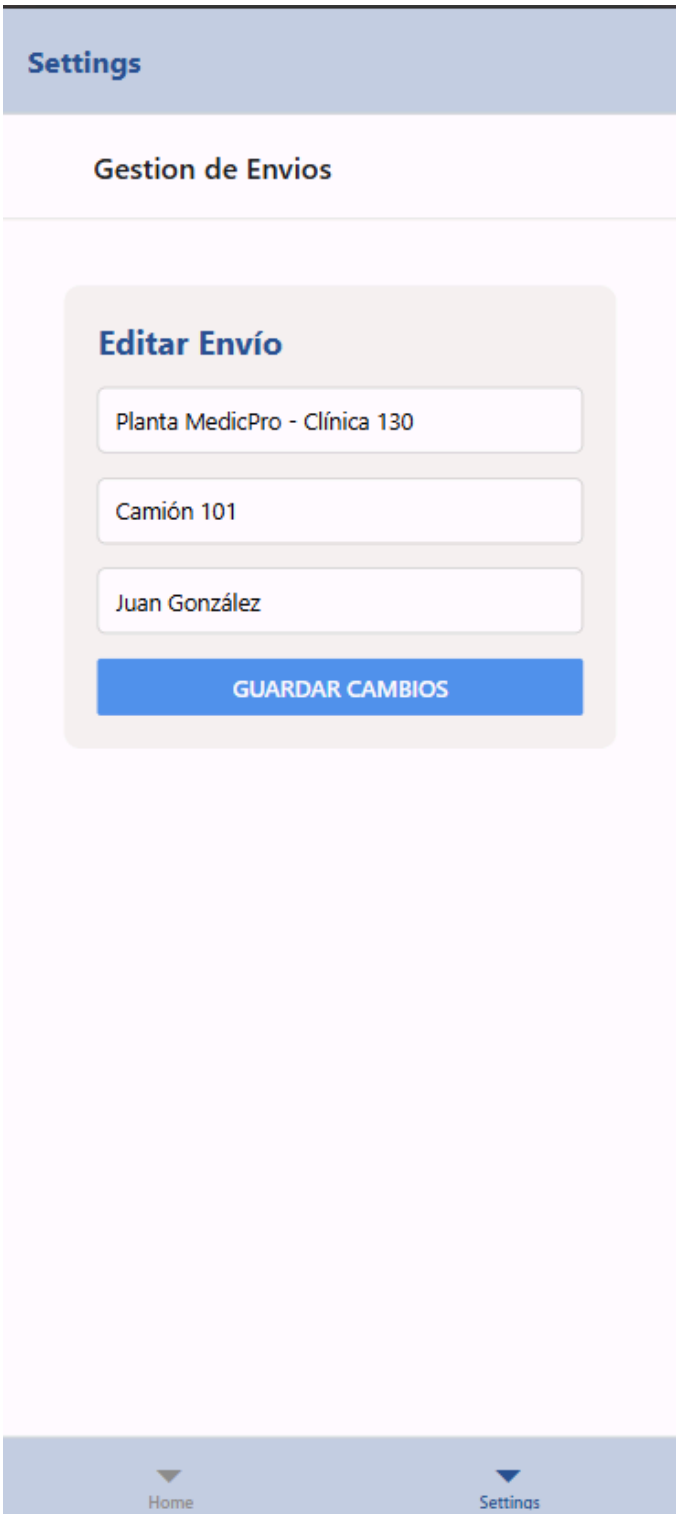
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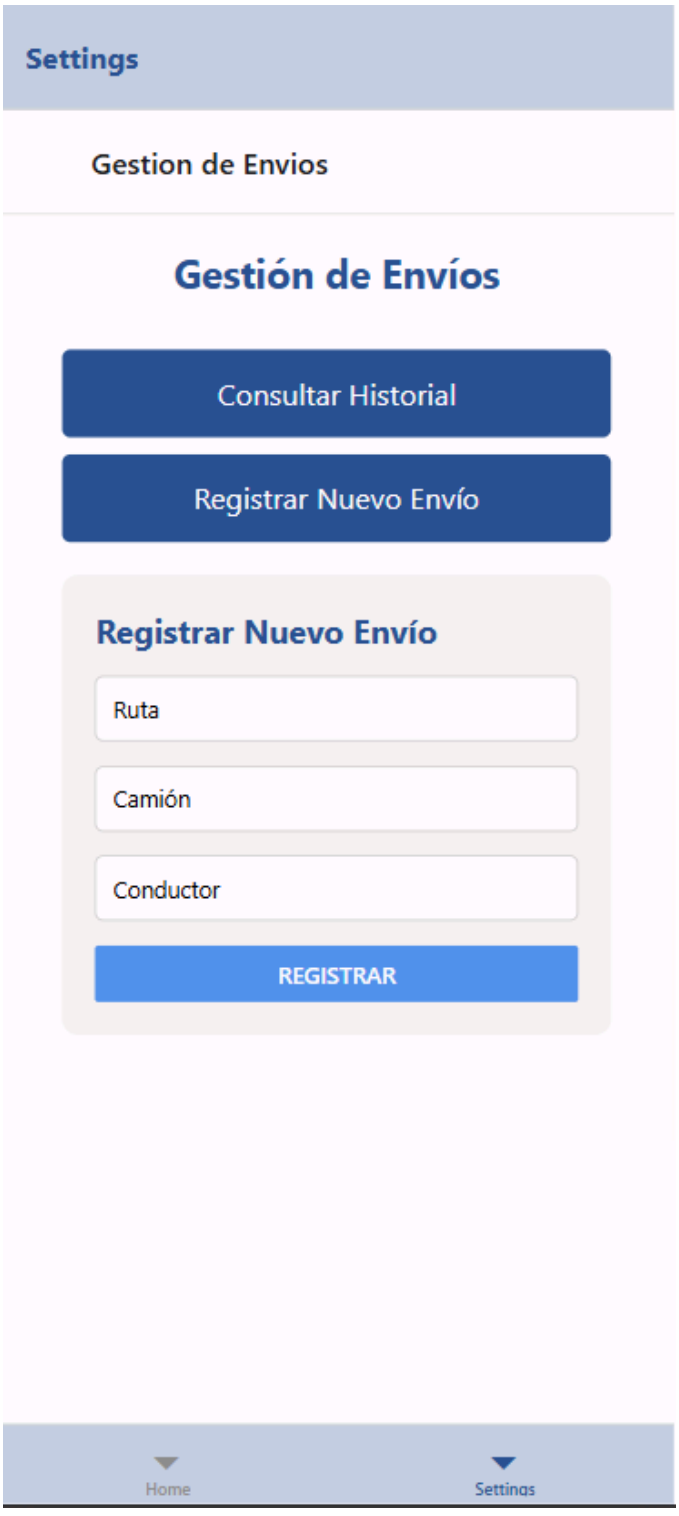
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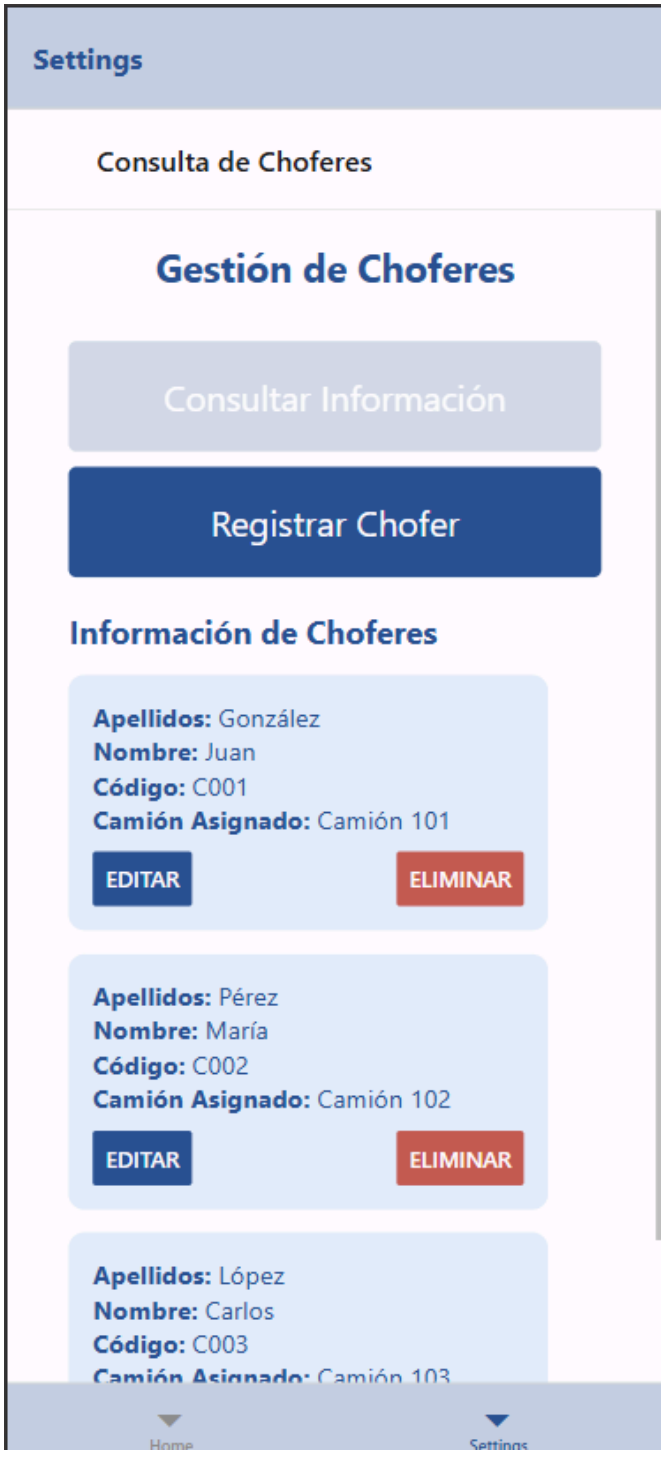

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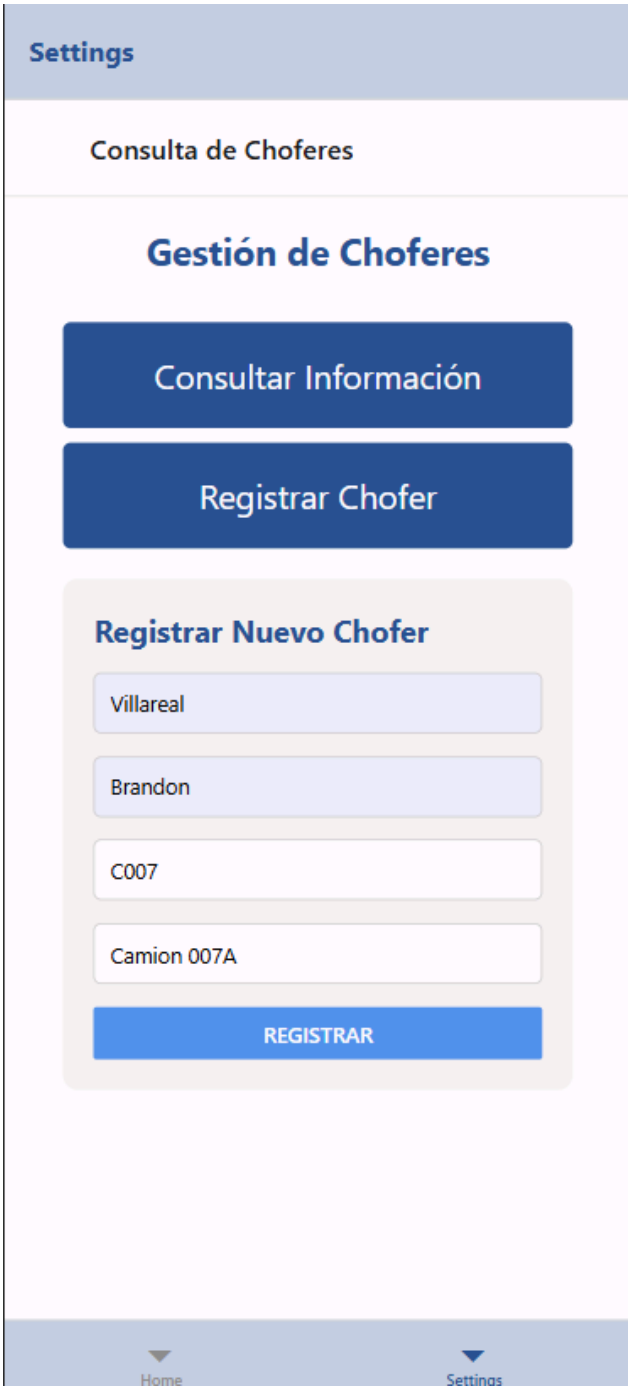
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Consultar Información
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Registrar Nuevo Chofer
Villareal
Brandon
C007
Camion 007A
REGISTRAR
Home
Settings


Settings
Consulta de Choferes
Gestión de Choferes
Consultar Información
Registrar Chofer
Información de Choferes
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Nombre: María
Código: C002
Camión Asignado: Camión 102
EDITAR
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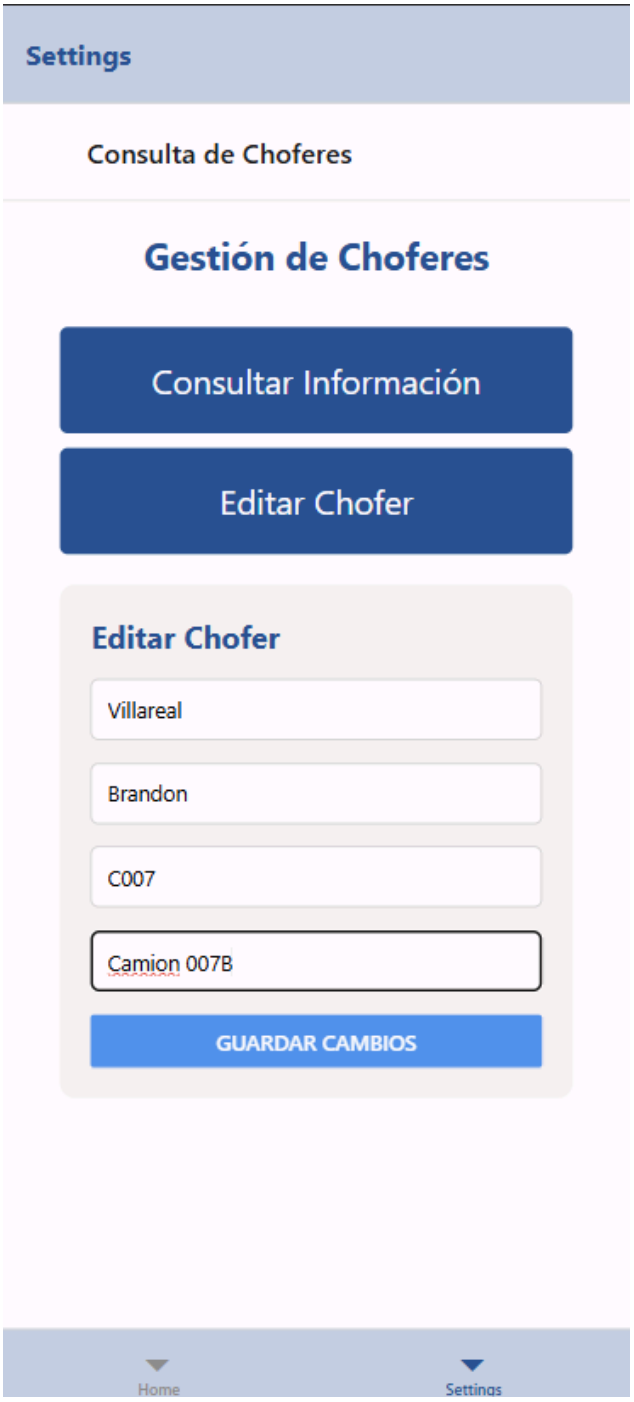
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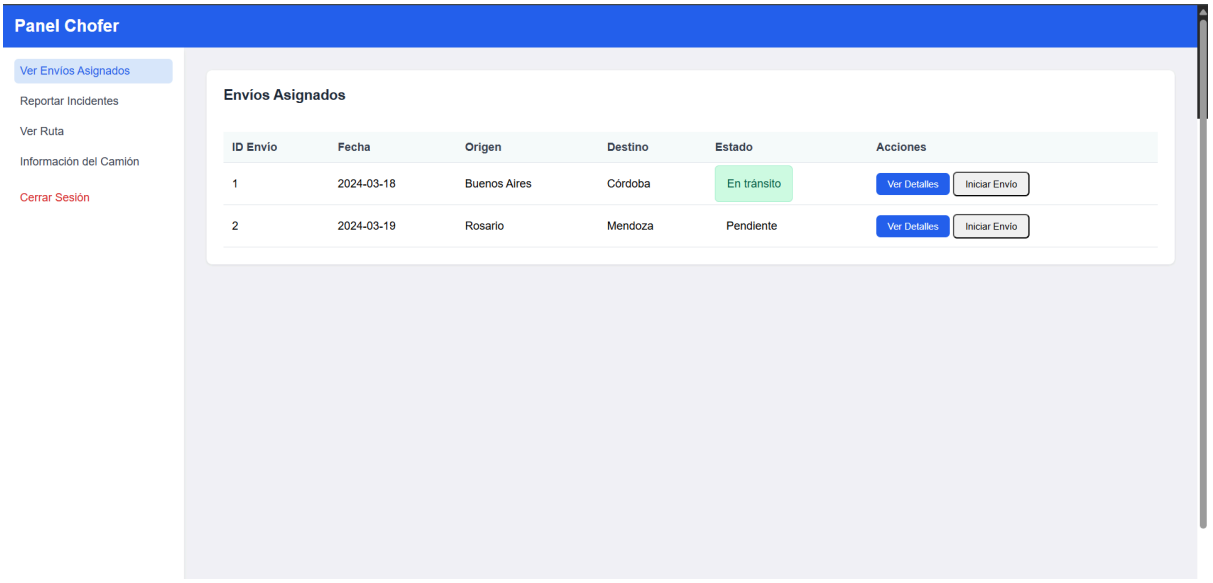
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Reportar Incidentes
Ver Ruta
Información del Camión
Cerrar Sesión
Envíos Asignados
ID Envío
Fecha
Origen
Destino
Estado
Acciones
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Buenos Aires
Córdoba
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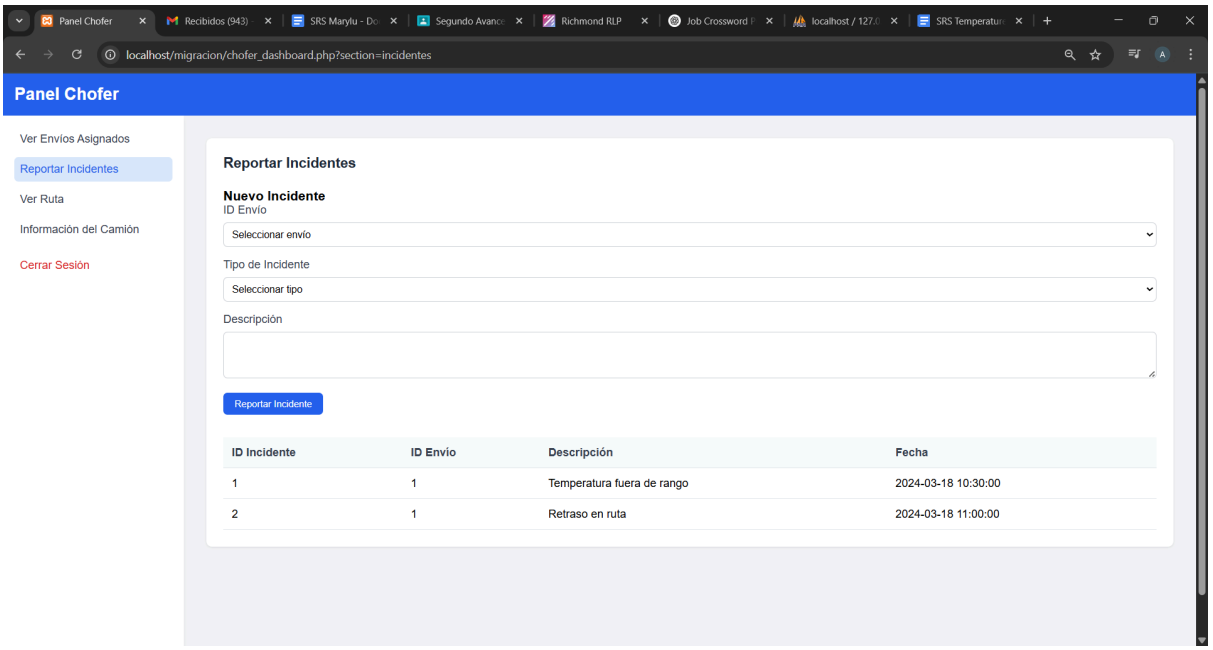
Iniciar Envío
2
2024-03-19
Rosario
Mendoza
Pendiente
Ver Detalles
Iniciar Envío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Reportar Incidentes
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Información del Camión
Cerrar Sesión
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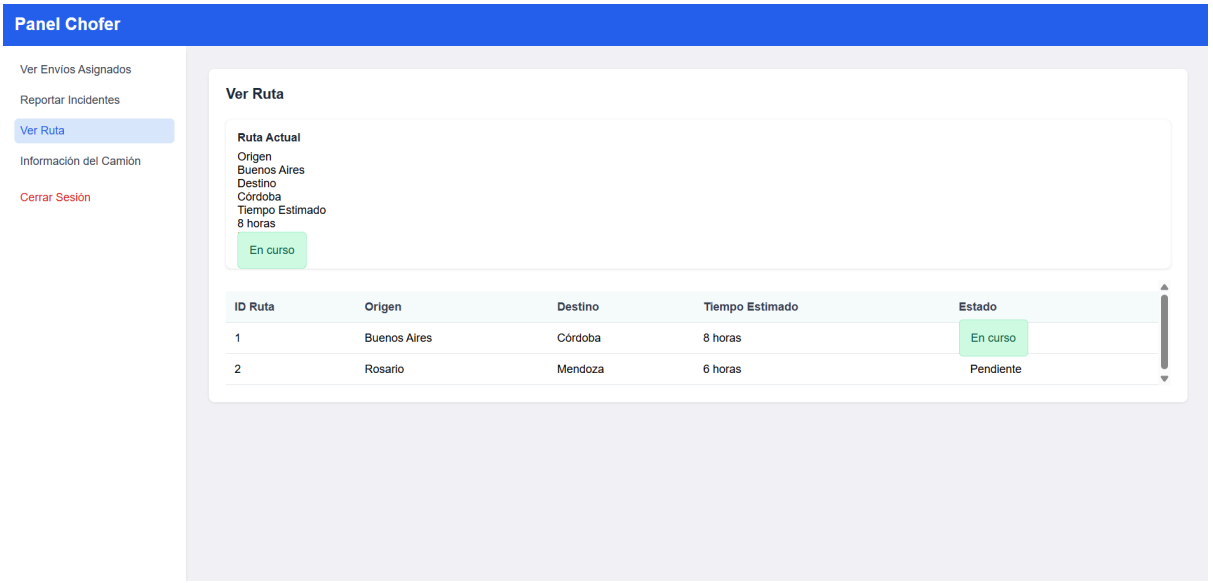
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Información del Camión
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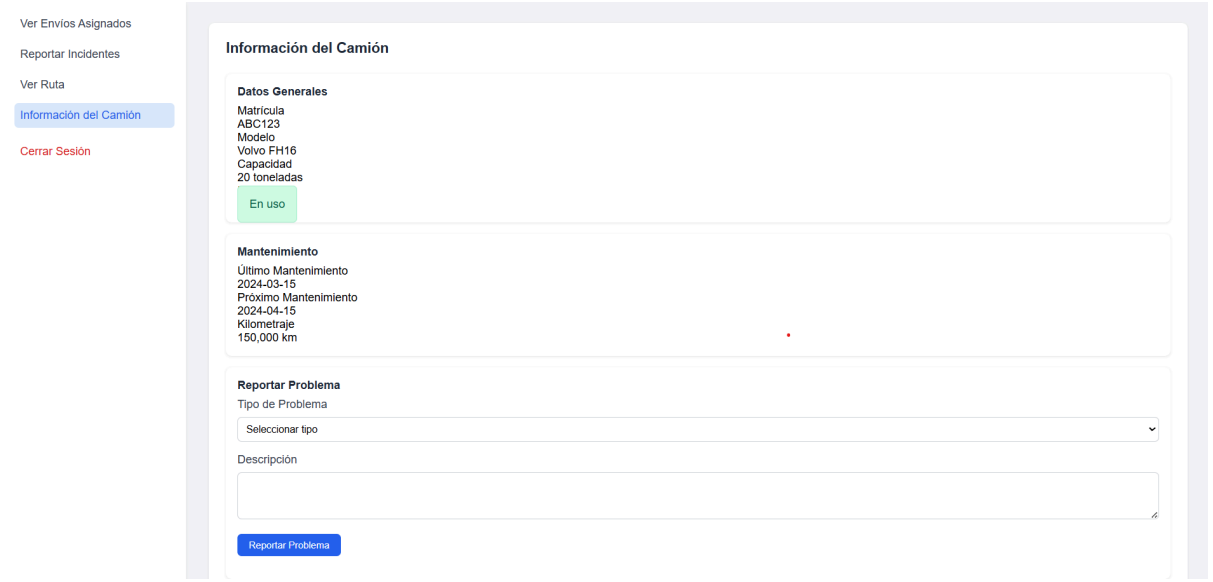
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Último Mantenimiento
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Descripción
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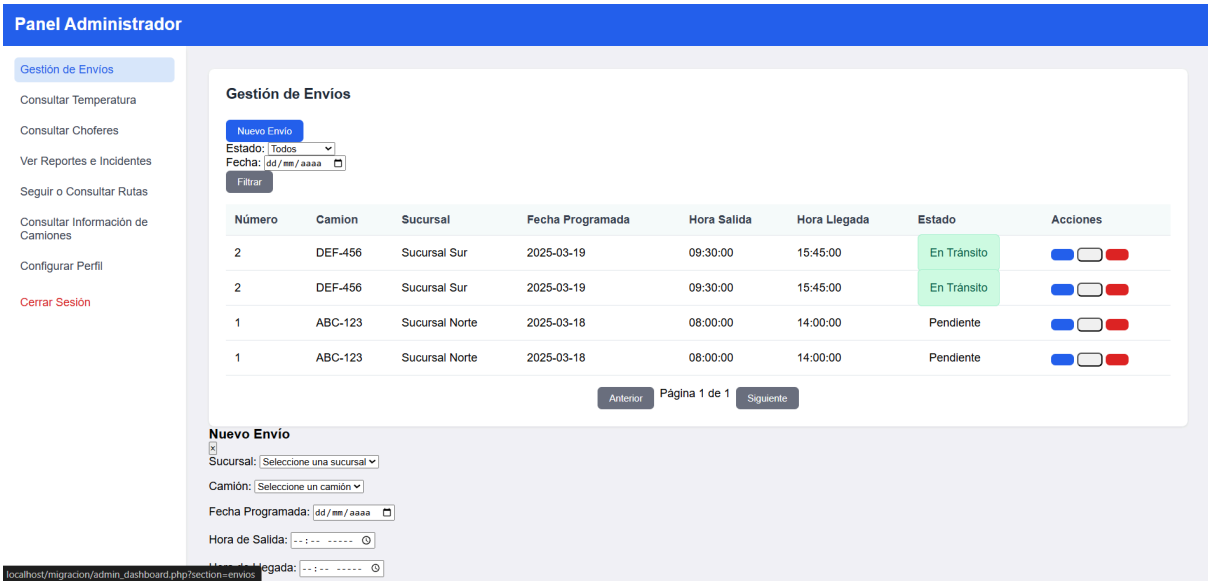
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Cerrar Sesión
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Página 1 de 1
Siguiente
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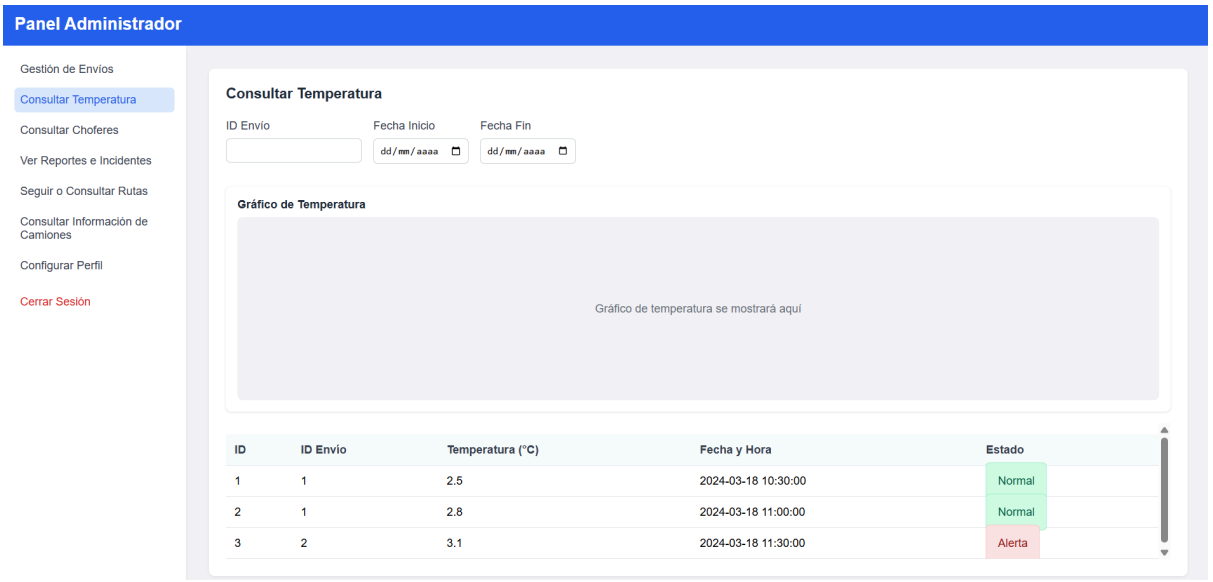
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Cerrar Sesión
Consultar Temperatura
ID Envío
Fecha Inicio
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Fecha Fin
dd/mm/aaaa
Gráfico de Temperatura
Gráfico de temperatura se mostrará aquí
ID ID Envío Temperatura (°C) Fecha y Hora Estado
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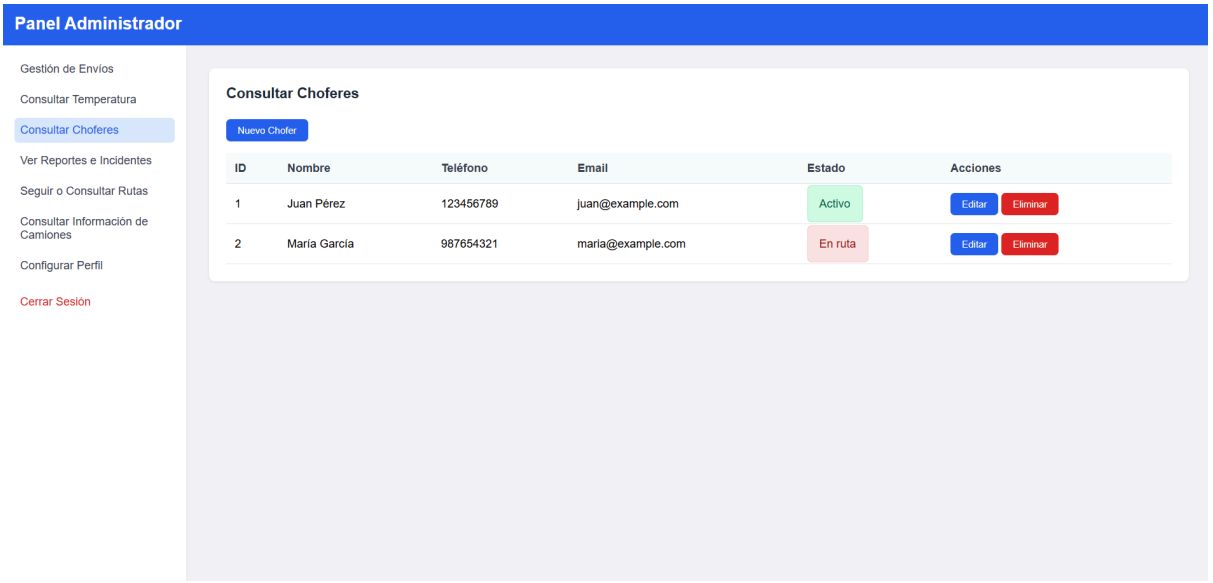
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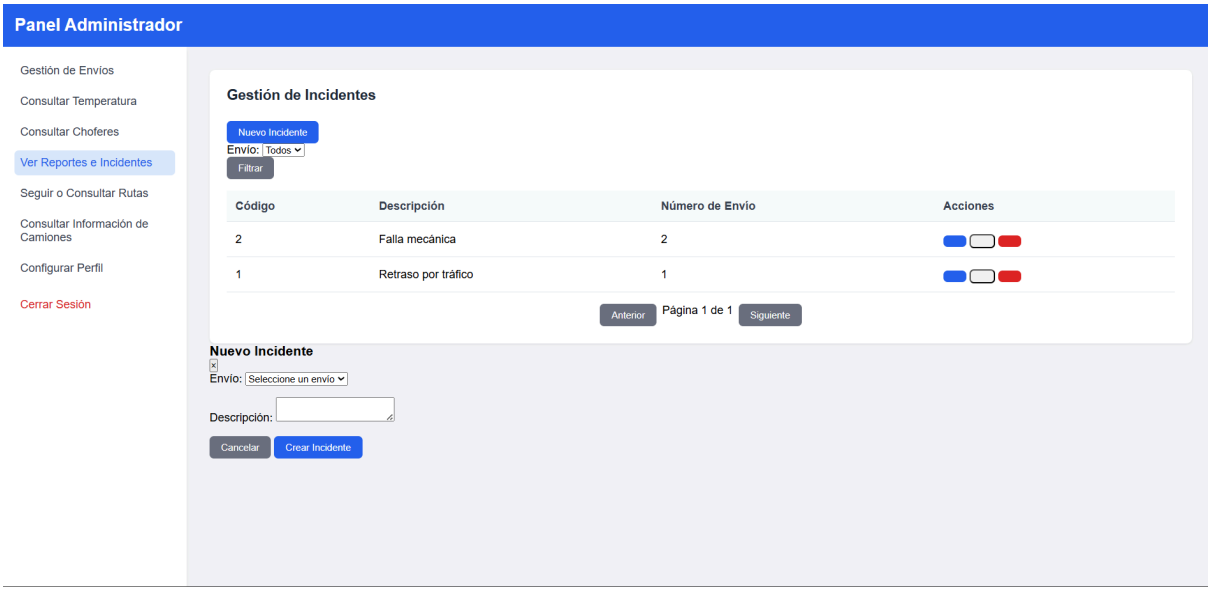
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Nuevo Incidente
Envío: Todos
Filtrar
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Descripción
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2
Falla mecánica
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1
Retraso por tráfico
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Anterior
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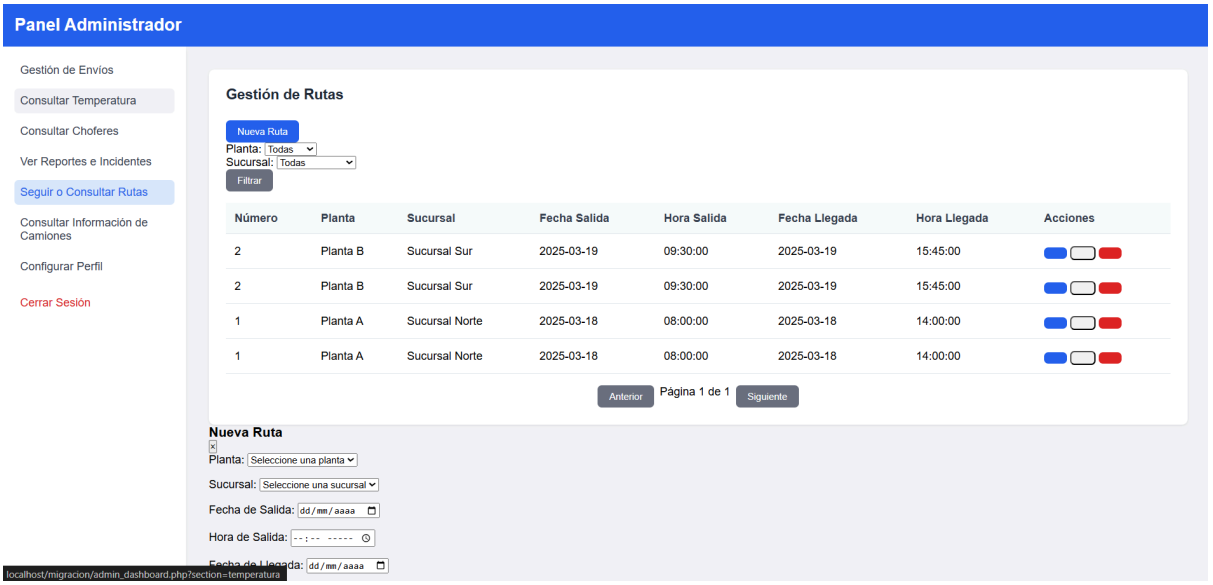
Siguiente
Nuevo Incidente
Envío: Seleccione un envío
Descripción:
Cancelar
Crear Incidente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Cerrar Sesión
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Siguiente
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Sucursal: Seleccione una sucursal
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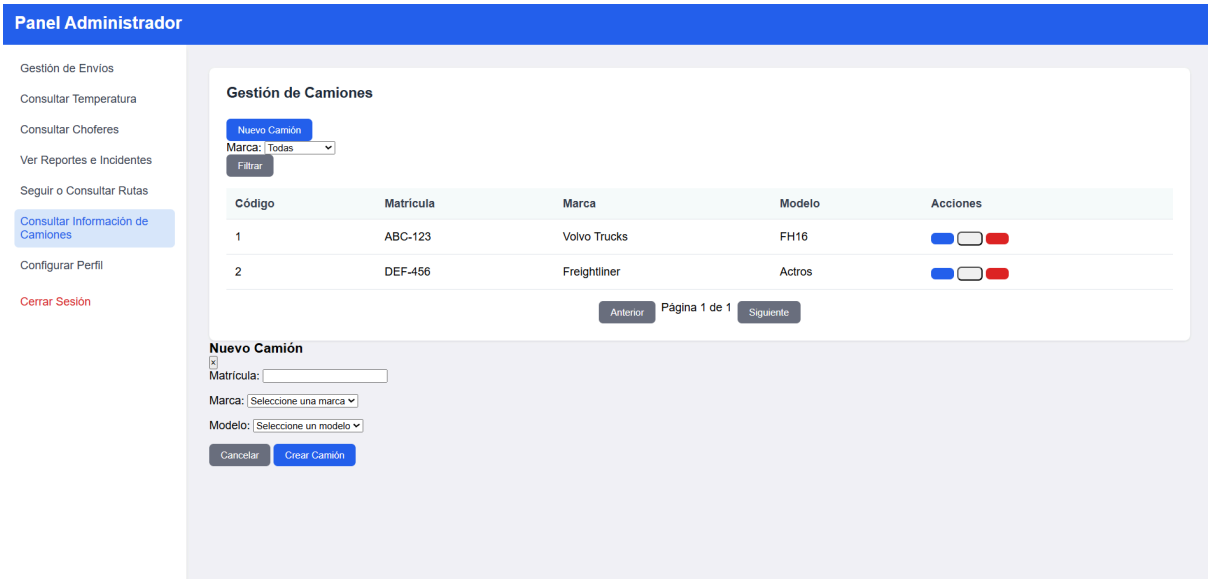
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Consultar Choferes
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Cerrar Sesión
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Actros
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