



SwiftSystem

PARCEL MANAGEMENT SYSTEM

Submitted in Partial Fulfillment of the Requirements
for the Bachelor of Computer

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I. Introduction

In today's logistics and delivery business, it is important to track and manage parcels quickly and correctly. Manual methods can cause mistakes, delays, and make it difficult to know the delivery status. To solve these problems, this project introduces SwiftTrack, a web-based Parcel Management System. The system helps users manage parcels, assign deliveries, and manage delivery staff more easily.

SwiftTrack is developed using Blazor Server on .NET 10. It uses PostgreSQL (hosted on Supabase) to store data and Cloudinary to store images. The system has four user roles: Admin, Manager, Staff and Viewer. Each role has different permissions based on its responsibilities.

The system includes features such as parcel tracking, delivery assignment, vehicle management, warehouse management, driver management with photo verification, payment management, and service type management. It also uses cookie-based authentication to provide secure user login. SwiftTrack helps improve work efficiency, reduce errors, and make it easier to track parcels from the sender to the receiver.

This project was developed as a software development assignment. It provided practical experience in full-stack web development, database design, user authentication, and cloud services while solving a real logistics management problem.

Software Development Life Cycle (SDLC)

The development of SwiftTrack followed an Agile SDLC approach. This method allowed the system to be developed step by step. After each stage, the team tested the system, fixed problems, and added new features. GitHub was used to manage the source code and support teamwork.

1. Requirement Analysis

The team studied the needs of a parcel management system. The main requirements included parcel tracking, user roles, delivery assignment, payment management, and warehouse management. An Entity Relationship Diagram (ERD) with about 18 tables was created to design the database.

2. System Design

The overall system structure was designed. This included the Blazor Server user interface, PostgreSQL database, cookie-based authentication, and five user roles: Admin, Manager, Staff and Viewer.

3. Implementation

The system was developed one module at a time. Features such as login, parcel management, delivery assignment, vehicle management, warehouse management, driver management, payment management, service types, and image upload with Cloudinary were completed.

4. Testing

Each feature was tested to make sure it worked correctly. The team tested user login, database operations, and role permissions. Bugs found during testing were fixed.

5. Deployment

After testing, the system was deployed on Render. The team also fixed deployment issues, such as user sessions and email configuration, to ensure the system worked correctly online.

6. Maintenance

After deployment, the system continued to be improved. Performance was increased by optimizing database queries and adding pagination. The email service was also changed from Gmail SMTP to the Resend API for better reliability.

Using the Agile SDLC helped the team improve the system during development. This allowed SwiftTrack to meet the project requirements and provide a reliable parcel management solution.

II. Functions / Use Cases of Application System

Main Functions

1. Authentication & Authorization

- User login/logout with cookie-based session persistence
- Role-based access control (4 roles: Admin, Manager, Staff, Viewer)
- Session restoration on browser refresh

2. Parcel Tracking

- Create, view, update, and track parcel status
- Real-time status updates throughout the delivery lifecycle
- Search and filter parcels by tracking number, status, or date

3. Delivery Assignment Management

- Assign parcels to available drivers
- Track assignment status (Pending, In Transit, Delivered, Failed)
- View assignment history

4. Vehicle Management

- Register and manage delivery vehicles
- Track vehicle availability and assignment to drivers

5. Warehouse Management

- Manage warehouse locations and capacity
- Track parcel storage by warehouse

6. User & Driver Management

- Admin/Manager can create and manage user accounts
- Driver profile management with photo upload (Cloudinary)
- Driver-to-User account linking for login access

7. Payment Management

- Record and track payment status per parcel/order
- Support for multiple service types with different pricing

8. Service Type Configuration

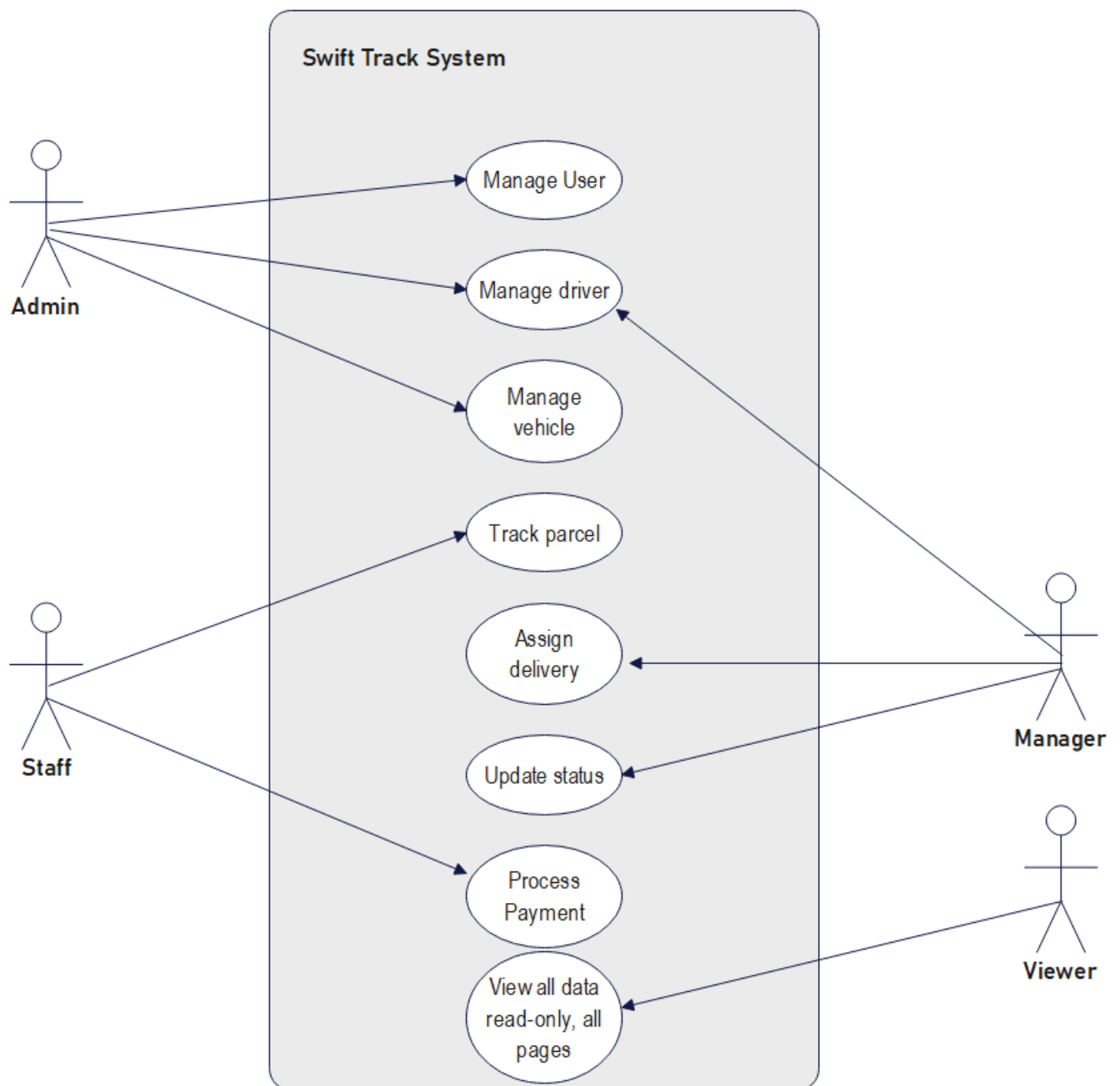
- Define and manage different delivery service types (e.g., Standard, Express)

Use Cases of Application System

Use cases Table

Actor	Use Case
Admin	Manage assignments, view team performance, approve payments
Staff	Create/update parcels, process tracking, handle customer requests
Manager	Manage assignments, view team performance, approve payments
Viewer	View all pages across the full system (Tracking, Assignments, Vehicles, Warehouses, Users, Drivers, Payments, Service Types, Reports) – read-only, cannot create, update, or delete any data

Use cases diagram



III. Business Logic and Conditions

Business logic checks that the data entered by users is correct and follows the system rules before it is saved to the database.

3.1 User & Authentication Rules

- Email must be unique across the system. Duplicate registration is rejected.
- Password must be hashed using BCrypt before storage; plain-text passwords are never saved.
- A user can only be assigned one role at a time: Admin, Manager, Staff or Viewer.
- A Driver role account must be linked to a corresponding Driver profile record — a driver cannot log in without an associated driver entity.
- The `manager_id` field (self-referencing foreign key on User) must not create a circular reporting chain (a user cannot be their own manager, directly or indirectly).
- Session cookies must be validated on every request; expired or tampered sessions force re-authentication via `SessionRestoreMiddleware`.

3.2 Parcel & Tracking Rules

- Every parcel must be assigned a unique tracking number upon creation.
- A parcel's status can only move forward through valid states (e.g., Pending → In Transit → Delivered), preventing invalid transitions such as reverting from Delivered back to Pending.
- A parcel must be linked to a valid warehouse (origin) before it can be marked as ready for pickup.
- A parcel cannot be marked Delivered unless it has an active `DeliveryAssignment` record.

3.3 Delivery Assignment Rules

- A delivery assignment can only be created if the selected driver's account is active and has an available vehicle.
- A driver cannot be assigned two overlapping deliveries at the same time.
- Assignment status must follow the sequence: Pending → In Transit → Delivered / Failed.
- Only Admin or Manager roles can create or reassign a delivery.

3.4 Vehicle & Warehouse Rules

- A vehicle must have a valid registration/license status to be assigned to any delivery.
- A vehicle already assigned to an active delivery cannot be assigned to another delivery simultaneously.
- Warehouse capacity should not be exceeded — the system should flag or restrict new parcel intake when a warehouse reaches its defined limit.

3.5 Payment Rules

- Payment amount must be greater than zero and match the service type's defined rate.
- A parcel cannot be marked as Delivered if its payment status is Unpaid (for COD/prepaid service types requiring payment confirmation).
- Payment status transitions: Pending → Paid / Failed — no direct jump from Pending to a final delivered state without payment resolution.

3.6 Role-Based Access Conditions

Condition	Rule
Data modification	Only Admin and Manager can create/edit Users, Vehicles, Warehouses
Assignment creation	Only Admin and Manager can assign deliveries
Status updates	Only Admin/Manager can update delivery status
Read-only access	Viewer can only view data; all write operations are blocked at both UI and service layer
Payment processing	Only Admin and Staff can record/confirm payments

3.7 Data Integrity Conditions

- All `DateTime` values are stored using `DateTime.SpecifyKind(..., DateTimeKind.Utc)` to maintain consistency with PostgreSQL's timestamp handling.
- Foreign key constraints (e.g., `manager_id`, `driver_id`, `warehouse_id`, `user_id`) must reference existing valid records — orphaned references are rejected at the database level.
- Soft validation is applied at the Blazor component level (form validation), while hard validation/business rules are enforced at the service layer before database commits.

IV. Application system Domain model (Entity Classes / C# Class Code)

+ Model

1. RoleType

- id
- name
- description
- salary
- created_at
- updated_at

2. Users

- id
- full_name
- gender
- email
- phone_number
- password
- role_type_id
- status
- address
- hired_at
- last_login
- created_at
- updated_at
- image_url

3. VehicleType

- id
- name
- description

4. Driver

- id
- name
- phone
- license_number
- national
- experience_year
- zone
- hire_date
- status
- Salary
- image
- created_at
- updated_at

5. Vehicles

- id
- vehicle_type_id
- plate_number
- brand
- model
- year
- capacity
- zone
- last_services
- status
- created_at
- updated_at

6. VehicleAssignment

- id
- vehicle_id
- driver_id
- status
- created_at
- updated_at

7. ServiceType

- id
- name
- description
- base_price_per_kilo
- minimum_charge
- volumetric_divisor
- is_active
- created_at
- updated_at

8. PaymentMethod

- id
- name
- description
- created_at
- updated_at

9. Warehouses

- id
- name
- address
- code
- phone
- type
- manager_id
- current_stock
- max_capacity
- status
- closed_at
- created_at
- updated_at

10. ParcelStatusHistories

- id
- parcel_id
- status
- description
- update_by
- create_by
- created_at
- updated_at
-

11. ParcelTracking

- id
- parcel_id
- driver_id
- Latitude
- Longitude
- location
- recorded_at

12. Parcels

- id
- tracking_id
- sender_name
- sender_phone
- sender_address
- recipient_name
- recipient_phone
- destination
- weight
- width
- height
- length
- volumetric_weight
- chargeable_weight
- price
- status
- notes
- service_type_id
- driver_id
- warehouse_id
- created_by
- created_at
- updated_at

13. DeliveryAssignment

- id
- parcel_id
- driver_id
- assigned_by
- pickup_location
- delivery_location
- priority
- notes
- scheduled_date
- assigned_at
- status

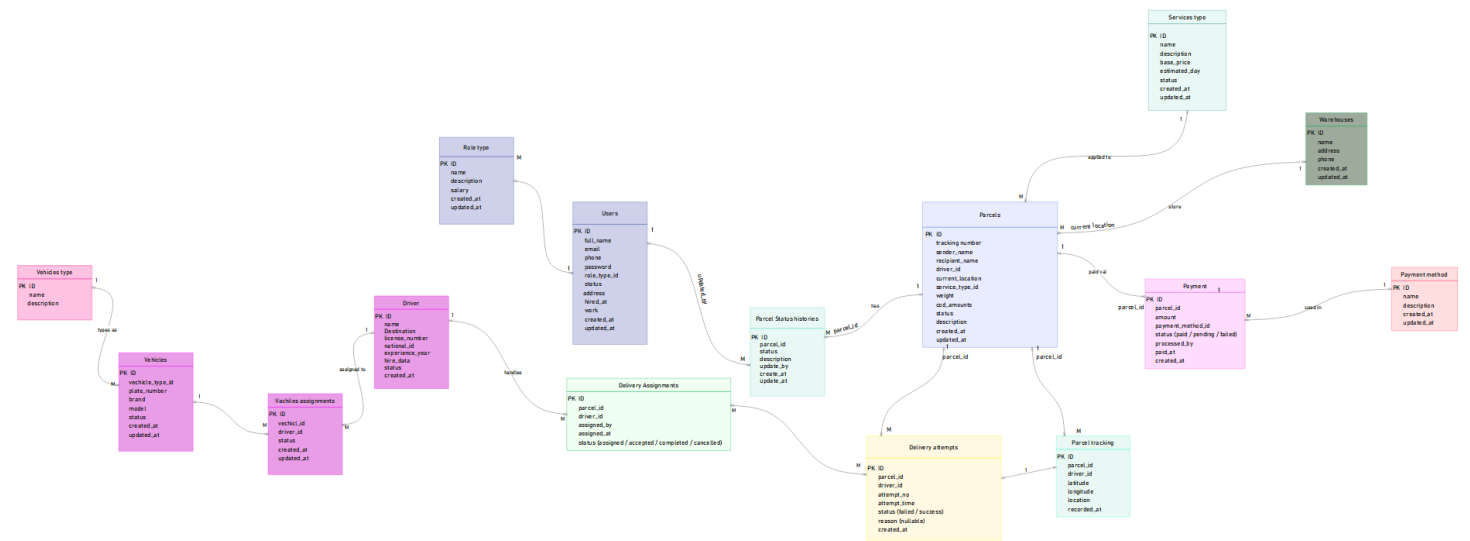
14. Payment

- id
- parcel_id
- amount
- payment_method_id
- payment_status
- processed_by
- paid_at
- created_at

+ Entity Relationship Summary

Entity	Relates To	Relationship
RoleType	User	One-to-Many
User	ParcelStatusHistory	One-to-Many (update_by)
User	DeliveryAssignment	One-to-Many (assigned_by)
User	Payment	One-to-Many (processed_by)
VehicleType	Vehicle	One-to-Many
Vehicle	VehicleAssignment	One-to-Many
Driver	VehicleAssignment	One-to-Many (assigned to)
Driver	DeliveryAssignment	One-to-Many (handles)
Driver	Parcel	One-to-Many (current driver)
Driver	ParcelTracking	One-to-Many
ServiceType	Parcel	One-to-Many (applied to)
Warehouse	Parcel	One-to-Many (current location)
Parcel	ParcelStatusHistory	One-to-Many
ParcelDelivery	Assignment	One-to-Many (has)
Parcel	ParcelTracking	One-to-Many
Parcel	Payment	One-to-One (paid val)
Payment	MethodPayment	One-to-Many (used in)

+ ER Diagram



V. Input Design

5.1 Login Page



Welcome Back to SwiftSystem

Email address

 you@company.com

Password

 [Forgot password?](#)

☐ Keep me signed in

[Sign in](#)

Need access? [Contact your admin](#)

5.2 Forgot password



Forgot Password?

Enter your email and we'll send a reset link

Email address

 you@swifttrack.com

[Send Reset Link](#)

Remember your password? [Back to Login](#)

5.3 Create Parcel

New Parcel

×

Fill in the details to create a new parcel

SENDER INFORMATION

Full Name

Enter sender's full name

Phone Number

Enter sender's phone number

Address

Enter sender's address

RECIPIENT INFORMATION

Full Name

Enter recipient's full name

Phone Number

Enter recipient's phone number

Destination

Enter delivery destination

PARCEL DETAILS

Weight (kg)

0

Service Type

Select service type

▼

Width (cm)

0

Height (cm)

0

Length (cm)

0

Notes (optional)

Add delivery instructions or additional details

Cancel

+ Create Parcel

5.4 Update Parcel

Edit Parcel

×

Update the details for **TRK-576877**

SENDER INFORMATION

Full Name

SanTin

Phone Number

0987654321

Address

St 6, Russey keo, Phnom Penh Cambodia

RECIPIENT INFORMATION

Full Name

So Nita

Phone Number

0713004767

Destination

St 4, Tnol TorToeng, Kompong Speu Cambodia

PARCEL DETAILS

Weight (kg)

3

Service Type

Standard (standard)

▼

Width (cm)

30

Height (cm)

10

Length (cm)

5

Status

In Transit

▼

Notes (optional)

Easy Broken

Price Calculation — Standard

Cancel

Save Changes

5.5 Add Tracking

Add Tracking Event

Save status + location update

TRACKING ID

e.g. TRK-123456

STATUS

-- Select Status --

DESCRIPTION

e.g. Parcel arrived at Phnom Penh Hub

LOCATION

e.g. Phnom Penh Hub, Street 271

LATITUDE

0

LONGITUDE

0

Cancel

Save Event

5.6 Create Delivery Assignment

New Assignment

Assign a parcel to a driver

PARCEL & DRIVER

PARCEL

-- Select Parcel --

DRIVER

-- Select Driver --

LOCATION

PICKUP LOCATION

Origin hub / address

DELIVERY LOCATION

Destination address

SCHEDULE & PRIORITY

SCHEDULED DATE

07/05/2026

PRIORITY

Normal

NOTES

NOTES (OPTIONAL)

Optional notes for driver...

Cancel

Create Assignment

5.7 Update Delivery Assignment

ASN-95

Edit Assignment

Update assignment details

PARCEL & DRIVER

PARCEL

TRK-20240004 — Keo Ratanak → Sam Oudom

DRIVER

Prum Vanny · Takeo

LOCATION

PICKUP LOCATION

St 6, Russey Keo, Phnom Penh Cambodia

DELIVERY LOCATION

St 3, Takeo Cambodia

SCHEDULE & PRIORITY

SCHEDULED DATE

07/05/2026

PRIORITY

Normal

STATUS

ASSIGNMENT STATUS

Accepted

NOTES

Cancel

Save Changes

15

5.8 Add New User

New User

USER PHOTO

No photot

Upload Photo

FULL NAME

e.g. San Tin

GENDER

Male

EMAIL

e.g. santin@swifttrack.com

PASSWORD

.....

PHONE

+855 12 000 000

ADDRESS

Phnom Penh, Cambodia

ROLE

Select Role

STATUS

Active

HIRE DATE

07/05/2026

MANAGER

Select Manager

Cancel

Create User

5.9 Update User

Edit User

USER PHOTO

Change Photo

FULL NAME

Nget Bunna

GENDER

Female

EMAIL

nget.bunna@swifttrack.com

NEW PASSWORD (LEAVE BLANK TO KEEP CURRENT)

Leave blank to keep current password

PHONE

0123456805

ADDRESS

Kandal

ROLE

Staff

STATUS

Active

HIRE DATE

07/01/2026

MANAGER

— Select Manager —

Cancel

Save Changes

5.10 Add New Driver

New Driver

DRIVER PHOTO

No photo

Upload Photo

FULL NAME

PHONE

LICENSE NUMBER

NATIONALITY

EXPERIENCE (YEARS)

ZONE

SALARY (USD)

HIRE DATE

Cancel

Add Driver

5.11 Update Driver

Edit Driver

DRIVER PHOTO

No photo

Change Photo

FULL NAME

PHONE

LICENSE NUMBER

NATIONALITY

EXPERIENCE (YEARS)

ZONE

SALARY (USD)

HIRE DATE

STATUS

Cancel

Save Changes

5.12 Add New Vehicles

Add Vehicle

PLATE NUMBER

TYPE

BRAND

MODEL

YEAR

CAPACITY (KG)

ZONE

LAST SERVICE DATE

Cancel

Add Vehicle

5.13 Update Vehicles

Edit Vehicle

PLATE NUMBER

TYPE

BRAND

MODEL

YEAR

CAPACITY (KG)

ZONE

LAST SERVICE DATE

STATUS

Cancel

Save Changes

5.14 Add New Warehouse

Add Warehouse

WAREHOUSE NAME

CODE

e.g. Phnom Penh Central Hub

e.g. WH-PP-01

ADDRESS

Full address

PHONE

CITY / PROVINCE

+855 12 000 000

Phnom Penh

TYPE

MANAGER

Hub

— Select Manager —

MAX CAPACITY (PARCELS)

CURRENT STOCK (PARCELS)

500

0

Cancel

Add Warehouse

5.15 Update Warehouse

Edit Warehouse

WAREHOUSE NAME

CODE

Takeo Branch

WH-TKO

ADDRESS

National Rd 2, Krong Doun Kaev

PHONE

CITY / PROVINCE

032211024

Takeo

TYPE

MANAGER

Select Manager

MAX CAPACITY (PARCELS)

CURRENT STOCK (PARCELS)

300

20

STATUS

Operational

Cancel

Save Changes

5.16 Add New Payment

Record Payment

PARCEL

— Select Parcel —

CUSTOMER

AMOUNT (USD)

0

METHOD

STATUS

— Select Method —

Pending

DATE

01/01/0001

Cancel

Record Payment

5.17 Update Payments

Edit Payment

TRACKING ID

CUSTOMER

TRK-462573

San Tin

AMOUNT (USD)

METHOD

10.00

ABA Bank

STATUS

PAID AT

Paid

07/03/2026

Cancel

Save Changes

5.18 Add New Services

New Service Type

SERVICE NAMECODE

e.g. Express Delivery

standard

DESCRIPTION

Short description of this service...

RATE PER KG (USD)MINIMUM CHARGE (USD)

0

0

VOLUMETRIC DIVISOR

5000

Cancel

Add Service Type

5.19 Update Services

Edit Service Type

SERVICE NAMECODE

Express

express

DESCRIPTION

Fast delivery 1-2 business days

RATE PER KG (USD)MINIMUM CHARGE (USD)

5.00

8.00

VOLUMETRIC DIVISORSTATUS

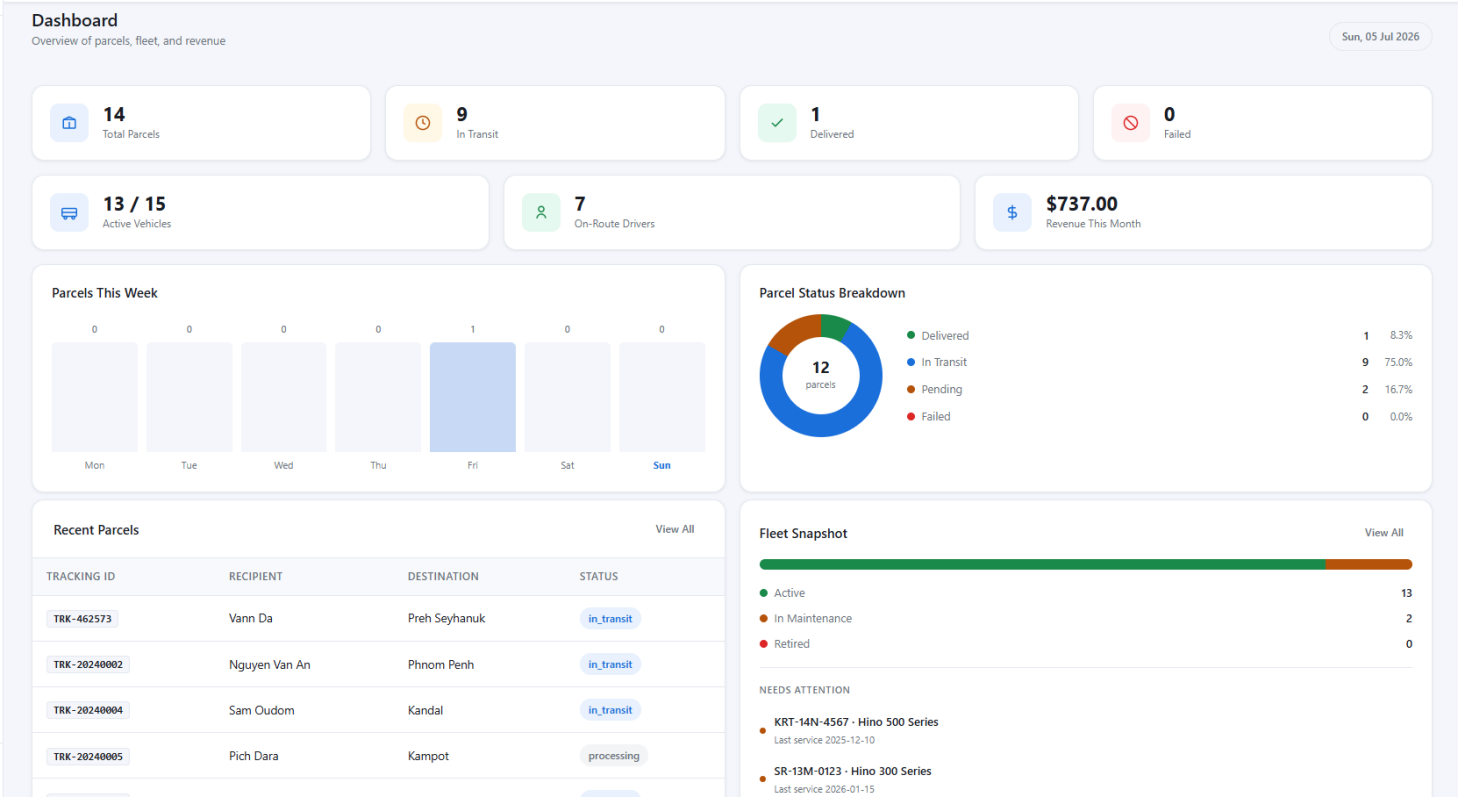
5000

Cancel

Save Changes

VI. Output Design

6.1 Dashboard



6.3 Tracking page

Tracking

Real-time parcel tracking and delivery status

+ Add Event

Q Enter tracking ID (e.g. TRK-001)

Track Parcel

Recent Tracking Activity

Q Search parcels...

All Status

TRACKING ID	SENDER	RECIPIENT	DESTINATION	STATUS	CREATED	ACTIONS
TRK-462573	Sok Pisey	Vann Da	Preh Seyhanuk	in_transit	2026-07-03	View
TRK-20240002	Lim Sokheng	Nguyen Van An	Phnom Penh	in_transit	2026-06-25	View
TRK-20240004	Keo Ratanak	Sam Oudom	Kandal	in_transit	2026-06-25	View
TRK-20240005	Mao Chanthy	Pich Dara	Kampot	processing	2026-06-25	View
TRK-20240001	Sok Dara	Chan Bopha	Siem Reap	in_transit	2026-06-25	View
TRK-20240009	Im Sokha	Vong Daravuth	Mondulkiri	in_transit	2026-06-25	View
TRK-935492	Houn Ly hour	Sorn Visal	St 1, Prey Veng	pending	2026-06-25	View
TRK-20240010	Chhim Bunna	Long Sreymom	Phnom Penh	in_transit	2026-06-25	View
TRK-20240006	Ty Sopheak	Sorn Menghout	Phnom Penh	in_transit	2026-06-24	View
TRK-20240008	Prum Vanny	Chhun Sophea	Ratanakiri	cancelled	2026-06-23	View
TRK-20240003	Hann Piseth	Bne Krutleak	Preah Sihanouk	delivered	2026-06-22	View

6.4 Delivery Assignment page

Assignments

Assign parcels to drivers and manage delivery tasks

+ New Assignment

35

Total Assignments

15

Assigned

6

Completed

11

Accepted

3

Cancelled

All Assignments

Q Search assignments...

All Status

All Priority

ASSIGNMENT ID	TRACKING ID	DRIVER	PICKUP	DELIVERY	PRIORITY	STATUS	SCHEDULED	ACTIONS
ASN-95	TRK-20240004	PV Prum Vanny	St 6, Russey Keo, Phnom Penh Cambodia	St 3, Takeo Cambodia	Normal	Accepted	2026-07-05	View Edit
ASN-94	TRK-462573	KR Keo Rattana	Preh Sehanuk	Prey nob	Normal	Accepted	2026-07-03	View Edit
ASN-93	TRK-20240009	R Rachana			Normal	Assigned	2026-07-01	View Edit
ASN-92	TRK-20240007	CD Chan Dara	Kompong thom	Bek cahm	Normal	Assigned	2026-06-26	View Edit
ASN-91	TRK-576877	IS Im Sokha	St 6, Russey Keo, Phnom Penh Cambodia	St 4, Tnol TorToeng, Kompong Speu Cambodia	Normal	Assigned	2026-06-27	View Edit
ASN-66	TRK-20240006	HB Heng Bopha	Pursat Province	Phnom Penh	High	Assigned	2026-07-03	View Edit
ASN-69	TRK-20240009	HB Heng Bopha	Phnom Penh, Chamkarmon	Mondulkiri	Normal	Assigned	2026-07-05	View Edit
ASN-72	TRK-20240002	HB Heng Bopha	Battambang, Central Market	Phnom Penh	Urgent	Accepted	2026-07-06	View Edit
ASN-75	TRK-20240005	HB Heng Bopha	Phnom Penh, Toul Kork	Kampot	Normal	Accepted	2026-07-08	View Edit
ASN-67	TRK-20240007	SP Sok Piseth	Kampong Speu	Kratie	Normal	Cancelled	2026-07-04	View Edit

6.5 User page

Users

Manage system accounts and access roles

+ New User

35

Total Users

32

Active

4

Admins

3

Inactive

All Users

Q Search users...

All Status

All Roles

USER	EMAIL	PHONE	ROLE	GENDER	STATUS	CREATED	ACTIONS
SN So Nita	sonita@gmail.com	0987654321	HR	FEMALE	active	2026-07-03	Detail Edit Disable
V Viewer	viewer@swifttrack.com	0987654321	Viewer	OTHER	active	2026-07-02	Detail Edit Disable
Pich Menghout	pich.menghout@swifttrack.com	0123456796	Staff	MALE	active	2026-07-01	Detail Edit Disable
Chan Dara	chan.dara@swifttrack.com	0123456782	Staff	FEMALE	inactive	2026-07-01	Detail Edit Enable
Heng Panha	heng.panha@swifttrack.com	0123456803	Staff	FEMALE	active	2026-07-01	Detail Edit Disable
Chan Sreyleak	chan.sreyleak@swifttrack.com	0123456802	Staff	FEMALE	active	2026-07-01	Detail Edit Disable
Keo Sokheng	keo.sokheng@swifttrack.com	0123456801	Staff	FEMALE	inactive	2026-07-01	Detail Edit Enable
Rachana	rachana@swifttrack.com	0123456806	Staff	FEMALE	active	2026-07-01	Detail Edit Disable
Sok Menghout	sok.menghout@swifttrack.com	0123456800	Staff	MALE	active	2026-07-01	Detail Edit Disable
Chhun Sophea	chhun.sophea@swifttrack.com	0123456798	Staff	MALE	active	2026-07-01	Detail Edit Disable

6.6 Driver page

All Drivers

Q Search drivers...

All Status

All Zones

DRIVER	PHONE	LICENSE	ZONE	EXPERIENCE	NATIONAL	STATUS	HIRED	ACTIONS
R Rachana	098765432	1KE-03024	Phnom Penh	2 yrs	Cambodian	Active	2026-06-28	Detail Edit Disable
CS Chhun Sophea	093100018	DL-2019-018	Stung Treng	6 yrs	Cambodian	Active	2019-02-14	Detail Edit Disable
HP Heng Panha	011100023	DL-2020-023	Preah Vihear	6 yrs	Cambodian	Active	2020-05-16	Detail Edit Disable
SM Sok Menghout	017100020	DL-2022-020	Monduliri	2 yrs	Cambodian	Active	2022-11-19	Detail Edit Disable
KS Keo Sokheng	089100021	DL-2018-021	Oddar Meanchey	8 yrs	Cambodian	Inactive	2018-08-25	Detail Edit Enable
CS Chan Sreyleak	096100022	DL-2021-022	Koh Kong	4 yrs	Cambodian	OnDelivery	2021-03-03	Detail Edit Enable
LR Lun Ratanak	078100019	DL-2020-019	Ratanakiri	5 yrs	Cambodian	Active	2020-07-07	Detail Edit Disable
RP Ros Pisey	015100024	DL-2019-024	Tboung Khmum	7 yrs	Cambodian	Active	2019-10-08	Detail Edit Disable
NB Nget Bunna	012100025	DL-2023-025	Kampong Chhnang	2 yrs	Cambodian	Active	2023-01-15	Detail Edit Disable
CD Chan Dara	093100002	DL-2018-002	Siem Reap	8 yrs	Cambodian	Active	2018-06-15	Detail Edit Disable
HB Heng Bopha	078100003	DL-2020-003	Battambang	6 yrs	Cambodian	OnDelivery	2020-01-20	Detail Edit Enable
SB Sorn Bopha	012100017	DL-2021-017	Kampong Thom	4 yrs	Cambodian	OnDelivery	2021-06-30	Detail Edit Enable

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← ២៨

បន្តបន្ទាប់ →

6.7 Vehicles page

Vehicles

Manage fleet vehicles and maintenance status

+ Add Vehicle

15

Total Vehicles

13

Active

2

In Maintenance

0

Retired

PP-1A-1234

Hilux - 2023

Available

TYPE

Motorbike

DRIVER

Sok Piseth

ZONE

Phnom Penh Central

LAST SERVICE

2026-03-10

View

Edit

Service

PP-2B-5678

Ranger - 2022

Maintenance

TYPE

Motorbike

DRIVER

Chan Dara

ZONE

Phnom Penh North

LAST SERVICE

2026-02-15

View

Edit

Service

SHV-3C-9012

L200 - 2021

Available

TYPE

Motorbike

DRIVER

Heng Bopha

ZONE

Sihanoukville

LAST SERVICE

2026-01-20

View

Edit

Service

KPT-4D-3456

Hilux - 2024

Available

TYPE

Motorbike

DRIVER

Keo Rattana

ZONE

Kampot

LAST SERVICE

2026-05-01

View

Edit

Service

PVG-5E-7890

Ranger - 2023

Assigned

TYPE

Motorbike

DRIVER

Lim Sokha

ZONE

Prey Veng

LAST SERVICE

2026-04-05

View

Edit

Service

PP-6F-2345

H100 - 2022

Available

TYPE

Pickup Truck

DRIVER

Mao Chanthy

ZONE

Phnom Penh South

LAST SERVICE

2026-03-22

View

Edit

Service

6.8 Warehouse page

Warehouses

Manage hubs, storage locations, and capacity

+ Add Warehouse

25

Total Warehouses

24

Operational

690

Parcels Stored

6%

Avg. Capacity Used

Kampong Cham Branch

WH-KPC

operational

TYPE

Branch

CITY

Kampong Cham

MANAGER

—

PARCELS

35 / 400

CAPACITY USED

8%

Detail

Edit

Close

Kampong Chhnang Branch

WH-KCH

operational

TYPE

Branch

CITY

Kampong Chhnang

MANAGER

—

PARCELS

20 / 300

CAPACITY USED

6%

Detail

Edit

Close

Kampong Speu Branch

WH-KSP

operational

TYPE

Branch

CITY

Kampong Speu

MANAGER

—

PARCELS

18 / 300

CAPACITY USED

6%

Detail

Edit

Close

Kampong Thom Branch

WH-KTM

operational

TYPE

Branch

CITY

Kampong Thom

MANAGER

—

PARCELS

15 / 300

CAPACITY USED

5%

Detail

Edit

Close

Kampot Branch

WH-KPT

operational

TYPE

Branch

CITY

Kampot

MANAGER

—

PARCELS

22 / 300

CAPACITY USED

7%

Detail

Edit

Close

Kandal Branch

WH-KDL

operational

TYPE

Branch

CITY

Kandal

MANAGER

—

PARCELS

30 / 400

CAPACITY USED

7%

Detail

Edit

Close

Kep Branch

WH-KEP

operational

TYPE

Branch

CITY

Kep

MANAGER

—

PARCELS

10 / 200

CAPACITY USED

5%

Detail

Edit

Close

Koh Kong Branch

WH-KKH

operational

TYPE

Branch

CITY

Koh Kong

MANAGER

—

PARCELS

8 / 150

CAPACITY USED

5%

Detail

Edit

Close

Kratie Branch

WH-KDL

operational

TYPE

Branch

CITY

Kratie

MANAGER

—

PARCELS

12 / 180

CAPACITY USED

6%

Detail

Edit

Close

6.9 Payments page

Payments

Track invoices, collections, and outstanding balances

+ Record Payment

\$737.00

Total Collected

24

Paid

5

Pending

0

Overdue

All Payments

Q Search payments...

All Methods

PAYMENT ID	TRACKING ID	CUSTOMER	AMOUNT	METHOD	DATE	STATUS	ACTIONS
PAY-35	TRK-462573	Sok Pisey	\$10.00	ABA Bank	2026-07-03	Paid	View Edit
PAY-22	TRK-20240002	Lim Sokheng	\$5.00	Pi Pay	2026-07-11	Paid	View Edit
PAY-7	TRK-20240007	Nget Sothea	\$4.00	ABA Bank	2026-07-04	Paid	View Edit
PAY-10	TRK-20240010	Chhim Bunna	\$65.00	Pi Pay	2026-07-05	Paid	View Edit
PAY-1	TRK-20240001	Sok Dara	\$12.50	Cash	2026-07-01	Paid	View Edit
PAY-13	TRK-20240003	Heng Piseth	\$45.00	Pi Pay	2026-07-07	Paid	View Edit
PAY-5	TRK-20240005	Mao Chanthy	\$15.00	Pi Pay	2026-07-03	Paid	View Edit
PAY-8	TRK-20240008	Prum Vanny	\$35.00	ACLEDA Bank	2026-07-04	Refunded	View Edit
PAY-20	TRK-20240010	Chhim Bunna	\$65.00	ACLEDA Bank	2026-07-10	Paid	View Edit
PAY-17	TRK-20240007	Nget Sothea	\$4.00	ABA Bank	2026-07-09	Paid	View Edit

6.10 Services page

Service Types

Manage delivery service types and pricing

+ New Service Type

Standard

standard

Active

Regular delivery 3-5 business days

Rate per kg\$0.10

Minimum charge\$3.00

Volumetric divisor5000

DetailDeactivate

Express

express

Active

Fast delivery 1-2 business days

Rate per kg\$5.00

Minimum charge\$8.00

Volumetric divisor5000

DetailDeactivate

Overnight

overnight

Active

Next day delivery guaranteed

Rate per kg\$9.00

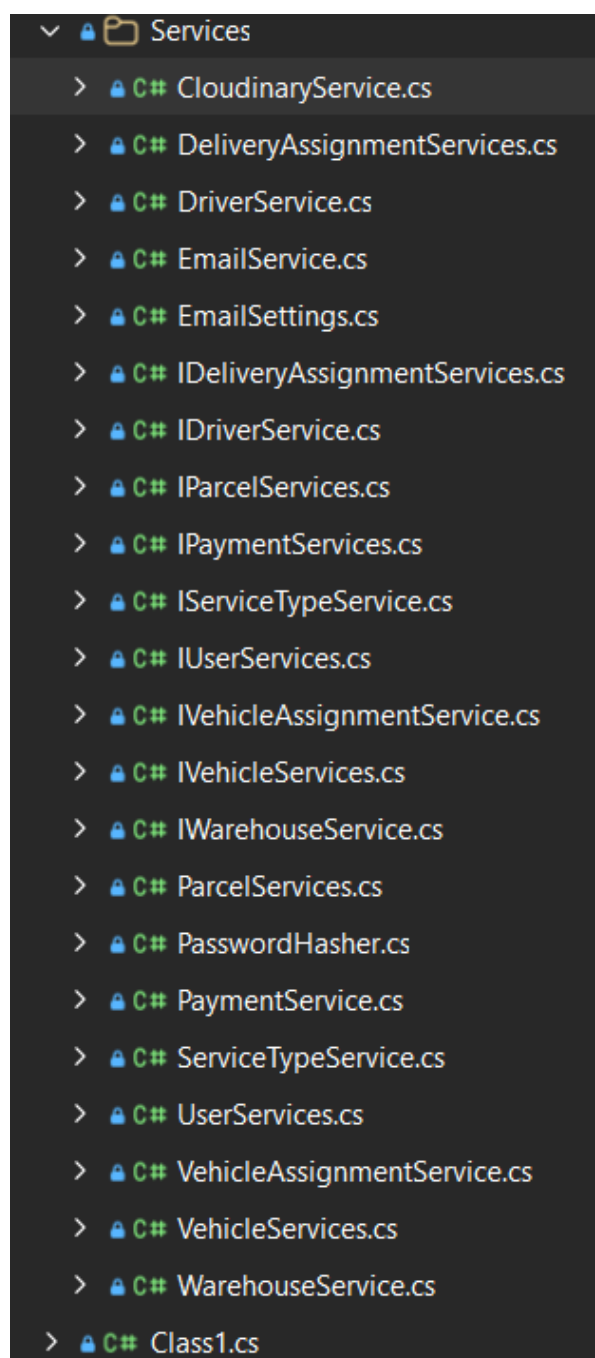
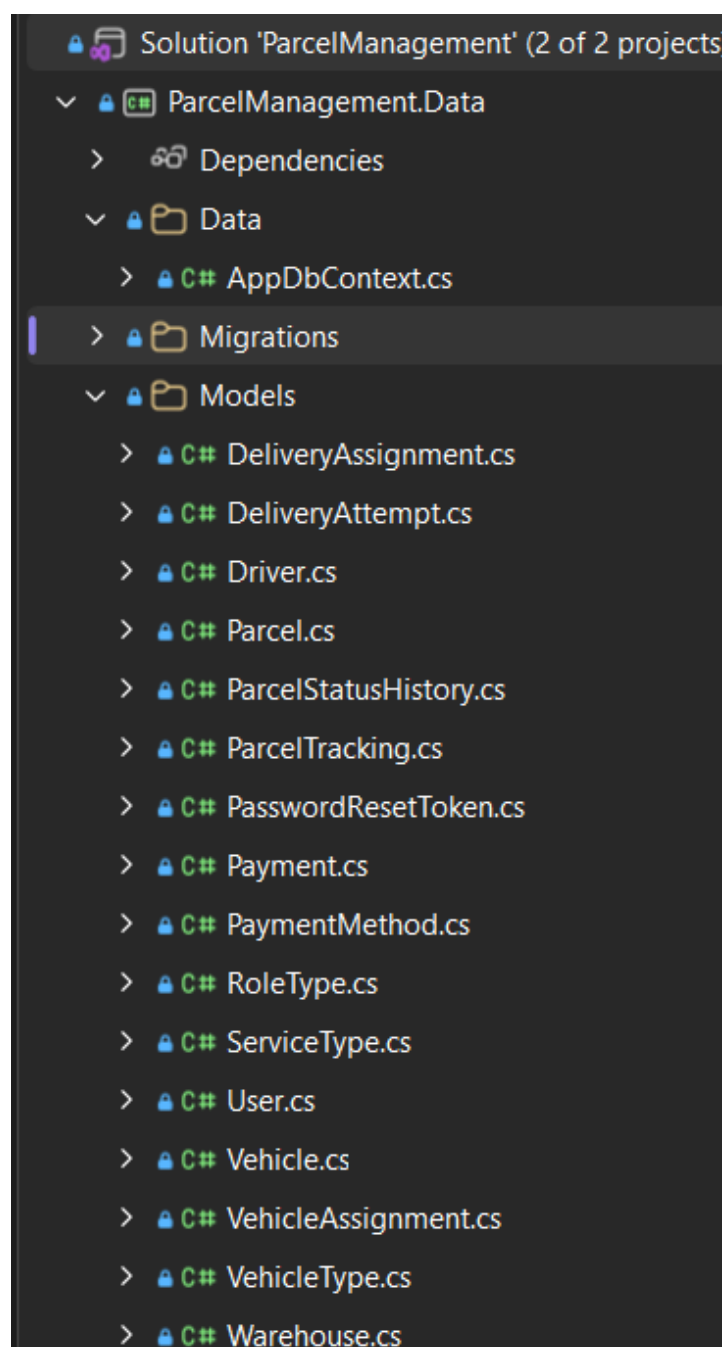
Minimum charge\$15.00

Volumetric divisor5000

DetailDeactivate

VII. Solution explorer

7.1 ParcelManagement.Data



7.2 ParcelManagement.WebApps

- ParcelManagement.WebApps
 - Connected Services
 - Dependencies
 - Properties
 - wwwroot
 - Components
 - Auth
 - C# AuthService.cs
 - C# CustomAuthProvider.cs
 - C# UserSession.cs
 - Layout
 - EmptyLayout.razor
 - Header.razor
 - Home.razor
 - MainLayout.razor
 - NavMenu.razor
 - ReconnectModal.razor
 - Sidebar.razor
 - Pages
 - Assignments
 - AssignmentDetail.razor
 - AssignmentForm.razor
 - AssignmentPage.razor
 - AssignmentUpdated.razor

- Drivers
 - DriverDetail.razor
 - DriverEditForm.razor
 - DriverForm.razor
 - DriverImageUpload.razor
 - DriverPage.razor
- Parcels
 - ParcelDetail.razor
 - ParcelForm.razor
 - ParcelPage.razor
 - ParcelUpdated.razor
- Payments
 - PaymentDetail.razor
 - PaymentEditForm.razor
 - PaymentForm.razor
 - PaymentPage.razor
- Services
 - ServicePage.razor
 - ServiceTypeDetail.razor
 - ServiceTypeEditForm.razor
 - ServiceTypeForm.razor
- Settings
 - ProfilePage.razor
- Tracking
 - AddEventModal.razor
 - TrackingPage.razor

- Users
 - NewUserModal.razor
 - UpdateUserModal.razor
 - UserDetailModal.razor
 - UserImageUpload.razor
 - UserPage.razor
- Vehicles
 - VehicleDetail.razor
 - VehicleEditForm.razor
 - VehicleForm.razor
 - VehiclePage.razor
- Warehouses
 - WarehouseDetail.razor
 - WarehouseEditForm.razor
 - WarehouseForm.razor
 - WarehousePage.razor
 - Error.razor
 - ForgotPassword.razor
 - ResetPassword.razor
- Shared
 - LoginLayout.razor
 - RedirectToLogin.razor

- _Imports.razor
- App.razor
- Index.razor
- Login.razor
- NotFound.razor
- Routes.razor
- Validator
 - C# LoginModal.cs
- appsettings.json
- C# Program.cs

VIII. Conclusion

The development of SwiftTrack, a web-based Parcel Management System, provided valuable experience in building a full-stack web application to solve a real logistics problem. The project followed the Software Development Life Cycle (SDLC), including requirement analysis, system design, implementation, testing, deployment, and maintenance. The system was developed using Blazor Server (.NET 10), PostgreSQL on Supabase, and deployed on Render.

SwiftTrack helps solve the problems of manual parcel management by storing all parcel information in one system. It allows users to track parcels, assign deliveries, manage drivers, vehicles, warehouses, and payments, and view parcel status from pickup to delivery. The system also uses role-based access control with four user roles: Admin, Manager, Staff, and Viewer. Business rules, such as preventing drivers from receiving multiple deliveries at the same time, limiting Viewer permissions, and checking payment status before completing a delivery, help keep the system accurate and reliable.

During development, several challenges were encountered, including handling DateTime data in PostgreSQL, maintaining user login sessions after deployment, and configuring email services in the production environment. These problems were solved through testing and debugging, helping improve practical problem-solving skills and understanding of real-world software development.

Overall, this project improved knowledge and skills in database design, Entity Framework Core, authentication and authorization, cloud service integration, and web application deployment. SwiftTrack is a complete and working parcel management system that demonstrates the practical use of software development concepts to solve a real business problem.

Thank You

PARCEL MANAGEMENT SYSTEM

