VILNIUS UNIVERSITY

FACULTY OF MATHEMATICS AND INFORMATICS

SOFTWARE ENGINEERING STUDY PROGRAMME

PS Software Design project

Design of a SaaS platform

Saas platformos projektavimas

1st laboratory work

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Vilnius

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Introduction

This project simulates the design of a **Software as a Service (SaaS) platform** aimed at small and medium-sized businesses operating in the cafe and barbershop (catering and beauty) sectors. The purpose of the system is to provide a unified digital solution that simplifies daily business operations, improves efficiency, and ensures a seamless customer experience.

The platform focuses on **business-side functionality**, where employees are the main users of the system. Customers interact only indirectly by providing booking information and making payments. By offering modular features, the system can adapt to the specific needs of both catering and beauty service providers, ensuring flexibility for different subscription plans.

Key goals of the system include:

- **Order management** – creation, modification, payment processing (cash, card, gift card), discounts, tips, and receipt generation.
- **Reservation management** – scheduling, modifying, and canceling appointments.
- **System management** – handling taxes, service charges, user management, inventory, and product/service configuration.
- **Security and authorization** – ensuring that only authorized employees can perform business operations.

By combining functionalities of both sectors into a single SaaS solution, the system helps businesses streamline operations, reduce manual effort, and provide professional and transparent service to their customers.

Business flows

User/business management

Business flow:

- SuperAdmin (IT Support) adds business owners to the system and all their data.
- SuperAdmin can modify the entire system.
- After business owners are added, each business owner adds location, contact info (phone, email), name and other relevant details.
- Each business owner adds employees (their services, all their data). Can modify all employees and orders, menu in their business.
- After employees are added, the employee tries to log in to the system.
- If the employee is registered in the system, he can login.
- If not, the business owner registers an employee in the system.
- Logged in employee gets a reservation from the client, creates an order.
- If an employee wants to cancel the reservation, then reservation is canceled and time is freed up in the system.
- Employee can modify the reservation (services, visit time).
- Client arrives and the employee does his job.
- Employee can apply discount to the order, after providing the service.
- Employee receives the payment (cash, card, gift card)
- Employee confirms payment and closes order

Tables/entities:

- Business (multiple catering or beauty establishments)
- User
- Service (hair cutting, hair coloring, hairstyle, beard shaving, catering, ...)
- Reservation
- Payment (cash, card, gift card, tips)
- Receipt
- Discount
- Tax

Components:

- Employee management (Business, User)
- Business management (Service, Reservation, Payment, Receipt, Discount, Tax)

Actions:

- SuperAdmin (IT Support) adds business managers
- Business managers add employees
- Employee creates an order
- Employee does his job
- Employee applies a discount
- Employee receives payment for the service
- Employee confirms payment and closes order

```
┌──────────────────────┐        ┌──────────────────────┐       ┌──────────────────────┐
│ SuperAdmin (IT       │        │ Each business owner  │       │ Each business owner  │
│ Support) adds        │───────▶│ adds location,       │──────▶│ adds employees       │
│ business owners to   │        │ contact info (phone, │       │ (their services, all │
│ the system all their │        │ email), name and     │       │ their data). Can     │
│ data. SuperAdmin can │        │ other relevant       │       │ modify all employees │
│ modify all system    │        │ details              │       │ and orders, menu in  │
└──────────────────────┘        └──────────────────────┘       │ his business         │
                                                               └──────────────────────┘
```

Employee tries to login to the system

```
┌────────────────────┐   YES   ◇ Is the employee ◇   NO    ┌──────────────────────┐
│ The employee logs  │◀────────│ registered to the │──────▶│ The business owner   │
│ in in the system   │         │ system?           │       │ registers employee   │
└────────────────────┘         ◇                   ◇       │ in the system        │
         │                                                 └──────────────────────┘
         ▼
┌────────────────────┐         ◇ Does employee ◇   Yes   ◇ Does employee ◇   Yes   ┌──────────────────────┐
│ The employee gets  │────────▶│ wants to modify │──────▶│ wants to cancel │────────▶│ Time is freed up in  │
│ a reservation from │         │ reservation?    │       │ reservation?    │        │ the system           │
│ the client,        │         ◇                 ◇       ◇                 ◇        └──────────────────────┘
│ creates an order   │                 │ No                      │ No
└────────────────────┘                 ▼                         ▼
                              ┌────────────────────┐    ┌──────────────────────┐
                              │ When client arrives│◀───│ Employee modifies    │
                              │ employee does his  │    │ reservation:         │
                              │ job                │    │ services, visit time │
                              └────────────────────┘    └──────────────────────┘
                                       │
                                       ▼
                              ┌────────────────────┐    ┌──────────────────────┐
                              │ The employee can   │───▶│ The employee         │
                              │ apply discount to  │    │ receives the payment │
                              │ the order, after   │    └──────────────────────┘
                              │ providing the      │
                              │ service            │
                              └────────────────────┘
```

Order management

Business flow:
- Client arrives at the catering establishment;
- Employee greets client;
- Client browses the menu and places an order (drink/food);
- If an item is unavailable, employee notifies client and suggests alternatives;
- Client makes final order decisions;
- Employee enters the order into the POS (Point of Sale) system;
- Employee applies a discount if applicable;
- Client pays for the order (by cash, card, gift card, may leave tips);
- Employee confirms payment, prints the receipt and closes the order;
- Employee hands the receipt to the client;
- Employee prepares the order;
- Employee asks the client whether the order is dine-in or takeout;
- If order is dine-in, order is served to the client at the table;
- If order is for takeout, order is handed to the client at the counter;
- Client consumes drink and/or food;
- Client leaves the catering establishment;
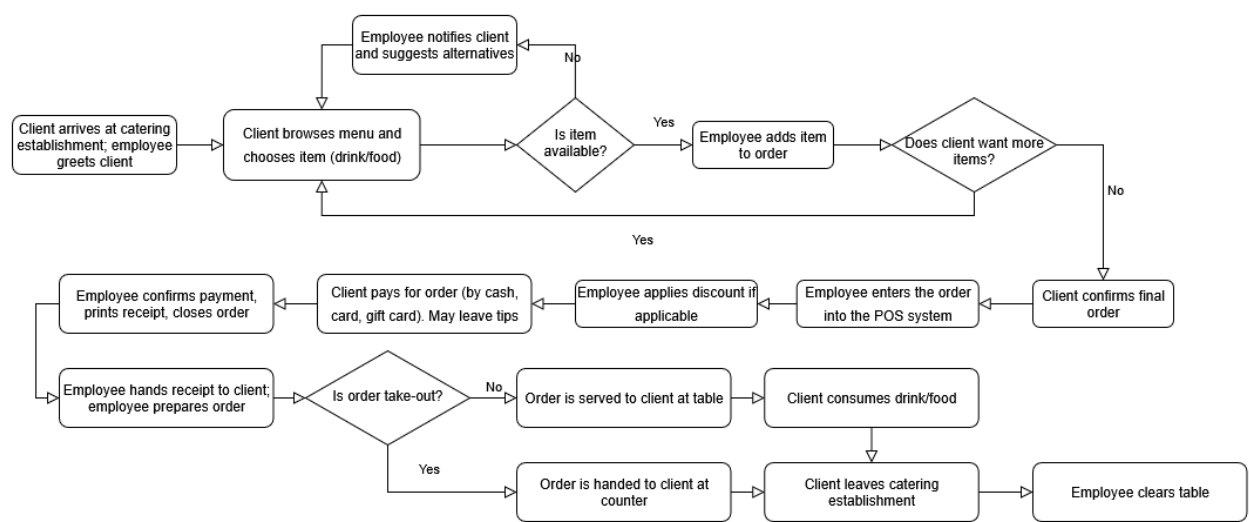- Employee clears the table.

Tables/entities:
- Product (drink/food)
- Order_Item
- Order
- Payment (cash, card, gift card, discount, tips)
- Receipt
- Discount
- Tax

Components:
- Order management (Product, Order_Item, Order, Payment, Receipt, Discount, Tax)

Actions:
- Client places an order
- Client pays for the order
- Employee applies a discount
- Employee confirms payment, prints and hands receipt
- Employee closes the order

```
                                    ┌─────────────────────┐
                                    │ Employee notifies client │
                                    │ and suggests alternatives │
                                    └─────────────────────┘
                                              ▲        ▲ No
                                              │        │
┌──────────────┐      ┌──────────────┐      ◇──────◇      ┌──────────────┐      ◇──────────────◇
│ Client arrives at  │      │ Client browses menu and │──►│ Is item   │ Yes ►│ Employee adds item │──►│ Does client want more │
│ catering          │──►│ chooses item (drink/food) │      │ available? │      │ to order       │      │ items?        │
│ establishment;    │      └──────────────┘      ◇──────◇      └──────────────┘      ◇──────────────◇
│ employee greets   │             ▲                                                        │ No
│ client            │             │                                                        │
└──────────────┘             │ Yes                                                      ▼
                             └────────────────────────────────────────────────┐
```

Flow text (left to right, top to bottom):

- Client arrives at catering establishment; employee greets client
- Client browses menu and chooses item (drink/food)
- Employee notifies client and suggests alternatives
- Is item available? — No → Employee notifies client and suggests alternatives; Yes → Employee adds item to order
- Employee adds item to order
- Does client want more items? — Yes → Client browses menu and chooses item (drink/food); No → Client confirms final order
- Client confirms final order
- Employee enters the order into the POS system
- Employee applies discount if applicable
- Client pays for order (by cash, card, gift card). May leave tips
- Employee confirms payment, prints receipt, closes order
- Employee hands receipt to client; employee prepares order
- Is order take-out? — No → Order is served to client at table; Yes → Order is handed to client at counter
- Order is served to client at table → Client consumes drink/food → Client leaves catering establishment → Employee clears table
- Order is handed to client at counter → Client leaves catering establishment
- Client leaves catering establishment → Employee clears table

Reservation management

Business flow:

- Client selects what he needs: catering or beauty establishments.
- For example, he chooses beauty establishments.
- Client selects what services he needs from the beauty establishments.
- The system shows all available beauty establishments that provide these services.
- Client selects the beauty establishments he wants.
- Client reserves free time at the beauty establishment.
- Client can modify reservation (services, visit time).
- If the client cancels the reservation, then time is freed up in the system.
- Client arrives at the beauty establishment.
- Client identifies himself as the one who made the reservation.
- Beauty establishment specialist does his job.
- Client makes payment (cash, card, gift card, may leave tips).

Tables/entities:

- Service (hair cutting, hair coloring, hairstyle, beard shaving)
- Business (multiple beauty establishments)
- Reservation
- Payment (cash, card, gift card, discount, tips)
- Receipt
- Discount
- Tax

Components:

- Reservation management (Service, Business, Reservation, Payment, Receipt, Discount, Tax)

Actions:

- Client reserves a service
- Client cancels the service
- Client modifies the service
- Client pays for the service
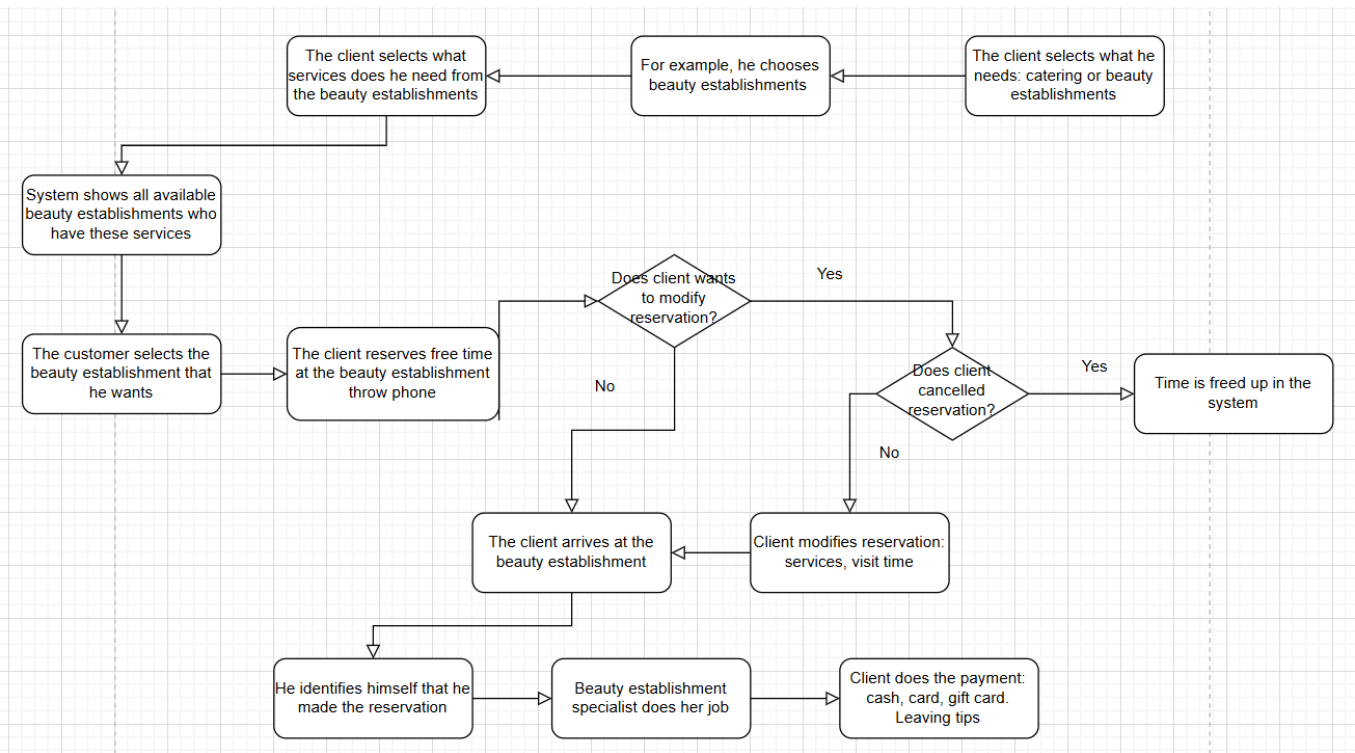
Wireframes

Employee/business management

Business

Add Employee

Name: Lorem Ipsum

Address: 1234 Lorem St.
Ipsum, TX 12345

Phone: (123) 456-7890

Email: info@example.com

Edit Business

Employees

Name	Role	Action
John Doe	Owner	
Jane Smith	Employee	✎ 🗑
Michael Brown	Employee	✎ 🗑
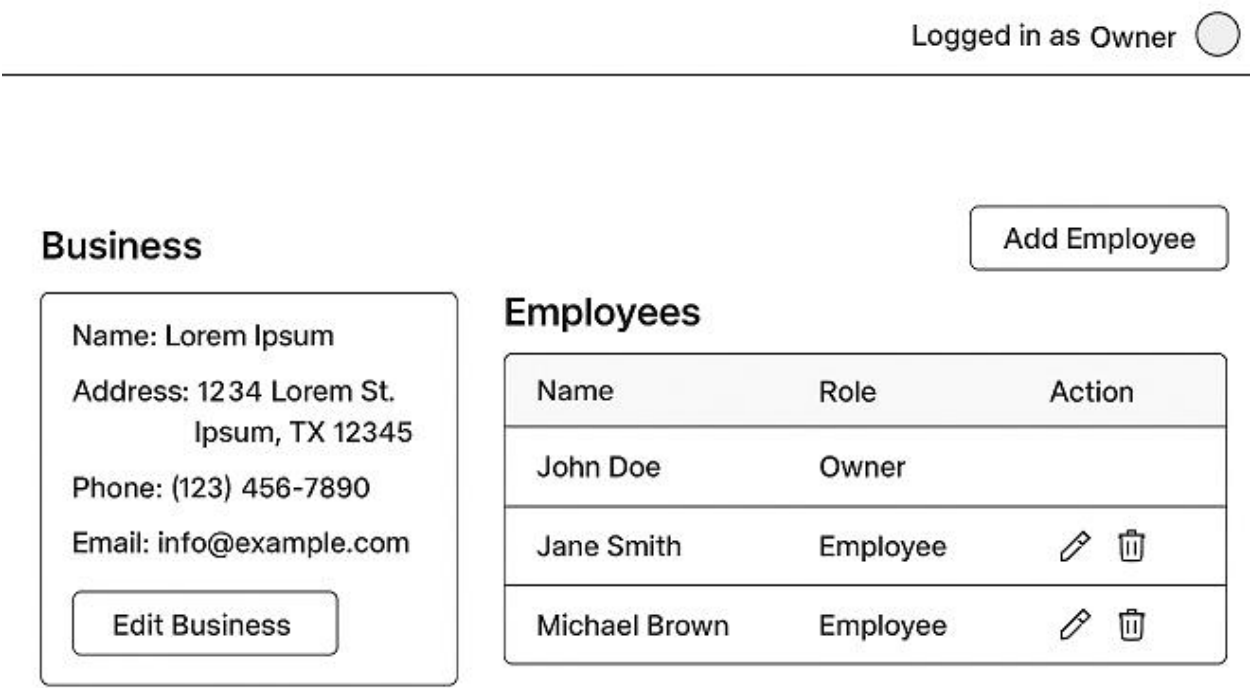
Employee/business management subpage from an owner's perspective. In this subpage, a business owner is logged in. He can view and edit the business information and manage employees. Clicking **"Edit Business"** will redirect him to a pop-up window, where he can modify company details such as name, address, phone, and email. Clicking **"Add Employee"** will redirect him to a pop-up window to create a new employee profile. The edit icon allows modifying an existing employee's details, while the delete icon removes the employee from the list. The owner isn't able to edit or remove himself.

Logged in as Admin ◯

Business

Add Employee

Name: Lorem Ipsum

Address: 1234 Lorem St.
Ipsum, TX 12345

Phone: (123) 456-7890

Email: info@example.com

Edit Business

Employees

Name	Role	Action
John Doe	Owner	✎ 🗑
Jane Smith	Employee	✎ 🗑
Michael Brown	Employee	✎ 🗑
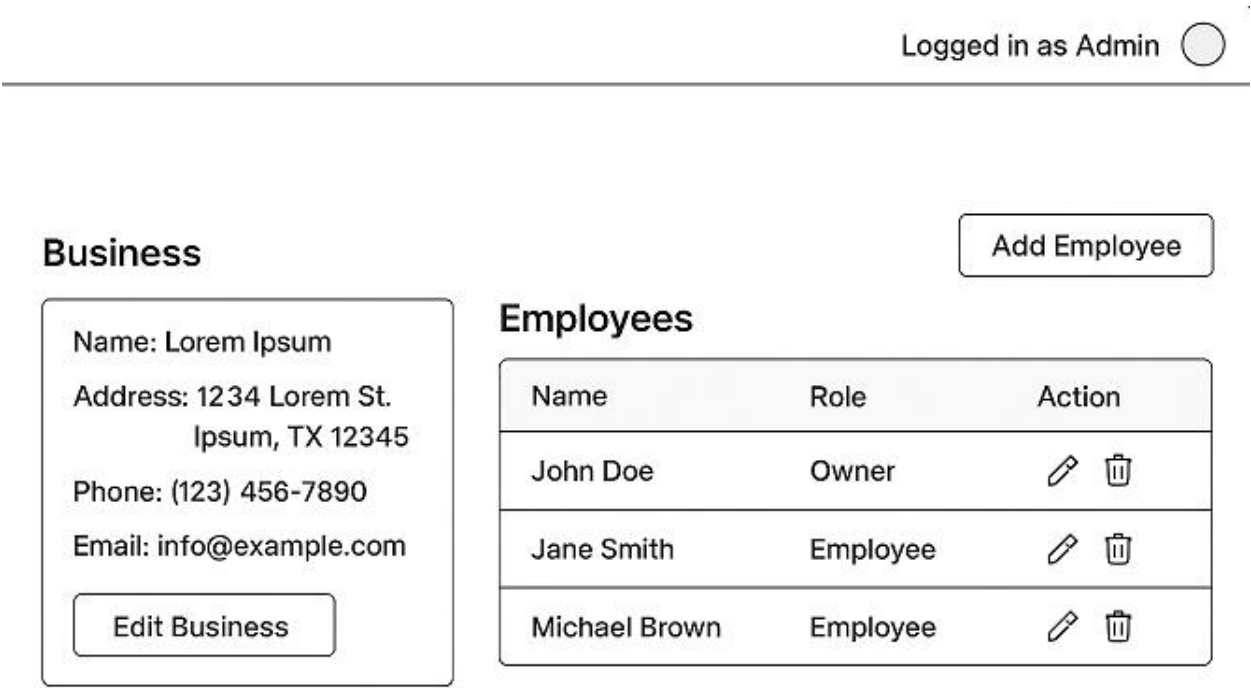
Employee/business management subpage from an admin's perspective. It has all the same features as in the previous example, with the only difference being that an admin can edit and delete the business owner.

Order management

Text inside boxes is either a button or field which value can be changed.

New order	Products	Closed orders	Refunded orders

Open orders

Order #0125

Order #0124

Order #0123				Add new item	Delete order

Item Id	Product	Quantity	Variations	Discount Id	
#001	Coffee	− 1 +	Edit	# 0010	Delete
#002	Croissant	− 2 +	Edit	# 0000	Delete

Order discount Id: # 0007

Tip: 10 % ∨ Proceed

Order #0122

Open orders subpage. Here one can create a new order, add new items to already open orders, completely delete orders. Items in an order can have various quantities, variations and discounts. Each item can also be deleted. A discount can be applied to the whole order and a tip can be added. If no more items are added to the order, one can proceed to payment. There can be several open orders at the same time. An open order can be expanded by pressing the corresponding button but only one order can be expanded. If one order is expanded and a button of another order is pressed, then the first order collapses and the second order expands.

Product Id	Name	
#0001	Coffee	Add
#0002	Croissant	Add
#0003	Tea	Add
#0004	Cake	Add
...	...	Add

Cancel

Add new item pop-up window. Accessed by pressing "Add new item" button in *Open orders* subpage. Here one can add an item from the list of products or close the window. After pressing any of the "Add" buttons, pop-up window automatically closes.

Variations pop-up window. Accessed by pressing "Edit" buttons near each item in an order. After all variations for particular item are selected, the selection is saved by pressing "Save" button. One can close the pop-up window with "Cancel" button if default selection was chosen.

Order sum: ....€

     Tip: ....€

Discount: - ....€
_____

   Total: ....€

                                                                    13

                                        Add split check

Payment Id	Amount	Payment	
#1	10.01	Pay	Delete
#2	8.56	Pay	Delete

Back

Payment subpage. Accessed by pressing "Proceed" button in *Open orders* subpage. One can have multiple payments by pressing "Add split check" button. After pressing the button, a new line in the table appears. Then amounts of each payment can be adjusted, though all "Pay" buttons should be inactive until all amounts add up to the total amount spent. After paying one bill, other bills will lock. One will not be able to change the amount or delete a bill.

New order	Products	Closed orders	Refunded orders

Products

Add new product

Product Id	Name	Base price	VAT		
#0001	Coffee	2.00	21%	Edit	Delete
#0002	Croissant	1.50	21%	Edit	Delete
#0003	Cake	3.30	21%	Edit	Delete
#0004	Wine	5.50	30%	Edit	Delete
...	...	...	...	...	...

Products subpage. Accessed by pressing the "Products" button at navigation bar at the top of the page. Here one can add new products, edit already existing products or delete them from the catalogue.

Product Id: #0005

Name:

Base price:

VAT:

Cancel   Save

Product pop-up window. Accessed by pressing either "Add new product" or "Edit" buttons in *Products* subpage. Name, base price and VAT can be entered.

New order	Products	Closed orders	Refunded orders

Closed orders

Order Id	Total amount	Receipt	
#0021	12.34	Get	Refund
#0008	5.64	Get	Refund
...	...	...	...

Closed orders subpage.Accessed from the navigation bar. Here one can get a receipt or refund a closed order.

New order	Products	Closed orders	Refunded orders

Refunded orders

Order Id	Total amount
#0021	12.34
#0008	5.64
...	...

Refunded orders subpage. Accessed from the navigation bar. Here one can see all the refunded orders.

Reservation management

Employee ID	Client name surname	Phone number	Service type	Start time	Finish time	Discount Nr.	Price €		
1	Mantas Mantaitis	+3701111111	Hair cut	10:00	10:30	D1234	20	Edit	Delete
2	Petras Petraitis	+370111222	Hair coloring	10:00	11:00		60	Edit	Delete
2	Petras Petraitis	+370122222	Hair cut	13:00	13:30		25	Edit	Delete

Year ▾   Month ▾   ⊕ Create

Open reservation subpage, sorted by hours. In this subpage, an employee is logged in as **Employee 1**. He can edit and delete only his reservation. Clicking "*Create*" (to make a new reservation) will redirect him to the "**Create Reservation**" page. Clicking "*Edit*" (to edit a reservation) will redirect him to the "**Edit Reservation**" page. Clicking "*Delete*" (to delete a reservation) will remove the reservation. Clicking "*Year*" or "*Month*" will open the calendar display, allowing the employee to choose the desired year and month.

Create reservation

Service Type

[⌄]

Date

<		OCTOBER 2025				>
S	M	T	W	T	F	S
28	29	30	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	1
2	3	4	5	6	7	8

Time

[-   ⌄]

Specialist

| Lukas Lukaitis |
| Jonas Jonaitis |

Client Name Surname

[-]

Phone Number

[-]

Discount Number

[-]

Price, €

[-]

[Create]

Create reservation subpage. Reached from "**Open reservation**" subpage. Must enter *specialist's name surname*, the client's *first name, last name, phone number*, the *Service* type, as well as the *available visit date* — based on the selected *Service* type. Then it is optional to enter the *discount number* — based on the number and *Service* type, the *final price* is calculated. The reservation cannot be added until all fields are filled and displayed, except for the *discount number*.

Edit reservation

Service Type

Hair cut	⌄

Date

<	OCTOBER 2025	>

S	M	T	W	T	F	S
28	29	30	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	1
2	3	4	5	6	7	8

Time

10:00	⌄

Specialist

Lukas Lukaitis

Client Name Surname

Mantas Mantaitis

Phone Number

+3701111111

Discount Number

D1234

Price, €

30

[Edit]

Edit reservation subpage. Reached from "**Open reservation**" subpage. It is possible to change the *specialist's name surname*, the client's *first name, last name, phone number*, and the *Service* type. It is also possible to change the *available visit date*. It is possible to adjust the *discount number*, and the *final price* will be recalculated accordingly. The edited reservation cannot be saved until all fields are filled and displayed, except for the *discount number*. It could be deleted.

Package diagrams

Package Relationships

Source Package	Depends On / Uses	Description
OrderManagement	PaymentProcessing, SystemUtilities	Uses payment, tax, and discount logic when closing orders
ReservationManagement	BusinessManagement, UserManagement	Uses business and employee data to schedule appointments
BusinessManagement	UserManagement	Businesses own employees and define services
UserManagement	SystemUtilities	For access control and authentication
PaymentProcessing	SystemUtilities	Uses tax and discount modules for price calculation
SystemUtilities	(independent)	Provides reusable tax, discount, and receipt features

Internal Package Structure

OrderManagement

- **Classes:** Order, OrderItem, Product, Receipt
- **Responsibilities:**
    - Create and modify orders
    - Handle discounts and taxes
    - Integrate with payment module
    - Generate receipts

ReservationManagement

- **Classes:** Reservation, Service, Schedule
- **Responsibilities:**
    - Manage customer bookings
    - Track service time and assigned employee
    - Support modification and cancellation

BusinessManagement

- **Classes:** Business, Location, ServiceCatalog
- **Responsibilities:**
    - Store business data
    - Define available services and pricing
    - Associate employees with businesses

UserManagement

- **Classes:** User, Role, Permission
- **Responsibilities:**
    - Authentication and authorization
    - Role-based access (Employee, Owner, SuperAdmin)
    - Manage user data

PaymentProcessing

- **Classes:** Payment, PaymentMethod, Transaction
- **Responsibilities:**
    - Handle cash, card, and gift card payments
    - Integrate with Stripe API
    - Support split payments and refunds

SystemUtilities

- **Classes:** Tax, Discount, ReceiptGenerator
- **Responsibilities:**
    - Apply VAT/tax logic
    - Manage discount types and validity
    - Generate final receipts

Dependency View

User Management
↓
Business Management
↓
Reservation Management
↓
Order Management
↓
Payment Processing
↓
System Utilities
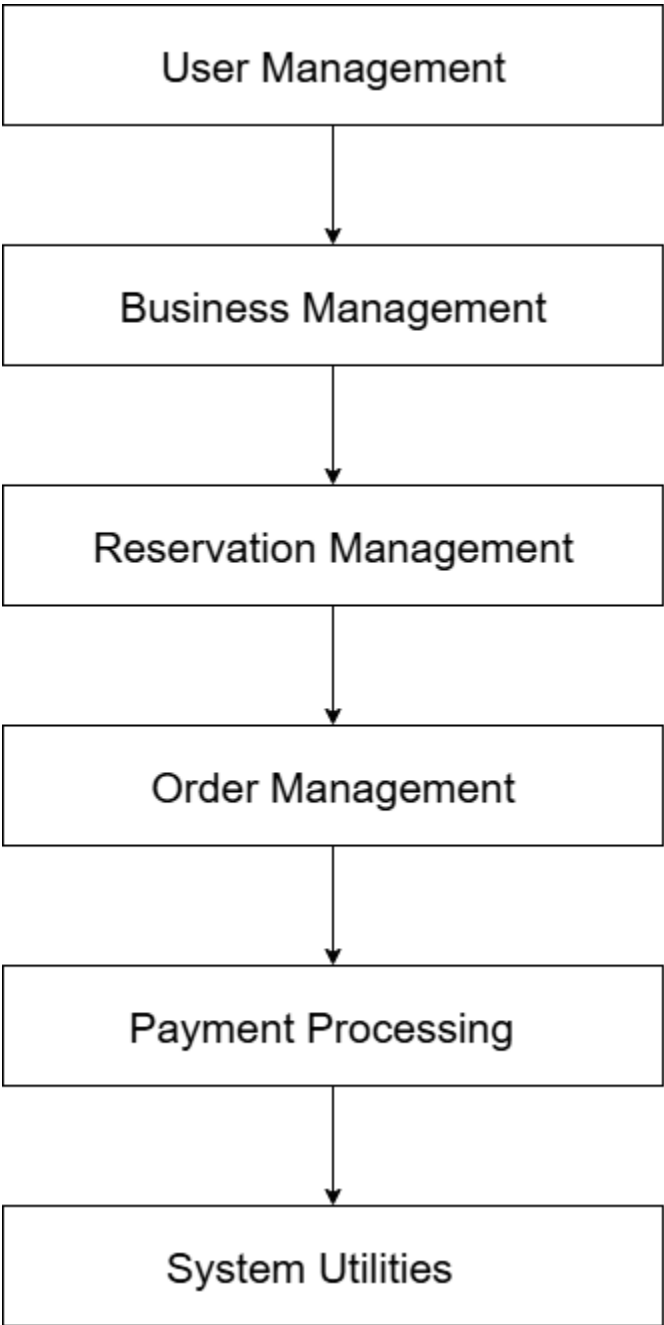
Data model
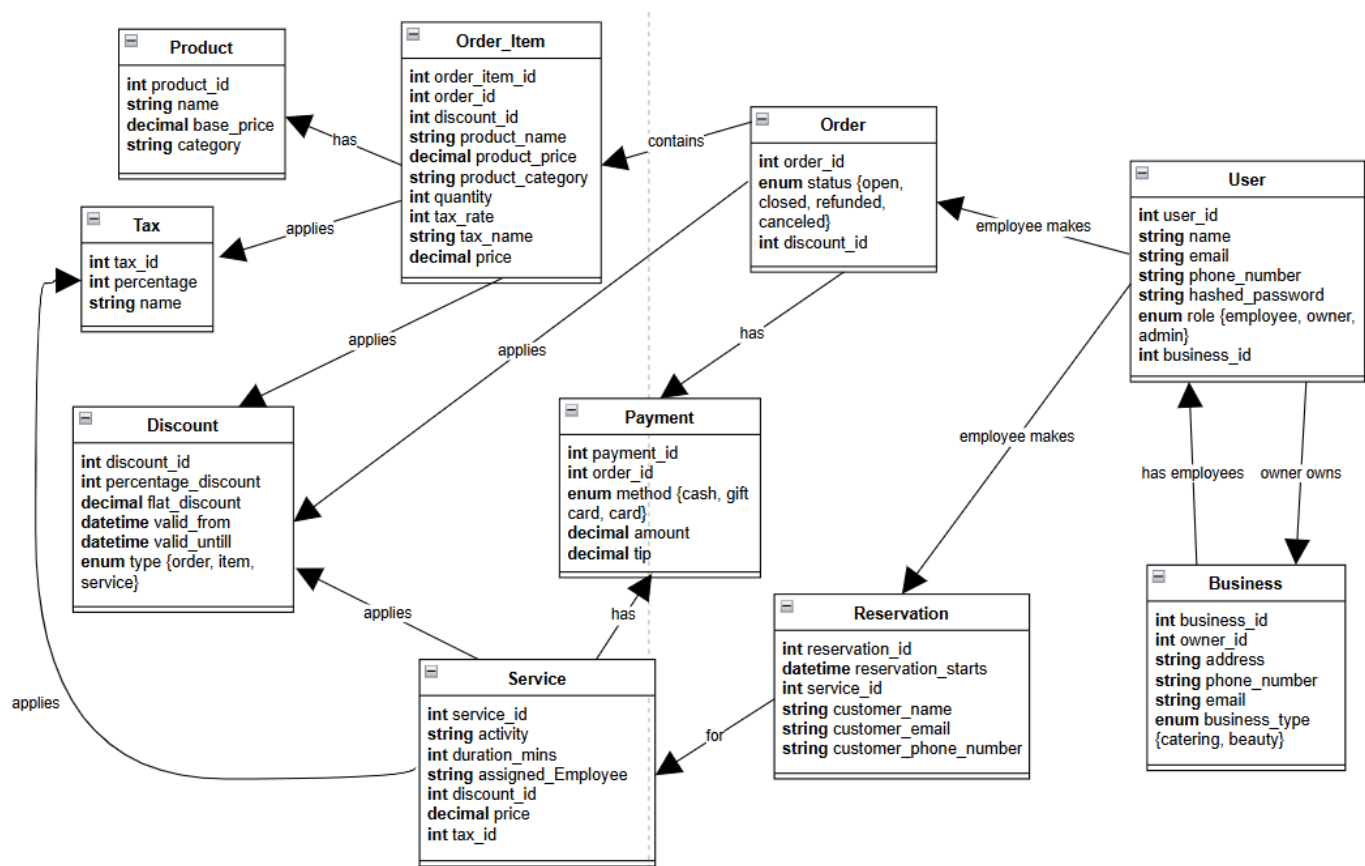
Product:
- Attributes:
  - product_id *(int)* — Unique identifier.
  - name *(string)* — Product name.
  - base_price *(decimal)* — Default price.
  - category *(string)* — Product category.
- Relationships:
  - It is an essential component of Order_Item.
  - Tax and Discount can apply to it.

Order_Item:
- Attributes:
  - order_item_id *(int)* — Unique item ID.
  - order_id (*int*) — The ID of the order, it is a part of.
  - discount_id *(int)* — Discount applied.
  - product_name (*string*) — a copy (snapshot) from Product
  - product_price (*int*) — a copy (snapshot) from Product
  - product_category (*string*) — a copy (snapshot) from Product
  - quantity *(int)* — Number of units.
  - tax_rate *(int)* — a copy (snapshot) from Tax
  - tax_name (*string*) — a copy (snapshot) from Tax
  - price *(decimal)* — Price after discounts/taxes.
- Relationships:
  - A component of an Order.
  - Contains information about a Product.
  - Tax and Discount can apply to it.

Order:
- Attributes:
  - order_id *(int)* — Unique order ID.
  - status *(enum)* — {open, closed, refunded, canceled}.
  - discount_id *(int)* — Discount applied.
  - payment_id *(int[])* — Associated payments.

- Relationships:
  - It is made by an Employee (User).

Payment:
- Attributes:
  - payment_id *(int)* — Unique payment ID.
  - order_id (int) — The ID of an order or service, the payment is associated with.
  - method *(enum)* — {cash, gift card, card}.
  - amount *(decimal)* — Paid amount.
  - tip *(decimal)* — Optional tip.
- Relationships:
  - Used in all Order payments.
  - Used in all Service payments.

Discount:
- Attributes:
  - discount_id *(int)* — Unique ID.
  - percentage_discount *(int)* — % discount.
  - flat_discount *(decimal)* — Fixed discount amount.
  - valid_from, valid_until *(datetime)* — Validity period.
  - type *(enum)* — {order, item, service}.
- Relationships:
  - Applies to Order_Item, Service, and Order.

Tax:
- Attributes:
  - tax_id *(int)* — Unique ID.
  - percentage *(int)* — Tax rate.
  - name (string) - Name of the tax for receipt printing.
- Relationships:
  - Applies to Order, Service, and Order_Item.

Service:
- Attributes:
  - service_id *(int)* — Unique ID.
  - activity *(string)* — Service type.
  - duration_mins *(int)* — Duration.
  - assigned_employee *(string)* — Employee handling it.
  - discount_id, tax_id *(int)* — Related IDs.
  - price *(decimal)* — Cost.
- Relationships:
  - Has an applied Tax and can have a Discount.
  - Linked to Reservation.

Reservation:
- Attributes:
  - reservation_id *(int)* — Unique ID.
  - reservation_starts *(datetime)* — Time when reservation starts.
  - service_id *(int)* — Booked service.
  - customer_name, customer_email, customer_phone_number *(string)* — Client details.
- Relationships:
  - Linked to a specific Service.

User:
- Attributes:
  - user_id *(int)* — Unique ID.

- o name, email, phone_number *(string)* — Personal info.
- o hashed_password *(string)* — Encrypted password.
- o role *(enum)* — {employee, owner, admin}.
- o business_id (int) — only relevant for employees working for a business, is NULL for everybody else.
- Relationships:
  - o Employees create Orders and Reservations
  - o Employees work for a Business.
  - o Owners own a business.

Business:
- Attributes:
  - o business_id *(int)* — Unique ID.
  - o owner_id *(int)* — Business owner.
  - o address, phone_number, email *(string)* — Contact info.
  - o business_type *(enum)* — {catering, beauty}.
- Relationships:
  - o Owned by a User (owner).