Topic: Car Workshop Management System

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Description of each person's contribution to the current work: Vladyslav Humeniuk – #1 Scope and brief description of the system, #2 System requirements and functionalities, #3 Diagram and description of individual tables, #4 Implementation (DLL)

1. Scope and brief description of the system

The goal of the project is to create an IT system that supports the management of a car repair workshop. The system enables customer service, repair registration, staff and spare parts management, invoicing, and tracking of vehicle repair history. The main users of the system are mechanics, customers, administrators, and service managers.

The system allows, among other things:

- receiving service requests,
- scheduling repairs and assigning tasks to mechanics,
- monitoring spare parts availability,
- handling invoices and payments,
- managing employee schedules,
- tracking repair progress and generating reports.

2. System requirements and functionalities

Mechanic (Must Have):

- Can view assigned repairs and their details.
- Can update repair status.
- Can check availability of parts and request needed components.
- Can add comments to repairs.
- Has access to their work schedule.

Mechanic (Nice to Have):

- Can define their own specializations.
- Can mark days off.
- Has access to salary history.
- Can reject repair tasks with justification.

Customer (Must Have):

- Can register an account and add vehicles.
- Can submit service requests.
- Has access to repair history.

- Can check the status of repairs.
- Can view and pay invoices.

Customer (Nice to Have):

- Can leave feedback.
- Can receive offers and reminders.
- Can reschedule repair appointments.
- Can choose a preferred mechanic.

Administrator (Must Have):

- Can register customers and their vehicles.
- Can create service requests.
- Can generate invoices and view payment statuses.
- Can view the list of employees currently on shift.

Administrator (Nice to Have):

- Has access to customer service history.
- Can add internal notes.
- The system can suggest optimal appointment times.

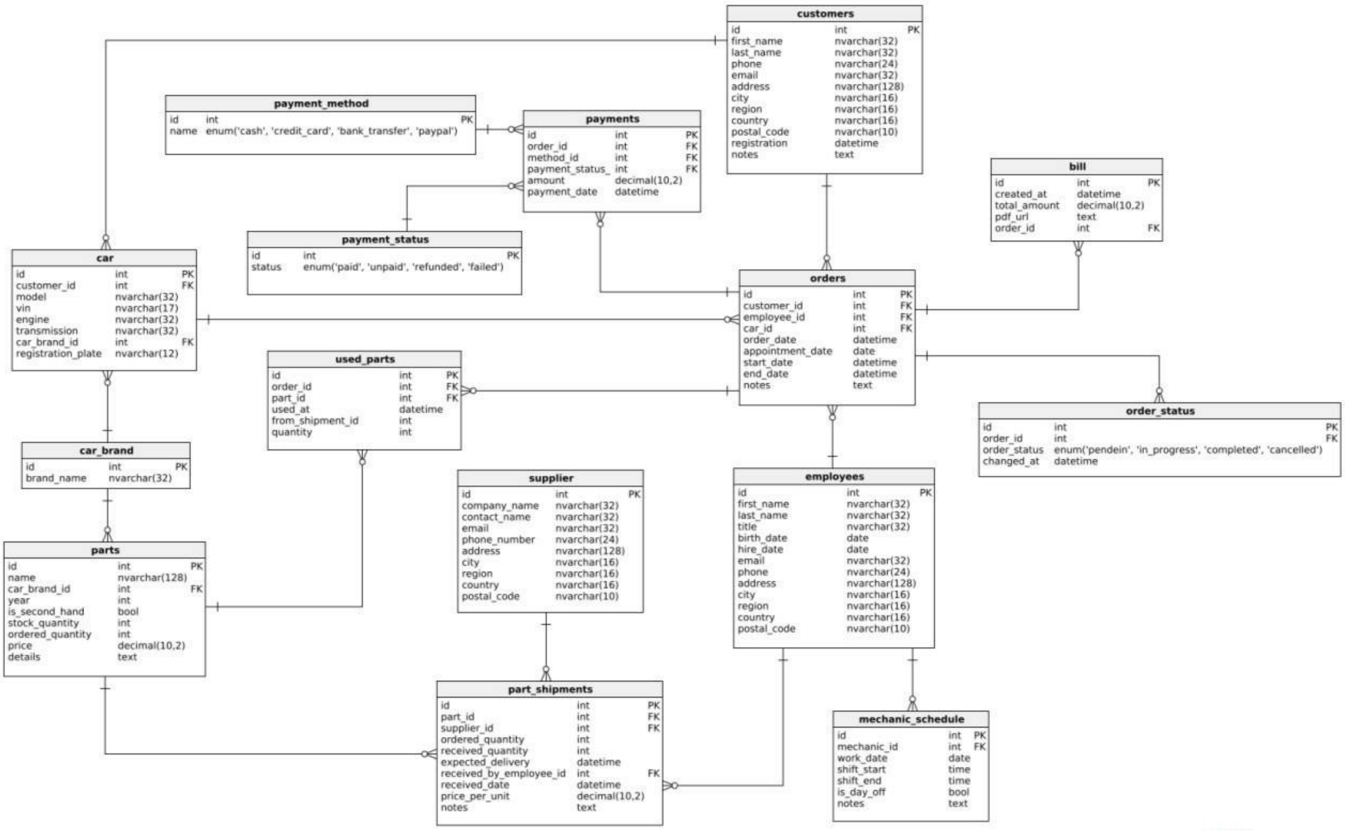
Manager (Must Have):

- Can manage employee accounts.
- Can assign repair requests to mechanics.
- Has insight into work schedules and parts availability.
- Can generate operational and financial reports.

Manager (Nice to Have):

- Can define days off and holidays.
- Can configure automatic notifications.
- Can manage the price list of services.

3. Database Project



Description of Individual Tables

Table: bill – Invoice Data

Attribute Name	Type	Description
id	INT	Primary key
created_at	DATETIME	Invoice issue date
total_amount	DECIMAL(10,2)	Total amount
pdf_url	TEXT	Link to the PDF invoice file
order_id	INT	Order ID (FK)

Table: car – Client Vehicle Data

Attribute Name	Type	Description
id	INT	Primary key
customer_id	INT	Client ID (FK)
model	NVARCHAR(32)	Vehicle model
vin	NVARCHAR(17)	VIN number (unique)
engine	NVARCHAR(32)	Engine type
transmission	NVARCHAR(32)	Transmission type

Attribute Name	Type	Description
car_brand_id	INT	Vehicle brand ID (FK)
registration_plate	NVARCHAR(12)	Registration number (unique)

Table: car_brand – Car Brands

Attribute Name	Type	Description
id	INT	Primary key
brand_name	NVARCHAR(32)	Brand name

Table: customers – Client Data

Attribute Name	Type	Description
id	INT	Primary key
first_name	NVARCHAR(32)	First name
last_name	NVARCHAR(32)	Last name
phone	NVARCHAR(24)	Phone number (unique)
email	NVARCHAR(32)	E-mail (unique)
address	NVARCHAR(128)	Address
city	NVARCHAR(16)	City
region	NVARCHAR(16)	Region
country	NVARCHAR(16)	Country
postal_code	NVARCHAR(10)	Postal code
registration	DATETIME	Registration date
notes	TEXT	Notes

Table: employees – Employee Data

Attribute Name	Type	Description
id	INT	Primary key
first_name	NVARCHAR(32)	First name
last_name	NVARCHAR(32)	Last name
title	NVARCHAR(32)	Position
birth_date	DATE	Birth date
hire_date	DATE	Hire date

Attribute Name	Type	Description
email	NVARCHAR(32)	E-mail (unique)
phone	NVARCHAR(24)	Phone number (unique)
address	NVARCHAR(128)	Address
city	NVARCHAR(16)	City
region	NVARCHAR(16)	Region
country	NVARCHAR(16)	Country
postal_code	NVARCHAR(10)	Postal code

Table: mechanic_schedule – Mechanics' Work Schedule

Attribute Name	Type	Description
id	INT	Primary key
mechanic_id	INT	Mechanic ID (FK → employees)
work_date	DATE	Work date
shift_start	TIME	Shift start
shift_end	TIME	Shift end
is_day_off	BOOL	Is day off
notes	TEXT	Notes

Table: order_status – Order Status History

Attribute Name	Type	Description
id	INT	Primary key
order_id	INT	Order ID (FK)
order_status	ENUM('pendein', 'in_progress', 'completed', 'cancelled')	Order status
changed_at	DATETIME	Status change date

Table: orders – Service Orders

Attribute Name	Type	Description
id	INT	Primary key
customer_id	INT	Client ID (FK)
employee_id	INT	Employee ID (FK)
car_id	INT	Vehicle ID (FK)

Attribute Name	Type	Description
order_date	DATETIME	Order date
appointment_date	DATE	Appointment date
start_date	DATETIME	Start of execution
end_date	DATETIME	End of execution
notes	TEXT	Notes

Table: part_shipments – Part Deliveries

Attribute Name	Type	Description
id	INT	Primary key
part_id	INT	Part ID (FK)
supplier_id	INT	Supplier ID (FK)
ordered_quantity	INT	Ordered quantity
received_quantity	INT	Received quantity
expected_delivery	DATETIME	Expected delivery
received_by_employee_id	INT	Received by (FK)
received_date	DATETIME	Receipt date
price_per_unit	DECIMAL(10,2)	Price per unit
notes	TEXT	Notes

Table: parts – Auto Parts

Attribute Name	Type	Description
id	INT	Primary key
name	NVARCHAR(128)	Part name
car_brand_id	INT	Vehicle brand ID (FK)
year	INT	Year of manufacture
is_second_hand	BOOL	Is second-hand
stock_quantity	INT	Stock quantity
ordered_quantity	INT	Ordered quantity
price	DECIMAL(10,2)	Price
details	TEXT	Details

Table: payment_method – Payment Methods

Attribute Name	Type	Description
id	INT	Primary key
name	ENUM('cash', 'credit_card', 'bank_transfer', 'paypal')	Payment method

Table: payment_status – Payment Statuses

Attribute Name	Type	Description
id	INT	Primary key
status	ENUM('paid', 'unpaid', 'refunded', 'failed')	Payment status

Table: payments – Order Payments

Attribute Name	Type	Description
id	INT	Primary key
order_id	INT	Order ID (FK)
method_id	INT	Payment method ID (FK)
payment_status_id	INT	Payment status ID (FK)
amount	DECIMAL(10,2)	Amount
payment_date	DATETIME	Payment date

Table: supplier – Part Suppliers

Attribute Name	Type	Description
id	INT	Primary key
company_name	NVARCHAR(32)	Company name
contact_name	NVARCHAR(32)	Contact person
email	NVARCHAR(32)	E-mail address
phone_number	NVARCHAR(24)	Phone number
address	NVARCHAR(128)	Address
city	NVARCHAR(16)	City
region	NVARCHAR(16)	Region
country	NVARCHAR(16)	Country
postal_code	NVARCHAR(10)	Postal code

Table: used_parts – Parts Used in Orders

Attribute Name	Type	Description
id	INT	Primary key
order_id	INT	Order ID (FK)
part_id	INT	Part ID (FK)
used_at	DATETIME	Date of use
from_shipment_id	INT	Shipment ID (FK)
quantity	INT	Quantity used

4. implementation

Code DDL

Table: bill

```
CREATE TABLE bill (
    id int  NOT NULL,
    created_at datetime  NOT NULL,
    total_amount decimal(10,2)  NOT NULL,
    pdf_url text  NOT NULL,
    order_id int  NOT NULL,
    CONSTRAINT bill_pk PRIMARY KEY (id)
);
```

Table: car

```
CREATE TABLE car (
    id int  NOT NULL,
    customer_id int  NOT NULL,
    model nvarchar(32)  NOT NULL,
    vin nvarchar(17)  NOT NULL,
    engine nvarchar(32)  NOT NULL,
    transmission nvarchar(32)  NOT NULL,
    car_brand_id int  NOT NULL,
    registration_plate nvarchar(12)  NOT NULL,
    UNIQUE INDEX unique_vin (vin),
    UNIQUE INDEX unique_registration_plate (registration_plate),
    CONSTRAINT car_pk PRIMARY KEY (id)
);
```

Table: car_brand

```
CREATE TABLE car_brand (
    id int  NOT NULL,
    brand_name nvarchar(32)  NOT NULL,
    CONSTRAINT car_brand_pk PRIMARY KEY (id)
);
```

Table: customers

```
CREATE TABLE customers (
    id int  NOT NULL,
    first_name nvarchar(32)  NOT NULL,
    last_name nvarchar(32)  NOT NULL,
    phone nvarchar(24)  NOT NULL,
    email nvarchar(32)  NOT NULL,
    address nvarchar(128)  NOT NULL,
    city nvarchar(16)  NOT NULL,
    region nvarchar(16)  NOT NULL,
    country nvarchar(16)  NOT NULL,
    postal_code nvarchar(10)  NOT NULL,
    registration datetime  NOT NULL,
    notes text  NOT NULL,
    UNIQUE INDEX unique_email (email),
    UNIQUE INDEX unique_phone (phone),
    CONSTRAINT customers_pk PRIMARY KEY (id)
);
```

Table: employees

```
CREATE TABLE employees (
    id int  NOT NULL,
    first_name nvarchar(32)  NOT NULL,
    last_name nvarchar(32)  NOT NULL,
    title nvarchar(32)  NOT NULL,
    birth_date date  NOT NULL,
    hire_date date  NOT NULL,
    email nvarchar(32)  NOT NULL,
    phone nvarchar(24)  NOT NULL,
    address nvarchar(128)  NOT NULL,
    city nvarchar(16)  NOT NULL,
    region nvarchar(16)  NOT NULL,
    country nvarchar(16)  NOT NULL,
    postal_code nvarchar(10)  NOT NULL,
    UNIQUE INDEX unique_email (email),
    UNIQUE INDEX unique_phone (phone),
    CONSTRAINT employees_pk PRIMARY KEY (id)
);
```

Table: mechanic_schedule

```
CREATE TABLE mechanic_schedule (
    id int  NOT NULL,
    mechanic_id int  NOT NULL,
    work_date date  NOT NULL,
    shift_start time  NOT NULL,
    shift_end time  NOT NULL,
    is_day_off bool  NOT NULL,
    notes text  NOT NULL,
    CONSTRAINT mechanic_schedule_pk PRIMARY KEY (id)
);
```

Table: order_status

```
CREATE TABLE order_status (
    id int  NOT NULL,
    order_id int  NOT NULL,
    order_status enum('pendein', 'in_progress', 'completed', 'cancelled')  NOT NULL,
    changed_at datetime  NOT NULL,
    CONSTRAINT order_status_pk PRIMARY KEY (id)
);
```

Table: orders

```
CREATE TABLE orders (
    id int  NOT NULL,
    customer_id int  NOT NULL,
    employee_id int  NOT NULL,
    car_id int  NOT NULL,
    order_date datetime  NOT NULL,
    appointment_date date  NOT NULL,
    start_date datetime  NOT NULL,
    end_date datetime  NOT NULL,
    notes text  NOT NULL,
    CONSTRAINT orders_pk PRIMARY KEY (id)
);
```

Table: part_shipments

```
CREATE TABLE part_shipments (
    id int  NOT NULL,
    part_id int  NOT NULL,
    supplier_id int  NOT NULL,
    ordered_quantity int  NOT NULL,
    received_quantity int  NOT NULL,
    expected_delivery datetime  NOT NULL,
    received_by_employee_id int  NOT NULL,
    received_date datetime  NOT NULL,
    price_per_unit decimal(10,2)  NOT NULL,
    notes text  NOT NULL,
    CONSTRAINT part_shipments_pk PRIMARY KEY (id)
);
```

Table: parts

```
CREATE TABLE parts (
    id int  NOT NULL,
    name nvarchar(128)  NOT NULL,
    car_brand_id int  NOT NULL,
    year int  NOT NULL,
    is_second_hand bool  NOT NULL,
    stock_quantity int  NOT NULL,
    ordered_quantity int  NOT NULL,
    price decimal(10,2)  NOT NULL,
    details text  NOT NULL,
    CONSTRAINT parts_pk PRIMARY KEY (id)
);
```

Table: payment_method

```
CREATE TABLE payment_method (
    id int  NOT NULL,
    name enum('cash', 'credit_card', 'bank_transfer', 'paypal')  NOT NULL,
    CONSTRAINT payment_method_status_pk PRIMARY KEY (id)
);
```

Table: payment_status

```
CREATE TABLE payment_status (
    id int  NOT NULL,
    status enum('paid', 'unpaid', 'refunded', 'failed')  NOT NULL,
    CONSTRAINT payment_status_pk PRIMARY KEY (id)
);
```

Table: payments

```
CREATE TABLE payments (
    id int  NOT NULL,
    order_id int  NOT NULL,
    method_id int  NOT NULL,
    payment_status_id int  NOT NULL,
    amount decimal(10,2)  NOT NULL,
    payment_date datetime  NOT NULL,
    CONSTRAINT payment_pk PRIMARY KEY (id)
);
```

Table: supplier

```
CREATE TABLE supplier (
    id int  NOT NULL,
    company_name nvarchar(32)  NOT NULL,
    contact_name nvarchar(32)  NOT NULL,
    email nvarchar(32)  NOT NULL,
    phone_number nvarchar(24)  NOT NULL,
    address nvarchar(128)  NOT NULL,
    city nvarchar(16)  NOT NULL,
    region nvarchar(16)  NOT NULL,
    country nvarchar(16)  NOT NULL,
    postal_code nvarchar(10)  NOT NULL,
    CONSTRAINT supplier_pk PRIMARY KEY (id)
);
```

Table: used_parts

```
CREATE TABLE used_parts (
    id int  NOT NULL,
    order_id int  NOT NULL,
    part_id int  NOT NULL,
    used_at datetime  NOT NULL,
    from_shipment_id int  NOT NULL,
    quantity int  NOT NULL,
    CONSTRAINT part_in_order_pk PRIMARY KEY (id)
);
```

Foreign keys

Reference: bill_orders (table: bill)

```
ALTER TABLE bill ADD CONSTRAINT bill_orders FOREIGN KEY bill_orders (order_id)
    REFERENCES orders (id);
```

Reference: car_car_brand (table: car)

```
ALTER TABLE car ADD CONSTRAINT car_car_brand FOREIGN KEY car_car_brand (car_brand_id)
    REFERENCES car_brand (id);
```

Reference: car_customers (table: car)

```
ALTER TABLE car ADD CONSTRAINT car_customers FOREIGN KEY car_customers (customer_id)
    REFERENCES customers (id);
```

Reference: mechanic_schedule_employees (table: mechanic_schedule)

```
ALTER TABLE mechanic_schedule ADD CONSTRAINT mechanic_schedule_employees FOREIGN KEY
mechanic_schedule_employees (mechanic_id)
    REFERENCES employees (id);
```

Reference: order_status_orders (table: order_status)

```
ALTER TABLE order_status ADD CONSTRAINT order_status_orders FOREIGN KEY
order_status_orders (order_id)
    REFERENCES orders (id);
```

Reference: orders_car (table: orders)

```
ALTER TABLE orders ADD CONSTRAINT orders_car FOREIGN KEY orders_car (car_id)
    REFERENCES car (id);
```

Reference: orders_customers (table: orders)

```
ALTER TABLE orders ADD CONSTRAINT orders_customers FOREIGN KEY orders_customers
(customer_id)
    REFERENCES customers (id);
```

Reference: orders_employees (table: orders)

```
ALTER TABLE orders ADD CONSTRAINT orders_employees FOREIGN KEY orders_employees
(employee_id)
    REFERENCES employees (id);
```

Reference: part_in_order_orders (table: used_parts)

```
ALTER TABLE used_parts ADD CONSTRAINT part_in_order_orders FOREIGN KEY
part_in_order_orders (order_id)
    REFERENCES orders (id);
```

Reference: part_in_order_parts (table: used_parts)

```
ALTER TABLE used_parts ADD CONSTRAINT part_in_order_parts FOREIGN KEY part_in_order_parts
(part_id)
    REFERENCES parts (id);
```

Reference: part_shipments_employees (table: part_shipments)

```
ALTER TABLE part_shipments ADD CONSTRAINT part_shipments_employees FOREIGN KEY
part_shipments_employees (received_by_employee_id)
    REFERENCES employees (id);
```

Reference: part_shipments_parts (table: part_shipments)

```
ALTER TABLE part_shipments ADD CONSTRAINT part_shipments_parts FOREIGN KEY
part_shipments_parts (part_id)
    REFERENCES parts (id);
```

Reference: part_shipments_supplier (table: part_shipments)

```
ALTER TABLE part_shipments ADD CONSTRAINT part_shipments_supplier FOREIGN KEY
part_shipments_supplier (supplier_id)
    REFERENCES supplier (id);
```

Reference: parts_car_brand (table: parts)

```
ALTER TABLE parts ADD CONSTRAINT parts_car_brand FOREIGN KEY parts_car_brand
(car_brand_id)
    REFERENCES car_brand (id);
```

Reference: payment_orders (table: payments)

```
ALTER TABLE payments ADD CONSTRAINT payment_orders FOREIGN KEY payment_orders (order_id)
    REFERENCES orders (id);
```

Reference: payments_payment_method (table: payments)

```
ALTER TABLE payments ADD CONSTRAINT payments_payment_method FOREIGN KEY
payments_payment_method (method_id)
    REFERENCES payment_method (id);
```

Reference: payments_payment_status (table: payments)

```
ALTER TABLE payments ADD CONSTRAINT payments_payment_status FOREIGN KEY
payments_payment_status (payment_status_id)
    REFERENCES payment_status (id);
```