

DrivePro - Automobile Dealer Management System

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Mission Statement

The objective of Automobile Dealer Management System (DMS) is to develop a comprehensive software solution that facilitates various dealership functions such as sales, inventory, parts, and customer information management. The system aims to provide Original Equipment Manufacturers (OEMs) and third-party industries with crucial information for measuring sales performance, customer satisfaction, revenue growth, and inventory management. By leveraging the capabilities of an RDBMS, the DMS will effectively manage dealership data, support complex queries and transactions, and provide valuable insights for strategic decision-making.

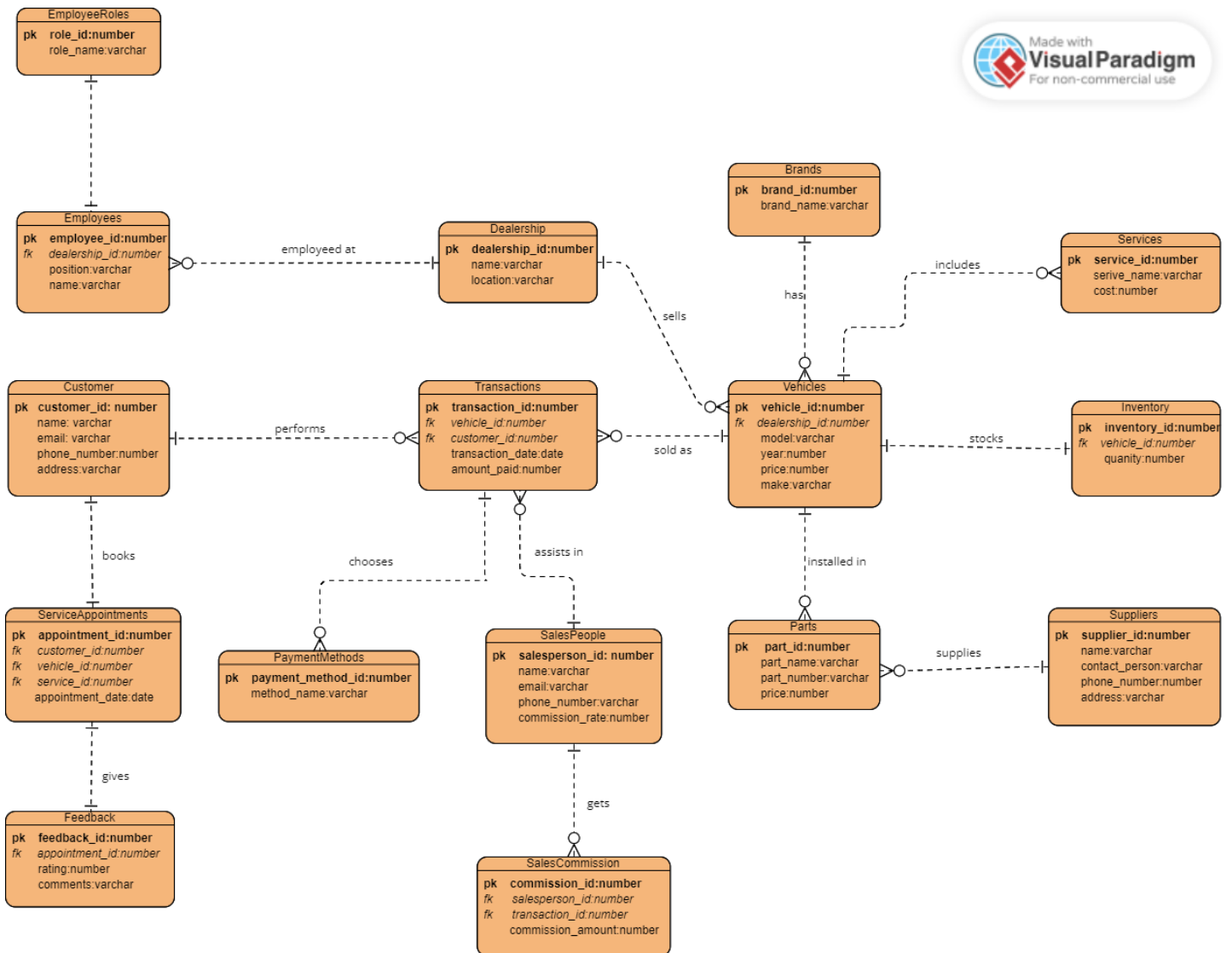
In summary, the business problem revolves around the need for a modern Automotive Dealer Management System to optimize dealership operations, handle the increasing volume of data, and provide meaningful insights for strategic decision-making in the automotive industry.

Data Requirements Phase

During the data requirements phase, our team engaged in comprehensive fact-finding activities aimed at understanding the necessary data for the development of the Automobile Dealership Management System (DMS). This phase involved extensive research to gather essential information pertinent to the system's requirements. The research included the best practices, regulatory requirements, and technological advancements in dealership management systems to ensure that our solution meets current standards and addresses emerging needs. The combination of these efforts allowed us to gather comprehensive data requirements that informed the subsequent phases of system development.

Conceptual Data Modeling Phase

ER Diagram:



Physical data store organization:

Table Name	Column Name	Data Type	Constraints	Additional Details
Dealerships	dealership_id	NUMBER	PRIMARY KEY	
	name	VARCHAR2(100)	NOT NULL	
	location	VARCHAR2(100)	NOT NULL	
Vehicles	vehicle_id	NUMBER	PRIMARY KEY	
	make	VARCHAR2(50)	NOT NULL	
	model	VARCHAR2(50)	NOT NULL	
	year	NUMBER	NOT NULL	
	price	NUMBER	NOT NULL	
	dealership_id	NUMBER	FOREIGN KEY (Dealerships)	References Dealerships(dealership_id)
Customers	customer_id	NUMBER	PRIMARY KEY	
	name	VARCHAR2(100)	NOT NULL	
	email	VARCHAR2(100)	UNIQUE NOT NULL	
	phone_number	VARCHAR2(20)		
	address	VARCHAR2(200)		
Transactions	transaction_id	NUMBER	PRIMARY KEY	
	vehicle_id	NUMBER	FOREIGN KEY (Vehicles)	References Vehicles(vehicle_id)
	customer_id	NUMBER	FOREIGN KEY (Customers)	References Customers(customer_id)
	transaction_date	DATE		
	amount_paid	NUMBER		
Inventory	inventory_id	NUMBER	PRIMARY KEY	
	vehicle_id	NUMBER	FOREIGN KEY (Vehicles)	References Vehicles(vehicle_id)
	quantity	NUMBER		

Employees	employee_id	NUMBER	PRIMARY KEY	
	name	VARCHAR2(100)	NOT NULL	
	position	VARCHAR2(50)	NOT NULL	
	dealership_id	NUMBER	FOREIGN KEY (Dealerships)	References Dealerships(dealership_id)
Services	service_id	NUMBER	PRIMARY KEY	
	service_name	VARCHAR2(100)	NOT NULL	
	cost	NUMBER	NOT NULL	
Parts	part_id	NUMBER	PRIMARY KEY	
	part_name	VARCHAR2(100)	NOT NULL	
	part_number	VARCHAR2(50)	NOT NULL	
	price	NUMBER	NOT NULL	
Suppliers	supplier_id	NUMBER	PRIMARY KEY	
	name	VARCHAR2(100)	NOT NULL	
	contact_person	VARCHAR2(100)		
	phone_number	VARCHAR2(20)		
	address	VARCHAR2(200)		
Salespeople	salesperson_id	NUMBER	PRIMARY KEY	
	name	VARCHAR2(100)	NOT NULL	
	email	VARCHAR2(100)	UNIQUE NOT NULL	
	phone_number	VARCHAR2(20)		
	commission_rate	NUMBER		
PaymentMethods	payment_method_id	NUMBER	PRIMARY KEY	
	method_name	VARCHAR2(100)	NOT NULL	
ServiceAppointments	appointment_id	NUMBER	PRIMARY KEY	

	customer_id	NUMBER	FOREIGN KEY (Customers)	References Customers(customer_id)
	vehicle_id	NUMBER	FOREIGN KEY (Vehicles)	References Vehicles(vehicle_id)
	appointment_date	DATE		
	service_id	NUMBER	FOREIGN KEY (Services)	References Services(service_id)
Feedback	feedback_id	NUMBER	PRIMARY KEY	
	appointment_id	NUMBER	FOREIGN KEY (ServiceAppointments)	References ServiceAppointments(appointment_id)
	rating	NUMBER		
	comments	VARCHAR2(500)		
SalesCommission	commission_id	NUMBER	PRIMARY KEY	
	salesperson_id	NUMBER	FOREIGN KEY (Salespeople)	References Salespeople(salesperson_id)
	transaction_id	NUMBER	FOREIGN KEY (Transactions)	References Transactions(transaction_id)
	commission_amount	NUMBER		
EmployeeRoles	role_id	NUMBER	PRIMARY KEY	
	role_name	VARCHAR2(100)	NOT NULL	

Relationship:

Dealerships:

- Each dealership operates independently, managing its inventory, staff, and services.
- They serve as the central hubs for vehicle sales, maintenance, and customer interaction.

Vehicles:

- Each vehicle is associated with a specific dealership, indicating where it is available for purchase.
- The inventory of vehicles is tracked to monitor stock levels and availability.
- Vehicles are involved in sales transactions, where customers purchase or lease them.
- They can also be scheduled for service appointments for maintenance and repairs.

Customers:

- Customers engage in transactions to buy or lease vehicles from dealerships.
- They schedule service appointments for vehicle maintenance and repairs.
- After service appointments, customers provide feedback, which helps improve service quality.

Transactions:

- Transactions record the details of vehicle sales, including the vehicle involved, the customer purchasing it, the transaction date, and the amount paid.
- They facilitate the transfer of ownership from the dealership to the customer.

Inventory:

- Inventory management tracks the quantity of each vehicle available at a dealership.
- It ensures that dealerships maintain adequate stock levels to meet customer demand.

Employees:

- Employees work at dealerships, fulfilling various roles such as sales representatives, service technicians, and administrative staff.
- They contribute to the day-to-day operations of the dealership, ensuring smooth functioning and customer satisfaction.

Services:

- Dealerships offer various services such as vehicle maintenance, repairs, and inspections.
- These services aim to keep customers' vehicles in optimal condition and ensure their safety and performance.

Parts:

- Dealerships stock various parts and accessories necessary for vehicle maintenance and repairs.
- These parts are used during service appointments to replace worn-out or damaged components.

Suppliers:

- Suppliers provide dealerships with parts and components necessary for vehicle maintenance and repairs.
- They play a crucial role in ensuring dealerships have access to high-quality parts to serve their customers effectively.

Salespeople:

- Salespeople assist customers in selecting and purchasing vehicles.
- They earn commissions based on the sales they facilitate, incentivizing them to provide excellent customer service.

PaymentMethods:

- Payment methods offer customers various options to pay for their vehicle purchases, including cash, credit/debit cards, financing, or leasing.

ServiceAppointments:

- Service appointments allow customers to schedule maintenance or repairs for their vehicles.
- They ensure timely servicing to maintain vehicle performance and safety.

Feedback:

- Customer feedback provides valuable insights into the quality of service provided by the dealership.
- Dealerships use this feedback to identify areas for improvement and enhance the overall customer experience.

SalesCommission:

- Sales commissions reward salespeople for their efforts in facilitating vehicle sales.
- They are typically calculated as a percentage of the sale amount, motivating sales staff to achieve higher sales volumes.

EmployeeRoles:

- Employee roles define the responsibilities and duties assigned to dealership staff.
- They ensure clear organization and delegation of tasks within the dealership hierarchy.
- This table provides a comprehensive overview of each table in the database schema, including all columns, their data types, constraints, and additional details as specified in the requirements.

Design Decision

1. **Primary Keys (PK):** Each table has a primary key that uniquely identifies each record within the table. Primary keys are essential for data integrity and to ensure that each entity instance is uniquely identifiable.
2. **Foreign Keys (FK):** Foreign keys establish relationships between tables by referencing the primary key of another table. They enforce referential integrity and ensure that data remains consistent across related tables.
3. **One-to-Many Relationships:** The ERD illustrates one-to-many relationships between entities using crow-foot notation. For example, one dealership can have multiple vehicles, employees, and transactions associated with it.
4. **Data Types:** The data types for each attribute are chosen based on the nature of the data they represent. For example, numerical data such as prices and quantities are represented using the NUMBER data type, while textual data such as names and addresses are represented using VARCHAR2.
5. **Normalization:** The database schema is designed to adhere to normalization principles to minimize data redundancy and dependency issues. This helps ensure data integrity and simplifies data maintenance and modification.
6. **Constraints:** Constraints such as NOT NULL, UNIQUE, and PRIMARY KEY are applied to ensure data consistency and integrity. These constraints prevent the insertion of null values, enforce uniqueness, and define primary keys, respectively.

7. Entity Relationships: Relationships between entities are carefully defined to accurately model the interactions and dependencies between different aspects of the dealership management system. This allows for efficient data retrieval and manipulation while maintaining data integrity.

Overall, these design decisions aim to create a robust and efficient database schema that effectively models the various entities and their relationships within the Automobile Dealership Management System.

Normalization

In the provided database schema for the Automobile Dealership Management System (DMS), several normalization techniques have been applied to ensure data integrity, minimize redundancy, and optimize data storage. Let's discuss the normalization levels achieved in this database:

First Normal Form (1NF):

All tables have atomic values in each column, meaning that each column contains only single, indivisible values. There are no repeating groups or arrays within any of the tables.

Second Normal Form (2NF):

Each non-key attribute is fully functionally dependent on the primary key.

For example:

In the Transactions table, attributes like transaction_date and amount_paid are functionally dependent on the transaction_id, which is the primary key.

In the ServiceAppointments table, attributes such as appointment_date are fully dependent on the appointment_id, which serves as the primary key.

Normalization Decisions and Achievements:

Decomposition into Smaller Tables:

Various tables such as Transactions, Inventory, ServiceAppointments, Feedback, SalesCommission, etc., have been created to store specific types of data separately. This decomposition reduces redundancy and improves data management.

Removal of Partial Dependencies:

Non-key attributes in each table are fully functionally dependent on the primary key, ensuring that there are no partial dependencies.

Elimination of Redundancy:

Redundant data has been minimized by breaking tables into smaller, more atomic units and establishing relationships between them. For example, rather than storing all information about a transaction in a single table, it is split between Transactions and Inventory tables, reducing redundancy and improving data integrity. Overall, normalization in the provided database schema ensures that the data is well-structured, efficient, and maintains integrity, which is crucial for the effective functioning of the Automobile Dealership Management System.

Conclusion

The completion of the data requirements and conceptual data modeling phases marks a significant milestone in the development of the Automobile Dealership Management System. Our team remains committed to delivering a robust and efficient database solution that addresses the needs and challenges faced by automotive industries, ultimately driving operational excellence and business growth.

**Minor changes to ERD and physical database design might be needed in case of any additional business requirement changes.*