DATABASE SYSTEMS
PROJECT
ITERATION-2:
DATA AND REQUIREMENT ANALYSIS OF THE DATABASE

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1. Entities and Their Definitions

    a. SHOP (Disjoint): A physical or a virtual place where customers can buy services or products.

      a.1. ONLINE SHOP (Inherits from **SHOP):** where e-commerce is done.

      a.2. SHOWROOM (Inherits from **SHOP):** physical shop that can only sell vehicles.

      a.3. REPAIR_SHOP (Inherits from **SHOP):** physical shop that can only provide services for vehicles.

    b. WORKER (Disjoint): people which work in the business.

      b.1. EMPLOYEE (Inherits from **WORKER) (Disjoint):** people that work in the shops.

        b1.1. FULL-TIME (Inherits from **EMPLOYEE):** employee that is always working fully in work hours.

        b1.2 PART-TIME (Inherits from **EMPLOYEE):** employee that is working partly not fully in work hours.

      b.2. MANAGER (Inherits from **WORKER) (Disjoint):** people that manage employees.

        b.2.1 GENERAL_MANAGER (Inherits from **MANAGER):** manages the department managers.

        b.2.2 DEPARTMENT_MANAGER (Inherits from **MANAGER):** manages the employees in a department.

    c. DEPARTMENT (Disjoint): branches that contain different employee groups.

      c.1 OFFICE (Inherits from **DEPARTMENT) (Disjoint):** employees that work via computer.

        c.1.1. E-COMMERCE (Inherits from **OFFICE):** employee work on e-commerce website.

        c.1.2 ACCOUNTING (Inherits from **OFFICE):** employees work on accounting.

        c.1.3 CUSTOMER_SERVICE (Inherits from **OFFICE):** employees that help " customers and answer calls.

c.2 REPAIR_INSTALLATION (Inherits from **DEPARTMENT):** employees that work on repair of vehicles and installation of accessories on vehicles.

d. PRODUCT (Disjoint): goods that can be sold (physical).

d.1 HEATING_COOLING (Inherits from **PRODUCT):** heating and cooling systems' products.

d.2 AWNING (Inherits from **PRODUCT):** awning products.

d.3 VEHICLE (Inherits from **PRODUCT) (Disjoint):** different types of vehicles which are being sold.

d.3.1 TRAILER (Inherits from **VEHICLE):** trail vehicle.

d.3.2 MOTOCARAVAN (Inherits from **VEHICLE):** motocaran vehicle.

d.3.3 CAMPER (Inherits from **VEHICLE):** camper vehicle.

d.4 TOWBAR (Inherits from **PRODUCT):** towbar products.

d.5 FURNITURE_MULTIMEDIA (Inherits from **PRODUCT):** furniture and multimedia products.

d.6 OUTDOOR (Inherits from **PRODUCT):** outdoor products.

d.7 ENERGY_SYSTEM (Inherits from **PRODUCT):** energy system products.

d.8 KITCHEN (Inherits from **PRODUCT):** kitchen products.

d.9 SANITATION (Inherits from **PRODUCT):** sanitation products.

e. SERVICE (Disjoint): an action that can be bought.

e.1 REPAIR (Inherits from **SERVICE):** repair services on vehicles.

e.2 INSTALLATION (Inherits from **SERVICE):** accessories installations.

f. CUSTOMER (Disjoint): person that buys a product or service.

f.1 INDIVIDUAL CUSTOMER: a type of customer which is a person.

f.2 DEALER: a type of customer which is a company.

g. TRANSACTION (Disjoint): customer payments to the company

g.1 CASH (Inherits from **TRANSACTION):** a payment method by using physical money.

g.2 CREDIT_CARD (Inherits from **TRANSACTION):** a payment method by using credit card.

g.3 BANK_TRANSFER (Inherits from **TRANSACTION):** a payment method by using bank accounts of customers and the company.

h. SUPPLIER (Disjoint): they are supply products and vehicles to the company.

i.1 REGULAR_SUPPLIER (Inherits from **SUPPLIER):** a type of supplier which supplies the products to the company regularly.

i.2 IRREGULAR_SUPPLIER (Inherits from **SUPPLIER):** a type of supplier which sometimes supplies the products to the company.

2. Business Process and Their Definitions

Process: **PRODUCT ADD-UPDATE-DELETE**

Definition: Admins will be able to add new products, update the existing product i.e. changing price and delete existing products.

Process: **TRANSACTION**

Definition: The transaction processes are holding the information regarding the money, service or product flow between the shops and customers or suppliers . This process involves selecting products or services that customers or suppliers buy or sell, processing payment details and updating the system records (e.g., stock levels, order history).

Process**: SUPPLIER MANAGEMENT**

Definition: The supplier process manages the interaction between the system and its suppliers. This includes adding new suppliers, updating supplier details, and deleting suppliers who are no longer active. Suppliers provide products to maintain inventory levels or fulfill specific needs.

Process: **REGISTRATION**

Definition: The registration process allows new users (customers, suppliers, or admins) to be added within the system.

Process: **SHOPPING**

Definition: The shopping process enables customers to browse, select, and purchase products or services through the system. It includes searching for products, adding items to a cart, and proceeding to checkout to complete the purchase. This process also involves calculating totals, applying discounts, and verifying stock availability. The departments that concerned with it will record the transactions and calculate the gains and expenses on each month.

Process: **SERVICE**

Definition: The service process involves repairing and installation services to customers. It includes service scheduling, execution, and follow-up. Customers can request, book, or manage services offered by the system, while the system ensures that services are properly tracked and recorded.

Process: **MANAGEMENT**

Definition: The "Management" process involves overseeing departments and employees to ensure functioning. This includes managing employees, monitoring departments. Managers makes strategic and operational decisions.

3. Business Rules and Constraints

a. Business Rules

- A worker should be a manager or an employee.

- A manager should be a general manager or department manager.

- An employee should be a full-time or part-time employee.

- An employee cannot work in more than one department.

- A department can have at least one employee.

- A department is managed by exactly one department manager.

- A department manager manages exactly one department.

- An employee has at least one department manager that he is reporting to.

- Department managers may have many employees.

- A department manager managed by exactly one general manager

- A general manager may manage many department managers

- A department should be an office or repair & installation department.

- An office sub department should be an e-commerce, accounting or customer services department.

- A department should be a part of exactly one shop.

- A supplier should be a regular or an irregular supplier.

- A shop has at least one department.

- A shop should be an online shop, showroom or a repair shop.

- A customer should be an individual or a dealer.

- A shop sells to at least one customer.

- A shop is supplied by at least one supplier.

- A supplier may supply many shops.

- A customer may buy from many shops.

- A transaction should be a cash, credit card or bank transfer transaction.

- A transaction cannot be exist without a customer, supplier or shop.

- A transaction may made by only one customer.

- A customer may make many transactions.

- A supplier may make many transactions.

- A transaction may made by only one supplier.

- A transaction may made by only one shop.

- A shop may make many transactions.

- A cash transaction should be taken by only one employee.

- An employee may take many cash transactions.

- A service should be a repair or installation service.

- A service may be inside many transactions.

- A transaction may contain many services.

- A service is given by exactly one repair shop.

- A repair shop gives at least one service.

- An installation installs at least one product.

- A product may installed in many installations.

- A product should be a heating-cooling, awning, vehicle, towbar, furniture-multimedia, outdoor, energy system, kitchen or sanitation product.

- A vehicle should be a trailer, motocaravan or a camper.

- A product may be inside many transactions.

- A transaction may contain many products.

- A product is sold by at least one shop.

- A shop sells at least one product.

b. Constraints

- Each entity must have a unique identifier.

- Workers cannot be under 18 years of age.

- Workers' salaries cannot be lower than ₺17.002.

- Workers' gender must be male or female.

- Workers' full name, birthdate, phone, address, salary and start date cannot be null.

- Part-time employees' working times cannot be null.

- Maximum annual leave days for a full-time employee is 30 days.

- Maximum annual leave days for a manager is 60 days.

- Departments' total employee count cannot be null and it should be greater than zero.

- Repair & Installation departments' tools inventory cannot be null.

- Shops' phone numbers cannot be null.

- Showrooms and repair shops must have an address so it cannot be null.

- Showrooms' vehicle capacity cannot be null.

- All repair shops' attributes cannot be null.

- Customers should have a shipping address and email.

- Individual customers should have a full name.

- Dealers should have a company name and tax id number.

- Transaction status can only be incoming or outgoing.

- Transaction currency type is by default Turkish liras.

- Transactions' total amount, tax amount and transaction status cannot be null.

- Cash, credit card and bank transfer transactions' all fields cannot be null.

- Suppliers' supplier name, supplier representative, primary contact number and business address cannot be null.

- Regular suppliers' all fields cannot be null.

- Irregular suppliers' all fields can be null.

- Services' service name and service price must be stated cannot be null.

- Services' service price cannot be lower than ₺500.

- Repair services' tools used field can be null.

- Products' product name, stock, description, price and brand cannot be null.

- Products' stock and price should be greater or equal to zero.

- Heating and cooling products' type and capacity cannot be null.

- Awnings' size should be given as centimeters and should be stated.

- Towbars' max towing capacity and suitable cars should be stated.

- Furniture and multimedia products' types cannot be null.

- Energy systems products' all fields must be stated.

- Outdoor products' type cannot be null.

- Kitchen products' type and size should be stated.

- Sanitation products' type, size and portability should be stated.

- Vehicles' all fields cannot be null.

- Trailers' trailer type cannot be null.

4. Other Functional & Non-functional Business Requirements

1. **Do not store the same data more than once:** In this system, data is not stored unnecessarily more than once. Relevant data is supplied from the most appropriate place when needed. Thus, performance gains are achieved in terms of both speed and memory. These can be provided using primary key-foreign key relationship, inheritance etc.