

CSE 3055 Database Systems Project Step 2

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Students

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Overview

A comprehensive database for the customer, Renkli Metal Sanayi ve Ticaret A.Ş., dealing with a wide range of non-ferrous metal products will be designed for the project, aiding the company regarding the matters of logistics. The name of the project is "Database Assisted Metal Manufacturing Company Logistics". Information about the customers, the materials, the orders and the transportation is the main focus of the database. Following details further explains the entities, business processes, rules, constraints, functional and non-functional requirements. An ER diagram is attached at the end of the report.

Entities

Company:

Definition: The entity representing the metal firm or logistics company managing the transportation and delivery of metal products.

Description: Contains information about the company, such as its name, address and contact details.

Product:

Definition: Represents the items or goods (metal products in this case) that the company deals with, sells, or transports.

Description: Includes details about the products, such as product name, code, description, unit price, dimensions, and weight.

Depot:

Definition: Refers to the storage or distribution centers where products are temporarily held before being dispatched for delivery.

Description: Contains information about depot location, and the product list stored in each depot.

Order:

Definition: Represents a request made by a customer for the purchase and delivery of specific products.

Description: Includes details such as order ID, customer ID, order date, delivery address, list of ordered products, list of quantities, total cost, and status (e.g., pending, fulfilled).

Customer:

Definition: Represents individuals or entities who place orders for products from the company.

Description: Contains customer information like name, contact details, and delivery address.

Shipment:

Definition: Refers to the transportation process of products from the company or depot to the customer's designated delivery location.

Description: Includes details about shipments, such as shipment ID, shipment date, arrival locations, associated order IDs, and tracking information.

Truck:

Definition: Represents the vehicles used for transporting products from depots to customers' locations.

Description: Contains information about trucks, including vehicle number, weight and length capacity and possibly routes assigned for deliveries.

Business Processes

Logistics:

Explanation: Logistics encompasses the overall planning, execution, and management of the transportation and delivery of products to customers.

Steps Involved:

Route Planning: Determining the most efficient routes for product delivery considering distance, traffic, and time constraints.

Truck Allocation: Assigning trucks based on the volume and location of orders, ensuring optimal load distribution.

Functional Requirements

Order Management:

- Customers submit orders containing a list of requested products.

Calculation and Prioritization:

- Prioritize orders based on total weight or length.
- Sort orders according to the customer's state.
- Group orders by proximity and selected predetermined route, and considering the distance between customers.
- Optimize truck loading to maximize efficiency while adhering to truck weight and length limits.

Order Separation and Loading:

- Load orders onto trucks according to the predefined criteria.

Transportation Routing:

- Select from already generated optimal routes considering the distance between customers and the company's depot.

Truck Limit Consideration:

- Ensure adherence to truck capacity limits (weight, length) when loading orders.
- Optimize truck loading to utilize maximum capacity without exceeding limits.

Non-functional Requirements

Security:

Access Control: Implement 2FA (Two Factor Authentication) API services to protect user account safety and prevent data theft.

Usability:

User Interface (UI): Ensure an intuitive and user-friendly interface for ease of navigation and interaction for both internal users (staff) and external users (customers).

Accessibility: Make sure the system is accessible to users with disabilities, adhering to accessibility standards and guidelines.

Training and Documentation: Provide comprehensive documentation and training materials for system users to effectively utilize the system's functionalities.

Business Rules & Constraints

Truck Load Restrictions:

- Trucks cannot be dispatched if the load exceeds predefined length or weight limits.
- Over-sized or over-weighted loads will not be transported using the trucks.

Delivery Schedule:

- Delivery days are fixed as Tuesdays and Thursdays.
- If orders on the same route fill a truck, the truck can be dispatched the next day for delivery.
- If the truck is not filled, it must wait for either additional orders to fill it or wait for the next delivery day.
- Due to Saturday being a full working day at the company, rules are valid on Saturday too.

Order Processing:

- Orders that are given by customers are prepared on the same day and ready to deliver tomorrow.
- Since Sunday is a holiday, orders that are given on Saturday are ready at monday.
- Due to the company being closed on Sundays, orders are not accepted.

Dispatch Conditions:

- If the truck's capacity is not filled, the vehicle cannot be dispatched on days outside of the regular delivery schedule (Tuesday and Thursday).
- However, if the truck capacity is filled regardless of the delivery schedule, it can be dispatched immediately.

Distance Limitation:

- Trucks have a maximum daily travel distance of 100 km .
- Route planning considers the daily limit for trucks when scheduling deliveries and optimizing routes.

ER Diagram

