

Grocery Store Chain

Data and Applications Project Phase - 1

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INTRODUCTION TO THE MINI-WORLD

The miniworld for this database design is of a grocery store chain resembling Ratnadeep. The database will help manage inventory, customers, suppliers, employees and other staff. This database will allow the owners to efficiently store and monitor all the records. This database will help in storing large amounts of data pertaining to the grocery store easily.

The mini world chosen for this project is a GROCERY STORE. This is a database for a store chain of 4 stores. All information pertaining to the functioning of the stores is stored in the database.. Some examples include the employees working in all the store branches, the financial record of each store, suppliers for inventory.

PURPOSE

This database focuses on the managerial aspect of a grocery store, and maintaining financials including salaries of employees, payments to suppliers, and payments from the customers.

USERS OF THE DATABASE

Users of the database can be anybody, including suppliers, customers, and employees. This database may be used to view the inventory of the grocery store and locate items in the store, shifts for different employees, and for suppliers to restock the items running low.

APPLICATIONS OF THE DATABASE

Our database will help in analysing the monthly sales from a particular store and the sales of the product so that the store orders and stores the products accordingly.

DATABASE REQUIREMENTS

Assumptions:

- A customer only visits and purchases from a single store.
- A store has a single owner.
- Every Employee is supervised by the supervisor (Manager) of the store.
- Every supplier supplies to a single store the items of a particular company.
- There are 4 stores in our chain.

Strong Entity Types:

Store

Location of the grocery store, being considered.

- Store ID [Primary Key]
- Location/Address
- Store Name
- Owner Name [Foreign Key]*referenced to Owner Name attribute of the Owner Entity*
- Opening and Closing Time
- Peak Hours

Transaction

Details of the transactions happening in a grocery store.

- Transaction ID [Primary key]
- Time of purchase
- Items purchased [Multivalued Attribute]
- Store ID
- Payment Details

Customer

Details of the customer

- Customer ID [Primary Key Attribute]
- Store ID
- Customer Name [Composite Attribute]
 - First Name
 - Last Name
- Phone No.
- DOB
- Age [derived from DOB]

Owner

A person who owns a store of the grocery chain

- Owner ID* [Key Attribute]
- Name [Composite Attribute]
 - First Name
 - Last name
- Store ID [Foreign Key]*referenced to Store ID in STORE entity type*
- Rent

Supplier

The suppliers of the grocery store who supply and restock products which are running low.

- Supplier ID* [Primary Key]
- Name [Composite Attribute]
 - First Name
 - Last name
- Store ID
- Phone No.
- Address
- Company
- Payment
- Time of Supply

Product (Entity with 2 key attributes)

- Product ID* [Primary Key]
- Store ID* [Primary Key]
- Name
- Company
- Manufacturing Date
- Time for which it remains fresh
- Expiry Date [Derived from the Manufacturing Date and Time it remains fresh]
- Cost Price
- Selling Price
- Number of items bought (by the customer)

Weak Entity Types:

Equipment (Store ID)

- Store ID (Foreign Key)
- Item ID [Partial Key]
- Item Name
- Cost of Maintenance
- Warranty
- Product Life Cycle

Finance (Store ID)

- Store ID (Foreign Key)
- Season
- Expenditure [Derived from Total Salaries + Supplier Fees + Misc]
- Income

Inventory (Store Id + Product ID)

- STORE Id (Foreign Key)
- Product ID (Foreign Key)
- Number of available items

Relationship Types:

1. Each EMPLOYEE (Supervisee) is **supervised by** an EMPLOYEE(Supervisor)

[Recursive Relation]

- a. N : 1 cardinality ratio (Many to One Relation)
 - b. Binary relationship Degree = 2
 - c. Each EMPLOYEE, who is in the supervisee role in a store is supervised by another EMPLOYEE, who is in the supervisor role.
 - d. (min, max) - (1,1) for SUPERVISEE and (1,N) for SUPERVISOR.
2. A CUSTOMER **buys** PRODUCT
 - a. 1 : N cardinality ratio (One to Many Relation)
 - b. Binary relationship degree = 2
 - c. This relationship connects the CUSTOMER entity to the PRODUCT entity, i.e. a CUSTOMER can buy 1 or many PRODUCTS
 - d. (min, max) - (0,1) for CUSTOMER and (1,N) for PRODUCT.
 3. A SUPPLIER **supplies** a PRODUCT
 - a. 1 : N cardinality ratio (One to Many Relation)
 - b. Binary relationship degree = 2 for a product
 - c. The SUPPLIER can supply 1 or more than 1 PRODUCTS.
 - d. (min, max) - (1,N) for PRODUCT and (1,1) for SUPPLIER.

4. A PRODUCT is **updated** in the INVENTORY
 - a. N : 1 cardinality ratio (Many to One Relation)
 - b. Binary relationship degree = 2
 - c. Many PRODUCTS can be updated in the INVENTORY to maintain a track of PRODUCTS that would need restocking.
 - d. (min, max) - (1,1) for PRODUCT and (1,N) for INVENTORY.

5. An EMPLOYEE **helps** a CUSTOMER
 - a. 1 : N cardinality ratio (One to Many Relation)
 - b. Binary relationship degree = 2
 - c. An EMPLOYEE can help CUSTOMERS in finding different items, provide directions etc.
 - d. (min, max) - (1,1) for both CUSTOMER and EMPLOYEE side.

6. A CUSTOMER **performs** a TRANSACTION
 - a. 1 : 1 cardinality ratio (One to One Relation)
 - b. Binary relationship degree = 2
 - c. A CUSTOMER performs a TRANSACTION when buying items from the store.
 - d. (min, max) - (1,N) for CUSTOMER, (1,1) for TRANSACTION.

7. STORE **purchase** EQUIPMENT
 - a. 1 : N cardinality ratio (One to Many Relation)
 - b. Binary relationship Degree = 2
 - c. To run a store, a store must buy all the necessary equipment like fridges, trolleys, billing machines, etc.
 - d. (min, max) - (1, 1) for STORE and (1, 4) for EQUIPMENT.

Degree > 3 Relationship:

Run (Degree 4)

EMPLOYEE, SUPPLIER and OWNER **run** a STORE.

- a. EMPLOYEE and STORE cardinality ratio is N : 1
- b. SUPPLIER and STORE cardinality ratio is N : 1
- c. OWNER and STORE cardinality ratio is 1 : 1
- d. EMPLOYEEs work at one STORE, which is owned by an OWNER and SUPPLIERs supply products at a STORE. Therefore, EMPLOYEE, SUPPLIER, and OWNER **run** a STORE
- e. (min, max) - (1, 1) for EMPLOYEE and (1, N) for STORE
- f. (min, max) - (1,N) for STORE and (1, 4) for SUPPLIER
- g. (min,max) - (1,1) for OWNER and (1,1) for STORE

FUNCTIONAL REQUIREMENTS

Modifications:

Insert

- Insert details of new customers, employees, and suppliers as and when new transactions are made.
- Insert details of inventory as and when new products are supplied by the supplier.

Delete

- Delete details of the employee when they resign or get transferred.
- Delete details of the store if it fails to perform as per requirements.
- Delete details of a supplier if a contract is broken or is expired.
- Delete the equipment details if the equipment gets damaged.
- Delete the grocery item from the inventory if it gets expired.

Update

- Update the details of the employee, store, owner, supplier if there is any change in information.
- Update the details of the finance as and when new transactions are made, or equipment are purchased, or salaries are paid every month.
- Update the inventory when the new set of groceries are supplied.

Retrievals:

Selection

- Get details of the employees working in the store, their supervisor details to address any concerns, customer info to contact them about the deals in the store etc.
- Get details of the available number of products present in a store.

Search

- Search and output results for queries like number of customers over a certain age, most appealing products to consumers, check for availability of products needed, etc.

Aggregate

- Maximum number of products sold from a store.
- Average number of transactions per day of a store.
- Calculate profit/loss percentage from the cost price and selling price of a product

Analysis

- Analyse the number and specifications of the products needed to be ordered, based on demand and cost.
- Analyse monthly sales of a store.

Summary

Our mini-world is a grocery store, with many stores having many more employees, owners as well as their respective suppliers. They have a list of products in each store and their inventory checks their availability. The transactions that happen here all are accounted for under the finances of the store.