

DATA AND APPLICATIONS

PROJECT

PHASE I

MINI WORLD

ON THE

DRUG CARTEL

LOS POLLOS HERMANOS

INTRODUCTION

Our mini-world is the drug syndicate, Los Pollos Hermanos. The kingpin, who is a very smart and fastidious person, supervises all the operations going on daily in his organization so that he's always informed of all the happenings in his trade.

The organization's trade is spread across various regions of the country, which in turn consist of multiple territories. There are departments of employees who oversee each of these different operations.

PURPOSE

Having a database for this event would serve various purposes, such as:

- **Removes Data Redundancy and Inconsistency**

Programmers create different files over some time, which are likely to have different structures, be written in various programming languages, and have duplicate information present.

For example, if a person enters data about the same drug on different systems, there will be multiple instances of the same data. This redundancy leads to higher storage, access cost, and time taken by the program

- **Reduce Difficulty in Accessing Data**

This database would aid in easier access to any data related to the drug. For example, consider the situation where the database administrator needs to find out the purity of a drug. With a database, all information can be accessed using certain basic queries without the need for any manual work or having to write any new programs. It would be a very efficient process.

- **Security Problems**

Not every user of the database system should be able to access all the data.

For example, in the organization, an accountant only needs to access the part of the database that has the financial information. They do not need access to information about transaction records. But, this would be a hassle in a file processing system since application programs are added to the former in an ad hoc manner, so enforcing such security constraints is difficult.

APPLICATIONS

This database management system stores information about the Organization, Producers, Buyers, etc. All of this information can be used by the organization to analyze its profits/losses. They will know exactly who sold which drug at what location at what price. This will help them pinpoint the reason behind their profits/losses and work to maximize the profits and minimize the losses. This information can be used to attract potential buyers by showing them their consistency in the purity of drugs and the satisfaction of previous buyers.

DATABASE REQUIREMENTS

Note: Unless specified, all attributes are required

I. STRONG ENTITIES

Note: * indicates that the attribute is the primary key

1. Organization Details Summary of daily activities of the organization

- a. * Date
 - *Type: Date*
- b. Kingpin
 - *Type: Varchar*
 - *Composite attribute, consisting of First Name and Last Name*
- c. Number of employees
 - *Type: Integer*
- d. Net Revenue
 - *Type: Money*
 - *Currency: Dollars*
- e. Net Spending
 - *Type: Money*
 - *Currency: Dollars*
- f. Net Profit
 - *Type: Money*
 - *Currency: Dollar*
 - *If a loss has been incurred, the attribute will have a negative value.*
 - *Derived from `Net Revenue - Net Spending`*

2. Organization Identifying Details of the organization

- a. * Organization Name
 - *Type: Varchar*
- b. Kingpin
 - *Type: Varchar*
 - *Composite attribute, consisting of First Name and Last Name*
- c. Number of employees
 - *Type: Integer*
- d. Current Worth
 - *Type: Money*
 - *Currency: Dollar*

3. Region An area that the organization operates in

- a. * Region ID
 - *Type: Varchar*
- b. Region Name
 - *Type: Varchar*
- c. Region Manager Employee ID
 - *Type: Varchar*
 - *Can only be an existing employee*

4. Producers A producer produces the drugs and provides them to the organization

- a. * Producer ID
 - *Type: Varchar*
- b. Producer Name
 - *Type: Varchar*
 - *Composite attribute, consisting of First Name and Last Name*
- c. Email ID
 - *Type: Varchar*
 - *Candidate Key*
 - *Alternate Key*
 - *Super Key*
- d. Phone Number
 - *Type: Integer*
 - *10 numbers only*
 - *Multivalued attribute (a person can have multiple phone numbers)*
- e. Total Amount Paid
 - *Type: Money*
 - *Currency: Dollar*

- *The total amount of money paid to the producer for the drug*

Here, Producer ID and Email ID are candidate keys and super keys.

5. Customer

A customer buys the drugs from the organization

- * Customer ID
 - *Type: Varchar*
- Customer Name
 - *Type: Varchar*
 - *Composite attribute, consisting of First Name and Last Name*
- Phone Number
 - *Type: Integer*
 - *10 numbers only*
 - *Not required*
 - *Multivalued attribute (a person can have multiple phone numbers)*
- Amount Received
 - *Type: Money*
 - *Currency: Dollar*
 - *The total amount of money paid by the buyer for the drug*

6. Drug (Transferable Entity) The drug

that is bought and sold

- * Drug ID
 - *Type: Varchar*
- Drug Name
 - *Type: Varchar*
- Purity (in percentage)
 - *Type: Float*
 - *Up to 3 decimal places*
- Total Packages Bought
 - *Type: Integer*
 - *Total packages of the drug bought from the producer*
- Total packages sold
 - *Type: Integer*
 - *Total packages of the drug sold to the buyer*
- Weight of a package
 - *Type: Float*
 - *Unit: Gram*
 - *Weight of a package for a particular type of drug*

7. Employee (Super Class) An employee

works for the organization

- a. * Employee ID
 - *Type: Varchar*
- b. Employee Name
 - *Type: Varchar*
 - *Composite attribute, consisting of First Name and Last Name*
- c. Phone Number
 - *Type: Integer*
 - *10 numbers only*
 - *Multivalued attribute (a person can have multiple phone numbers)*
- d. Start Date
 - *Type: Date*
- e. End Date
 - *Type: Date*
 - *Not required*
- f. Date Of Birth
 - *Type: Date*
- g. Age
 - *Type: Integer*
 - *Derived attribute from `Date of Birth - Current Date`*
- h. Salary
 - *Type: Money*
 - *Currency: Dollar*
- i. Region ID
 - *Type: Varchar*
 - *Foreign Key from Region entity*

Subclasses of Employee: Will inherit all the attributes of the superclass, which is Employee

6.1. Soldier

A soldier is responsible for carrying out assassinations, kidnappings, thefts, and defending their territory from rival organizations.

- a. Number of assassinations
 - *Type: Integer*

6.2. Accountant An accountant is in charge of the money flow

- a. Amount of money laundered
 - *Type: Money*
 - *Currency: Dollar*
 - *The total amount of money laundered by the accountant*

6.3. Supplier

A supplier buys the drugs from the producer and supplies them to the lieutenants.

a. Number of Packages Supplied

- *Type: Integer*

6.4. Lieutenants

The territory manager oversees all the operations taking place in the territory. He also divides and distributes the packages that he gets from the supplier to the falcons of the territory.

a. Number of Packages Distributed

- *Type: Integer*

b. Territory ID

- *Type: Varchar*
- *Foreign key from an entity*

6.5. Falcons

Falcons are the eyes and ears of the organization that work on the streets, selling drugs to buyers. Each Falcon works in a specific territory.

a. Number of Packages Sold

- *Type: Integer*

b. Territory ID

- *Type: Varchar*
- *Foreign key from Territory*

6.6. Regional Manager

a. Net Profit - *Type:*

Money

- *Currency: Dollar - If a loss has been incurred, the attribute will have a negative value.*

II. WEAK ENTITIES

- 1. Territories** Territories are sub-parts of a region. Multiple territories exist in a region.

- a. Territory ID
 - *Type: Varchar - Partial Key*
 - *Foreign Keys:*
 - a. *Region ID (a territory will be unique only within a region)*
 - b. *Lieutenant ID (a territory will be unique to a lieutenant)*
- b. Total Number of Packages Sold
 - *Type: Integer*
 - *Total number of packages sold in a territory*
- c. Number of Employees
 - *Type: Integer*
- d. Address
 - *Type: Varchar - Composite Attribute consisting of Street Number, Area Code, Region Name*

2. Money Laundering Front

The shell companies are used to launder the drug money in order to legitimize it.

- a. Front Name
 - *Type: Varchar*
 - *Partial Key*
 - *Foreign Key: Region ID (a front will be unique to a region)*
- b. Amount Laundered
 - *Type: Money - Currency: Dollar*

III. RELATIONSHIP ATTRIBUTES

1. Sell

The information related to the Producer selling drugs to the Supplier

- a. Date
 - *Type: Date*
- b. Number of packages sold
 - *Type: Integer*

2. Supply

The information related to Supplier supplying drugs to the Lieutenant

- a. Date
 - *Type: Date*
- b. Number of packages supplied
 - *Type: Integer*

3. Distribute

The information related to Lieutenant distributing drugs to the Falcon

- a. Date
 - *Type: Date*
 - b. Number of packages distributed - *Type: Integer*
4. **Buy** The information related to Customers buying drugs from the Falcon
- a. Date
 - *Type: Date*
 - b. Number of packages bought - *Type: Integer*

RELATIONSHIPS

I. Binary Relationship

1. **Falcon** REPORTS to the **Lieutenant** -
Cardinality ratio -: **N:1**
2. **Soldier** REPORTS to the **Lieutenant**
- Cardinality ratio -: **N:1**
3. **Accountant** REPORTS to the **Lieutenant** - Cardinality
ratio -: **N:1**
4. **Employee** WORKS for an **Organization**
a. Cardinality ratio -: **N:1**
5. **Organization** OWNS a **Money Laundering Front** -
Cardinality ratio -: **1:N**
6. **Organization** OPERATES in a **Region** -
Cardinality ratio -: **1:N**
7. **Money Laundering Front** is HANDLED by the **Accountant** -
Cardinality ratio -: **1:N**
8. **Region** CONTAINS a **Territory** -
Cardinality ratio -: **1:N**

II. Ternary Relationship

1. **Producer** SELLS **Drug** to the **Supplier** -
Cardinality ratio -: **N:M:L**

2. **Suppliers** SUPPLIES **Drug** to the **Lieutenant** -
Cardinality ratio -: **N:M:L**
3. **Lieutenant** DISTRIBUTE **Drug** to the **Falcon** -
Cardinality ratio -: **N:M:L**

III. **N>3 RELATIONSHIP**

1. **Customer** BUYS **Drug** from a **Falcon** in a **Territory**
- Cardinality ratio -: **N:M:L:K**

FUNCTIONAL REQUIREMENTS

I. **MODIFICATIONS**

1. **Insert**

- a. Region entry with all attributes when the region is acquired
- b. Money Laundering front entry when the new front is created
- c. Employee entry on employment

2. **Delete**

- a. Delete Employee entry if an employee decided to quit
- b. Delete Money Laundering Front entry if the front is dissolved

3. **Update**

- a. Buyer information is updated after payment
- b. Producer information is updated after receiving packages
- c. The organization is updated at the end of each day

II. **RETRIEVALS**

1. **Selection**

- b. List all attributes of Drugs whose purity is greater than 90%
- c. List all attributes of Employees who are accountants

2. **Projection**

- a. List managers of all Money laundering Fronts whose Amount Laundered \geq 50000
- b. List the total number of employees working in a particular territory

3. Aggregate

- a. The total amount of packages sold in a day in a particular territory
- b. Net profit acquired at the end of the year.

4. Search

- a. List all Phone numbers that have "69420" in them
- b. List names of Drugs whose name starts with 'L'

5. Analysis

- a. An average number of packages sold in a region where the Region Manager started working after a particular date.
- b. The total amount of profit a lieutenant generates in a week.
- c. Growth or decline of the number of buyers in a territory over the months