

DnA Project Phase 1

GMV

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Introduction to the mini-world

Technology is all about helping humans make their daily life activities simple. But, some people are less fortunate when it comes to technology making their daily lives easy. Hence, we came up with the idea of creating a DBMS that helps small scale cottage industries to keep better track of their business records by digitising their business data. Our main intention is to scrape the old hand-book which is used by these small scale industries, in which they generally maintain a hand-written copy of their business transactions.

Database requirements (various entities)

❖ **Suppliers:-**

The supplier entity is responsible for the procurement of the raw materials for making the finished products.

Attributes:-

- Name (Composite Attribute)
- Address (Composite Attribute)
- Phone Number (Key Attribute)
- Materials Supplied (multi-valued attribute)
- Supply Frequency

Relationships:-

- Supplier(1,S) Supplies (1,R)Raw Materials to (1,D)Departments (3 -ary relationship)
 - S suppliers supply to one department for one raw material
 - 1 supplier supply to D department for one raw material
 - 1 supplier supply to one department for R raw materials

❖ **Raw Material:- (Weak Entity)**

The Raw Material entity represents the goods sold by suppliers to the company for making the products.

It is a weak entity as its existence depends on suppliers and departments.

Attributes:-

- Name
- Quantity

Relationships:-

- Supplier(1,S) Supplies (1,R)Raw Materials to (1,D)Departments (3 -ary relationship)
 - S suppliers supply to one department for one raw material
 - 1 supplier supply to D department for one raw material
 - 1 supplier supply to one department for R raw materials

❖ Employee:-

The employee entity represents the people who work in the company and produce the finished products.

Subclasses(distinct total participation specialization):-

➤ Full Time Employees:-

Attributes:-

- Name (Composite Attribute)
- Employee ID & Aadhaar number (Composite Key Attribute)
- Address (Composite Attribute)
- Phone Number
- Salary
- DOB
- Age (Derived Attribute)

➤ Part Time Employees:-

Attributes:-

- Name (Composite Attribute)
- Employee ID & Aadhaar number (Composite Key Attribute)
- Address (Composite Attribute)
- Phone Number
- Hourly Wage
- DOB
- Contract duration
- Age (Derived Attribute)

Relationships:-

- Employee(1,1) Work in a (1,N)Department
 - Every employee must work in a department
 - No employee can work in more than one department
 - Department can have N employees
- Employee(1,1) Manages (1,1)Department
 - An employee can manage utmost one department.
 - Department can be managed by utmost one employee

❖ Department:-

The department entity is responsible organising the employees, making the products and selling it.

Attributes:-

- Name (Composite Attribute)
- Department ID (Key Attribute)
- Manager
- No. of people working in it

Relationships:-

- Supplier(1,S) Supplies (1,R)Raw Materials to (1,D)Departments (3 -ary relationship)
 - S suppliers supply to one department for one raw material
 - 1 supplier supply to D department for one raw material
 - 1 supplier supply to one department for R raw materials
- Employees(1,1) Work in a (1,N)Department
 - Every Department must have at least one employee.
 - An Employee can Work in only one Department
- Employee(1,1) Manages (1,1)Department
 - A Department can have only one employee as a manager.
 - An Employee can manage only one Department

❖ Product:- (Weak Entity)

The Product entity represents the final goods sold by the company.

It is a Weak entity as it cant exist without the Department , Dealer and Supplier entity.

Attributes:-

- Name (Composite Attribute)
- Price
- Quantity

Relationships:-

- Employees(1,E) in Departments(1,D) makes Products(1,P) (3 -ary relationship)
- Products(1,P) are sold to (1,DA)Dealers by (1,DP)Departments supplied by (1,S)Supplier(4 -ary relationship)

❖ Dealers:-

The dealer entity buys the products from the department and sells it.

Attributes:-

- Name
- Address (Composite Attribute)
- Phone Number (Key Attribute)
- Products needed (Multi valued Attributes)
- Commission

Relationships:-

- Products(1,P) are sold to (1,DA)Dealers by (1,DP)Departments supplied by (1,S)Supplier(4 -ary relationship)

Functional requirements

❖ Suppliers:

Retrieval:

- Show suppliers: Gives a complete list of all the details of all the suppliers.
- Search supplier type: Enables users to search for suppliers based on what product is supplied by them.
- Average frequency: Calculates the average supply frequency of all suppliers.
- Most frequent: Shows the details of the supplier(s) who is/are the most frequent.
- Least frequent: Shows the details of the supplier(s) who is/are the least frequent.
- Search supplier name: Runs a partial text match and shows the details of all the suppliers whose names partial match with input string.

Modification:

- Add supplier: Adds a new supplier.

| Attribute | Domain |
|-----------|----------|
| Name | Not null |
| Address | Not null |

| | |
|--------------------|---|
| Phone number | Must be a 10 number string |
| Materials supplied | Not null |
| Supply frequency | Has to be a number > 0 (frequency in days) |

- Update supplier x name: Enables to update “name” attribute of supplier with phone number “x”.
- Update supplier x address: Enables to update “address” attribute of supplier with phone number “x”.
- Update supplier x phone number: Enables to update “phone number” attribute of supplier with phone number “x”.
- Update supplier x material: Enables to update “Materials supplied” attribute of supplier with phone number “x”.
- Update supplier x frequency: Enables to update “supply frequency” attribute of supplier with phone number “x”.
- Delete supplier x: Deletes data about a supplier whose phone number is “x”

❖ Raw Material:

Retrieval:

- Show material: Shows the complete list of all raw materials
- Search material x: Shows all raw materials with quantity greater than x.
- Max material: Shows the raw material with the highest quantity.
- Min material: Shows the raw material with the lowest quantity.
- Material show x: Runs a partial text match and shows the details of all the raw materials whose names partial match with input string.

Analysis:-

- Find Supplier:- An analysis function to retrieve data regarding what supplier had supplied a certain raw material by using functions like join and data from both supplier and Raw Material entity.

Modification:

- Add raw material: Adds a new raw material

| | |
|-----------|------------------|
| Attribute | Domain |
| Name | Not null |
| Quantity | A number $x > 0$ |

- Update material x name: Allows updating of “name” attribute of a raw material named “x”.
- Update material x quantity: Allows updating of “quantity” attribute of a raw material named “x”.
- Delete material x: Allows deleting data of raw material with name “x”.

❖ **Employee:**

(These functions are for the class “employee”, although there are 2 subclasses)

Retrieval:

- Show employee: Shows the complete list of all employees.
- Search employee x: Shows the list of all employees whose age is greater than x.
- Average employee: Shows the average age of all employees.
- Employee search x: Runs a partial text match and shows the details of all the employees whose names partial match with input string.

Modification:

- Add employee: Adds a new employee.

| Attribute | Domain |
|--------------------|--|
| Name | Not null |
| Employee ID | 10 numbered string |
| Aadhar number | 12 character string |
| Address | Not null |
| Phone number | 10 numbered string |
| Salary/hourly wage | Not null |
| DOB | 8 numbered string in the format ddmmyyyy |
| Contract duration | 4 numbered string in the format mmyy (Only for subclass “part-time employee”) 0000(Only for full time employees) |

- Update employee x name: Allows updating “name” attribute of an employee with employee ID “x”.
- Update employee x ID: Allows updating “employee ID” attribute of an employee with employee ID “x”.

- Update employee x aadhar: Allows updating “Aadhar number” attribute of an employee with employee ID “x”.
- Update employee x Address: Allows updating “Address” attribute of an employee with employee ID “x”.
- Update employee x phone number: Allows updating “phone number” attribute of an employee with employee ID “x”.
- Update employee x salary: Allows updating “salary/hourly wage” attribute of an employee with employee ID “x”.
- Update employee x dob: Allows updating “DOB” attribute of an employee with employee ID “x”.
- Update employee x contract: Allows updating “contract duration” attribute of an employee with employee ID “x”. (only for subclass “part-time employee”)
- Delete employee x: Deletes data of an employee with employee ID “x”.

❖ Department:

Retrieval:

- Show Department: Gives a complete list of all the details of all the Department.
- Search Department type: Enables users to search for departments based on what product they make.
- Search manager name: Runs a partial text match and shows the details of all the departments whose manager names partial match with input string.
- Maximum department: Allows users to search for the department with the highest number of employees.
- Minimum department: Allows users to search for the department with the lowest number of employees.
- Average department: Shows the average number of employees per department.

Analysis:-

- Find Sales:- An analysis function to retrieve data regarding the total sales made by each department by using functions like join and data from both department and product entity.

Modification:

- Add Department: Adds a new Department.

| Attribute | Domain |
|---------------|----------|
| Name | Not null |
| Department ID | Not null |
| Manager name | Not null |

| | |
|--|----------------------------|
| Number of people working in the department | A number greater than zero |
|--|----------------------------|

- Update Department x name: Enables to update “name” attribute of department with department ID “x”.
- Update Department x ID: Enables to update “Department ID” attribute of department with department ID “x”.
- Update Department x manager: Enables to update “manager name” attribute of department with department ID “x”.
- Update Department x people: Enables to update “Number of people working in department” attribute of department with department ID “x”.
- Delete Department x: Deletes data about a Department whose department ID is “x”

❖ Product:

Retrieval:

- Show products: Shows the entire list of products available.
- Show products less x: Shows the list of products with quantity less than “x”.
- Search product x: Runs a partial text match and shows the details of all the products whose names partial match with input string.
- Total product: Shows the price of all the products combined.
- Average product: Shows the average price of all the products combined.

Modification:

- Add product: Adds a new product.

| Attribute | Domain |
|-----------|----------------------------|
| Name | Not null |
| Price | A number greater than zero |
| Quantity | A non-negative number |

- Update product x name: Updates “name” attribute of a product named “x”.
- Update product x price: Updates “price” attribute of a product named “x”.
- Update product x quantity: Updates “quantity” attribute of a product named “x”.
- Delete product x: Deletes data related to a product named “x”.

❖ Dealers:

Retrieval:

- Show dealers: Shows the complete list of dealers in the database.
- Search dealer x: Runs a partial text match and shows the details of all the dealers whose phone numbers partial match with input string.
- Show dealer product x: Shows all dealers who need product “x”.
- Average commission: Shows the average % commission taken by all the dealers.

Modification:

- Add dealer: Adds a new dealer

| Attribute | Domain |
|-----------------|-------------------------|
| Name | Not null |
| Address | Not null |
| Phone number | 10 numbered string |
| Products needed | Not null |
| Commission | Value greater than zero |

- Update dealer x name: Updates “name” attribute of dealer with phone number “x”.
- Update dealer x address: Updates “address” attribute of dealer with phone number “x”.
- Update dealer x phone number: Updates “phone number” attribute of dealer with phone number “x”.
- Update dealer x product: Updates “products needed” attribute of dealer with phone number “x”.
- Update dealer x commission: Updates “commission” attribute of dealer with phone number “x”.
- Delete dealer x: Deletes details of dealer with phone number “x”.