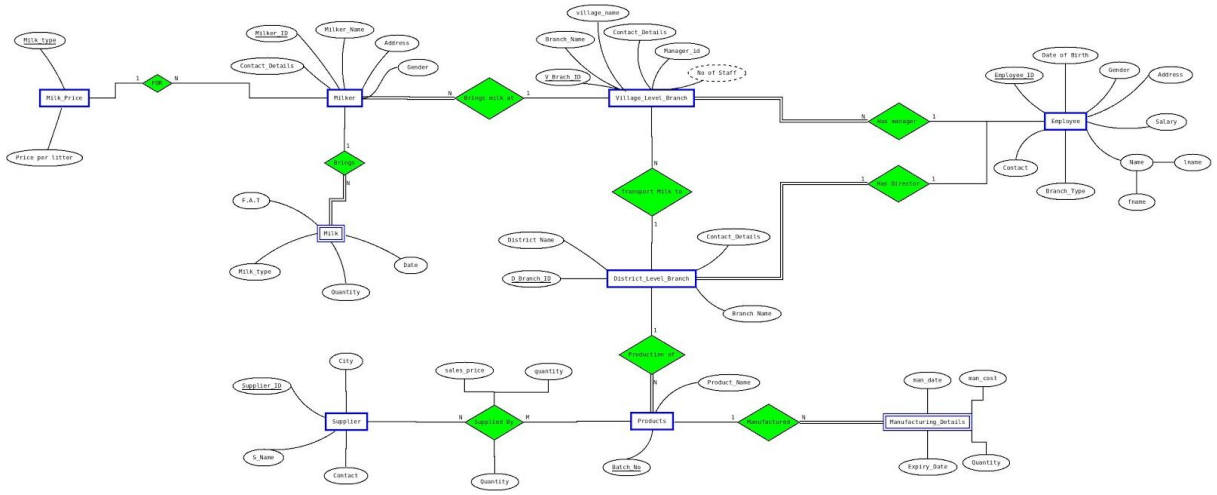
ERD



Group : 3.9

Project Name : Dairy Database System

Functional dependencies :

Milker_ID → Milker_Name
Milker_ID → Milker_Contact_details
Milker_ID → Address
Milker_ID → Milk_Type
Milker_ID → Village_Branch_ID
Milk_Type → Price

{Milker_ID, Date} → Quantity
{Milker_Type, Date} → FAT
{Milker_Type, Date} → Milk_Type

Village_Branch_ID → District_Branch_ID
Village_Branch_ID → Village_Branch_Name
Village_Branch_ID → Village_Contained_Details

Village_Branch_ID → Village_Name
Village_Branch_ID → Maneger_ID

District_Branch_ID → Branch_Name
District_Branch_ID → Contact_Details
District_Branch_ID → Address
District_Branch_ID → Director_ID

Supplier_ID → Supply_Name
Supplier_ID → City
Supplier_ID → Contact

{Batch_id , supplierID} →sales_price
{Batch_id , supplierID} →Quantity
{Batch_id , supplierID} →supply_date

Batch_id → Product_name
Batch_id → D_branch_id
Batch_id → manufacturing_date
Batch_id → manufacturing_cost
Batch_id → Expiry_date

Employee_ID → fname
Employee_ID → lname
Employee_ID → Date of Birth
Employee_ID → Gender
Employee_ID → contact_details
Employee_ID → Address
Employee_ID → Branch_Type
Employee_ID → Salary

Canonical Cover:

Milker_ID → { Milker_ID ,Milker_Name, Milker_Contact_details, Village_Branch_ID,District_Branch_ID,Village_Branch_Name, Village_Contained_Details,Address }

{Milk_Type, Milker_ID, Date} → Quantity

{Milk_Type, Milker_Type, Date} → FAT

Village_Branch_ID → { Village_Branch_ID, District_Branch_ID, Village_Branch_Name, Village_Contained_Details, Address, Branch_Name , Contact_Details,Maneger_ID,Director_ID }

District_Branch_ID → {District_Branch_ID, Branch_Name , Contact_Details,Address ,Director_ID}

Batch_ID → {Product_Name, Expiry_Date, Manufacturing_Date, District_Branch_ID}

{Batch_ID,Manufacturing_Date} → Quantity

{Batch_ID, Supplier_ID} → {Product_Name, Batch_ID, Supplier_ID, Supply_Date}

{Batch_id} → {Product_name, D_branch_id, manufacturing_date, manufacturing_cost , Expiry_date}

{Supplier_ID} → {Supplier_ID, Supply_Name, City, Contact}

{Employee_ID} → {fname, lname, Date of Birth, Gender, contact_details, Address, Branch_Type, Salary

{Batch_id , supplierID} →{sales_price , Quantity, supply_date
}

Universal Relation of Dairy system :

R(Milker_ID, Milker_Name,Milker_Contact_details,Address,Milk_Type, Village_Branch_ID,Price,date_collection_milk,Quantity,FAT,Village_Branch_ID,District_Branch_ID,Village_Branch_Name,Village_Contained_Details,Village_Name,Branch_Name,Contact_Details,address_Dbranch,Batch_ID,Product_Name,Expiry_Date,Manufacturing_Date,Quantity,Supply_Date,Supplier_ID,Supply_Name,sup_City,sup_Contact,Employee_ID,fname, lname, EMP_Date_of_Birth, Gender,EMPcontact_details, EMP_Address, EMP_Branch_Type , EMP_Salary)

This relation is not BCNF because there is no Candidate key and redundancy is there so, we can reduce this relation as below which is BCNF.

Relation Decompose In BCNF as Below:

Milker(Milker_ID,Milker_Name,contact_details,Address,Milk_type,Village_Branch_ID)

FDs: Milker_ID → Milker_Name
Milker_ID → Milker_Contact_details
Milker_ID → Address
Milker_ID → Milk_Type
Milker_ID → Village_Branch_ID.
Candidate Key: Milker_ID.
So, all FDs satisfies BCNF conditions.Hence,given relation is in **BCNF.**

village_Branch(V_branch_ID,Branch_Name,village_name,contact_details,Manager_ID,D_Branch_ID)

FDs: Village_Branch_ID → District_Branch_ID
Village_Branch_ID → Village_Branch_Name
Village_Branch_ID → Village_Contained_Details
Village_Branch_ID → Village_Name
Village_Branch_ID → Maneger_ID

Candidate Key: Village_Branch_ID.
So, all FDs satisfies BCNF conditions.Hence,given relation is in **BCNF.**

milk(Date,milker_id,FAT milk_type, quantity of milk)

FDs:

{ Milker_ID, Date} → Quantity

{Milker_ID, Date} → FAT

{Milker_ID, Date} → Milk_Type

Candidate Key:{Milker_ID, Date}

So, given FD satisfies BCNF conditions.Hence,given relation is in **BCNF.**

milk_price(milk_type,price_per_L)

FDs:

Milk_type -> Price_per_L

Candidate Key : Milk_type

So, given FD satisfies BCNF conditions.Hence,given relation is in **BCNF.**

District_level_branch(D_branch_ID,Branch_name,Contact_details,address,Director_ID)

FDs:

District_Branch_ID → Branch_Name

District_Branch_ID → Contact_Details

District_Branch_ID → Address

District_Branch_ID → Director_ID

Candidate key : District_Branch_ID .

So, given FD satisfies BCNF conditions.Hence,given relation is in **BCNF.**

Product(Branch_ID,Product_name,D_branch_ID)

FDs:

Batch_ID → District_Branch_ID

Batch_ID → Product_Name

Candidate Key : Batch_ID.

So, given FD satisfies BCNF conditions.Hence,given relation is in **BCNF.**

Employee(Employee_ID, DOB, Gender, Contact_details, address, Fname, Lname, Branch_ID, salary)
FDs:

Employee_ID → fname
Employee_ID → lname
Employee_ID → Date of Birth
Employee_ID → Gender
Employee_ID → contact_details
Employee_ID → Address
Employee_ID → Branch_Type
Employee_ID → Salary

Candidate Key: Employee_ID
So, given FD satisfies BCNF conditions.Hence,given relation is in **BCNF.**

Supplier(Supplier_ID, S_name, City, contact)
FDs:

Supplier_ID → Supply_Name
Supplier_ID → City
Supplier_ID → Contact

Candidate Key : Supplier_ID

So, given FD satisfies BCNF conditions.Hence, given relation is in **BCNF.**

product_supply_details(Batch_ID, supplier_ID, sale_price, Quantity, supply_date)
FDs:

{Batch_ID, supplier_ID} → sale_price
{Batch_ID, supplier_ID} → Quantity
{Batch_ID, supplier_ID} → supply_date

Candidate Key: {Batch_ID, supplier_ID}

So, all FDs satisfies BCNF conditions.Hence,given relation is in **BCNF.**

Manufacturing_Details(Manufacturing_date,Manufacturing_cost,quantity, Expiry_date,Batch_ID)

FDs: Batch_ID → Expiry_Date
Batch_ID → Manufacturing_Date
Batch_ID → Manufacturing_cost.
{Batch_ID,Manufacturing_Date} → Quantity

Candidate Key: {Batch_ID,Manufacturing_Date}.
So,here given relation is **NOT BCNF.** Hence we have to decompose this relation.
R1(Batch_Id, Manufacturing_cost,Expiry_date)
R2(Batch_ID, Manufacturing_Date, Quantity)
So, Now both the relation are in **BCNF.**

Supplier(Supplier_ID,S_Name,City,Contact)

FDs: Supplier_ID → S_Name
Supplier_ID → City
Supplier_ID → Contact_Details

Candidate Key: {Supplier_ID}

So, all FDs satisfies BCNF conditions.Hence,given relation is in **BCNF.**