UNIVERSITY OF KALYANI.

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING.

Designing a DBMS for Factory and Inventory Management.

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➢ Problem Scenario of a Fertilizer Factory Management:

A fertilizer factory named LCD Fertilizers LTD needs a Production and inventory management system to track its fertilizers, raw materials, suppliers, production batches, and storage locations. The system should allow efficient tracking of inventory, facilitate purchase orders, and enable analysis of stock levels and production history.

▪ Requirements:

- The system should store information about different types of fertilizers produced by the factory. Each fertilizer should have a unique ID, name, composition, and usage instructions.
- The factory purchases raw materials from various suppliers. Supplier information such as ID, name, address, and contact details should be stored in the database.
- The system should track employees working in the factory. The employees may be permanent or contractual. Employee information should include ID, name, position, and contact details.
- Each production batch of fertilizer should have a unique ID, production date, and quantity produced.
- The storage locations within the factory should be recorded in the database. It should have corresponding product id, quantity and capacity of the storage location within the factory. From the factory storage the product will be sent to different inventory locations. The system should track inventory details such as unique ID, location and capacity.
- Raw materials used in fertilizer production should be tracked. Each raw material should have a unique ID, name, supplier information, and quantity in stock.
- The database should store customer information for those who purchase fertilizers. Each customer should have a unique ID, name, address, and contact details.

▪ Tasks:

- Draw the ER-Diagram for the above problem.
- Convert the ER-Diagram to Relational Data Model.
- Using query language implement the Database.

➢ Introduction:

We are going to make a database on managing all inventories and factory productions of a fertilizer company named **'LCD Fertilizers LTD'.** The Production and Inventory Management System for 'LCD Fertilizers LTD' is a crucial project aimed at efficiently tracking fertilizers, raw materials, suppliers, production batches, and inventory locations. This system will enable effective inventory management, streamline purchase orders, and provide valuable insights through analysis of stock levels and production history.

To successfully meet the requirements of the system, an ER (Entity-Relationship) diagram will be created, followed by the conversion of the ER diagram into a Relational Data Model. The Relational Data Model will serve as the foundation for implementing the database using a query language.

The system will begin by storing information about the various types of fertilizers produced by the factory. Each fertilizer will be uniquely identified and have attributes such as name, composition, and usage instructions. This will allow for easy categorization and management of fertilizers.

The factory procures raw materials from multiple suppliers, necessitating the storage of supplier information in the database. Details like supplier ID, name, address, contact information and supplied raw materials will be recorded to establish effective supplier management.

The system will also keep track of the employees working in the factory, including both permanent and contractual staff. Employee information such as ID, name, position and contact details will be stored to manage the workforce efficiently.

Each production batch of fertilizer will be assigned a unique ID, and information about its production date and quantity produced will be recorded. This data will enable monitoring of production batches and facilitate analysis of production trends.

Inventory locations will be documented in the database, along with corresponding product IDs, quantities, and storage capacity. These will be tracked to ensure effective inventory management and organization.

Raw materials used in fertilizer production will also be stored in factory warehouse and carefully monitored. Each raw material will have a unique ID, name, supplier information, and quantity in stock. This information will allow for efficient tracking of raw material availability and enable timely procurement.

Lastly, customer information will be stored in the database to keep a record of customers who purchase fertilizers. Each customer will have a unique ID, name, address, and contact details, facilitating effective customer management and communication. Each customer will be allocated a distinct order ID and according to that order ID the order will be placed and delivered.

➢ LCD Fertilizers Database Information:

1. Product information
    - Product Identification Number (Pid)
    - Product Name (Pname)
      Uses of the product (Uses)

2. Production Batch information
    - Production Batch Identification Number (PBid)
    - Date of the Production (Date)
    - Quantity of product produced in a batch (quantity)

3. Supplier information
    - Supplier Identification Number (Sid)
    - Supplier Name (Sname)
    - Supplier Phone Number (ph_no)
    - Supplier Address (address)
4. Employees information
    - Employee identification number (Eid)
    - Employee Name (Ename)
    - Position of the employee (Position)
    - Employee Phone number (ph_no)
    - Employee Address (address)
    - Salary of the employee (salary)
    - Permanent or Temporary (Status)
    - Joining Date (Date)

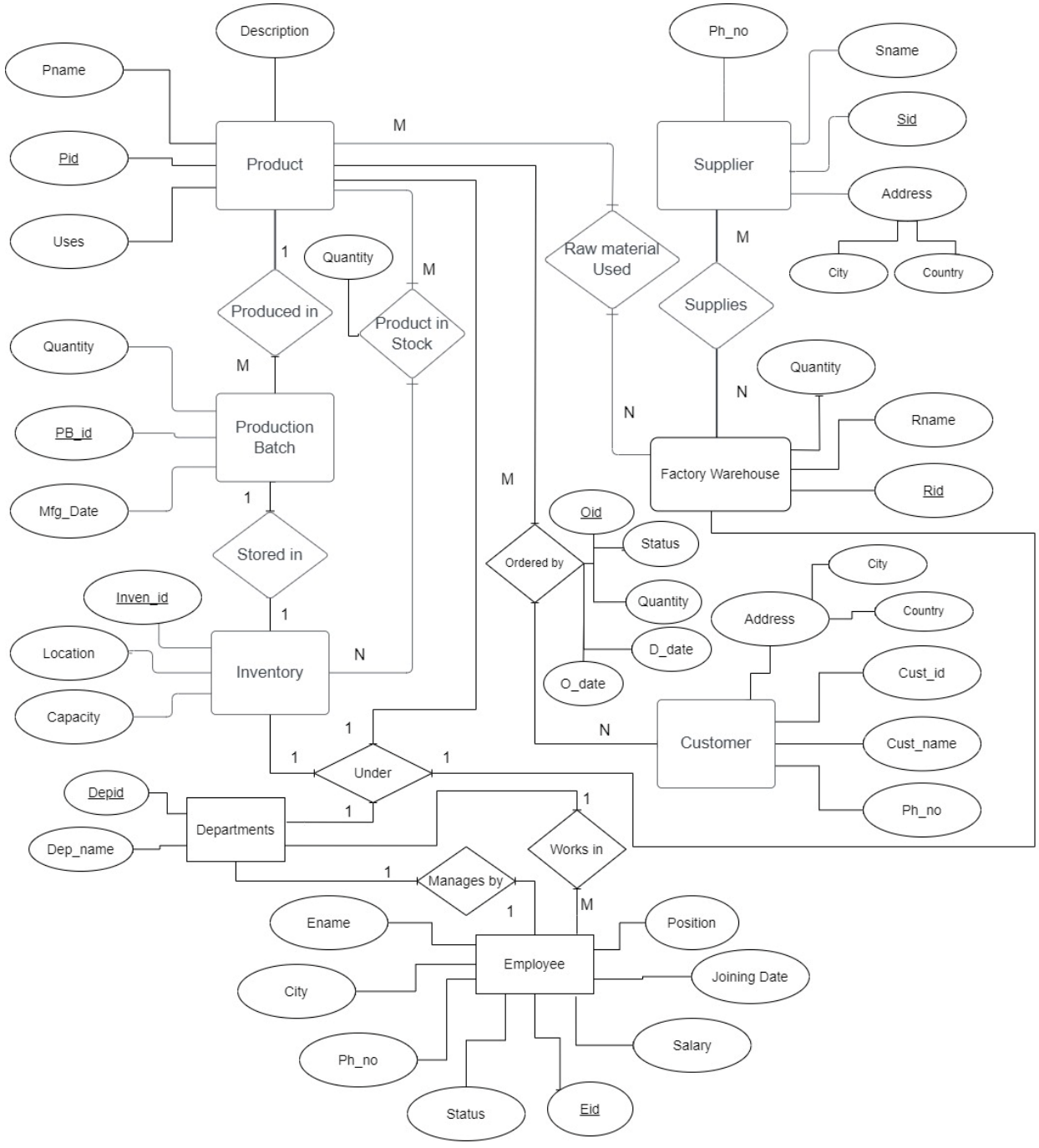
5. Inventory Information
    - Inventory identification number (Invenid)
    - Inventory Location (location)
    - Total Capacity of the Inventory (capacity)

6. Factory Warehouse Information
    - Quantity of each raw material stored (quantity)
    - Raw material Identification Number (Rid)
    - Raw material Name (Rname)

7. Customer Information
    - Customer identification number (Cust_id)
    - Customer Name (Cust_name)
    - Customer Ph no. (ph_no)
    - Customer Address (address)

8. Department Information
    - Department identification number (Cust_id)
    - Department Name (Cust_name)

➢ ER- Diagram of LCD Fertilizers Database:



➢ ERD to RDBMS of LCD Fertilizers Database:

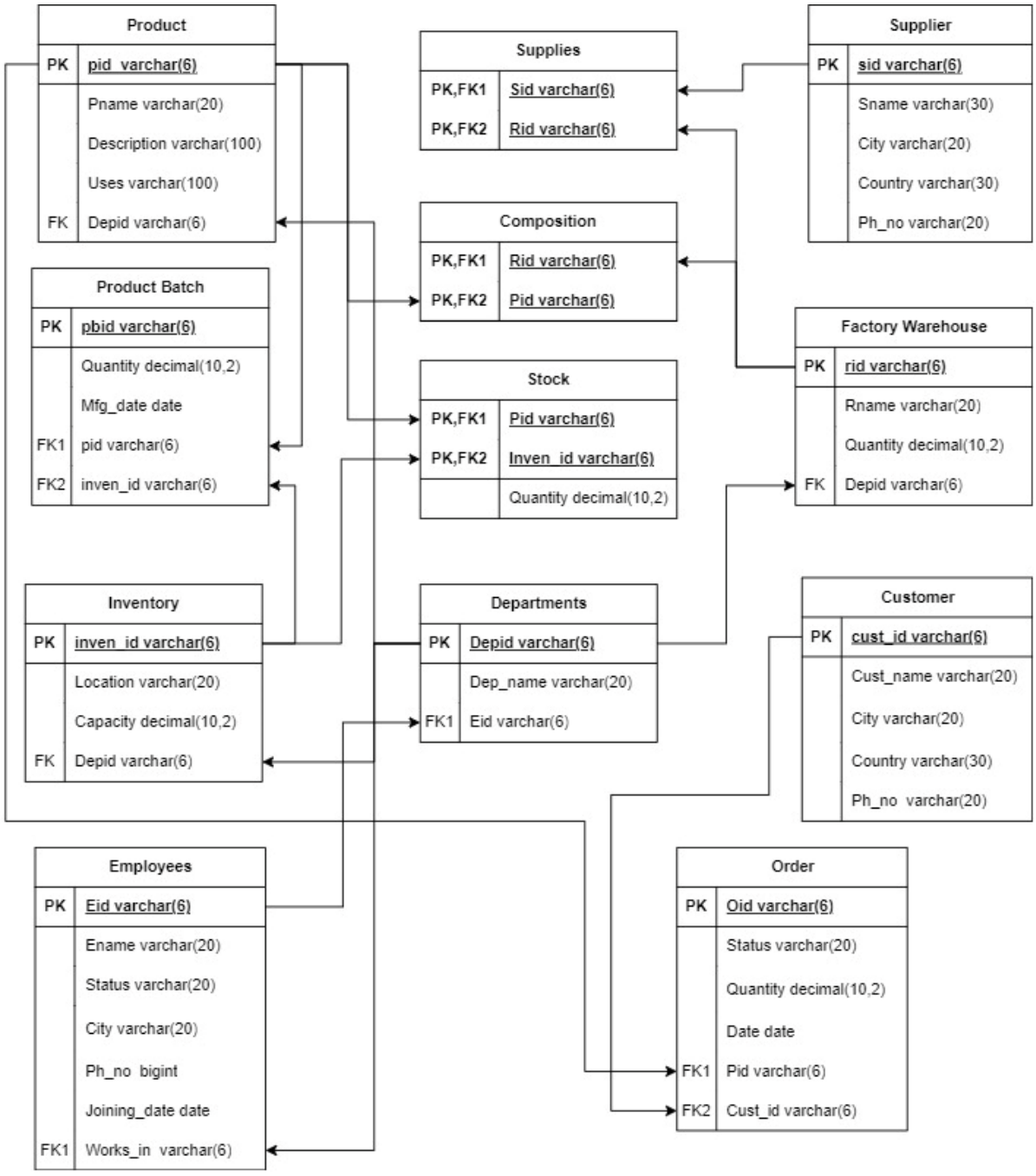
- Strong entity sets must be converted to tables.
    1. Product(Pid, Pname, Description, Uses)
    2. Product Batch(PBid, Quantity, Mfg_Date)
    3. Inventory (Invenid, Location, Capacity)
    4. Factory Warehouse (Rid, Rname, Quantity)
    5. Supplier (Sid, Sname, City, Country , Ph_no)
    6. Customer (Cust_id, Cust_name, City, Country, Ph_no)
    7. Employees (Eid, Ename, Status, Salary, City, Ph_no, Joining Date)
    8. Departments (Depid, Dep_name)

- Many to many relationship (M:N) must be converted into table with the primary keys of both the entity sets as the attribute and they together form a primary key in the table (individually both of them are foreign key in the table).
    1. Product(Pid, Pname, Description, Uses)
    2. Product Batch(PBid, Quantity, Mfg_Date)
    3. Inventory (Invenid, Location, Capacity)
    4. Factory Warehouse (Rid, Rname, Quantity)
    5. Supplier (Sid, Sname, City, Country, Ph_no)
    6. Customer (Cust_id, Cust_name, City, Country, Ph_no)
    7. Employees (Eid, Ename, Status, Salary, City, Ph_no, Joining Date)
    8. Departments (Depid, Dep_name)
    9. Supplies (Sid, Rid)
    10. Stock (Pid, Invenid, Quantity)
    11. Composition (Rid, Pid)
    12. Orders (Oid, Status, Quantity, O_date, D_date, Pid, Cust_id)

- One to many(1:M) and many to one (M:1) relationship sets do not converted into table, but primary key of one side entity set must be copied to many side entity set.
    1. Product(Pid, Pname, Description, Uses)
    2. Product Batch(PBid, Quantity, Mfg_Date, Pid)
    3. Inventory (Invenid, Location, Capacity)
    4. Factory Warehouse (Rid, Rname, Quantity)
    5. Supplier (Sid, Sname, City, Country, Ph_no)
    6. Customer (Cust_id, Cust_name, City, Country, Ph_no)
    7. Employees (Eid, Ename, Status, Salary, City, Ph_no, Joining Date, Works_in)
    8. Departments (Depid, Dep_name)
    9. Supplies (Sid, Rid)
    10. Stock (Pid, Invenid, Quantity)
    11. Composition (Rid, Pid)
    12. Orders (Oid, Status, Quantity, O_date, D_date, Pid, Cust_id)

- One to one relationship sets do not convert into tables but the primary of one of the related entity set must be copied to another side entity set.
    1. Product(Pid, Pname, Description, Uses, Depid)
    2. Product Batch(PBid, Quantity, Mfg_Date, Pid , Invenid)
    3. Inventory (Invenid, Location, Capacity, Depid)
    4. Factory Warehouse (Rid, Rname, Quantity, Depid)
    5. Supplier (Sid, Sname, City, Country, Ph_no)
    6. Customer (Cust_id, Cust_name, City, Country, Ph_no)
    7. Employees (Eid, Ename, Status, Salary, City, Ph_no, Joining Date, Works_in)
    8. Departments (Depid, Dep_name, Eid)
    9. Supplies (Sid, Rid)
    10. Stock (Pid, Invenid, Quantity)
    11. Composition (Rid, Pid)
    12. Orders (Oid, Status, Quantity, O_date, D_date, Pid, Cust_id)

➢ Mapping of Relational Model for LCD Fertilizers Database:



➢ Implementation of LCD Fertilizers Database:

```
create database lcd_fertilizers;
use lcd_fertilizers;

create table Departments(
        depid varchar(6) primary key,
        dep_name varchar(20));

create table Product(
        pid varchar(6) primary key,
        pname varchar(20),
        description varchar(100),
        uses varchar(100),
        depid varchar(6) default 'dep001',
        foreign key(depid) references Departments(depid));

create table Inventory(
        inven_id varchar(6) primary key,
        location varchar(20),
        capacity decimal(10,2),
        depid varchar(6) default 'dep004',
        foreign key(depid) references Departments(depid));

create table Factory_warehouse(
        rid varchar(6) primary key,
        rname varchar(20),
        quantity decimal(10,2),
        depid varchar(6) default 'dep005',
        foreign key(depid) references Departments(depid));

create table Supplier(
        sid varchar(6) primary key,
        sname varchar(30),
        city varchar(20),
        country varchar(20),
        ph_no varchar(20));

create table Customer(
        cust_id varchar(6) primary key,
        cust_name varchar(20),
        city varchar(20),
        country varchar(20),
        ph_no varchar(20));

create table Product_batch(
        pbid varchar(6) primary key,
        quantity decimal(10,2),
```

```
        mfg_date date,
        pid varchar(6),
        inven_id varchar(6),
        foreign key(pid) references Product(pid),
        foreign key(inven_id) references Inventory(inven_id));

create table Composition(
        pid varchar(6),
        rid varchar(6),
        foreign key(pid) references Product(pid),
        foreign key(rid) references Factory_warehouse(rid),
        primary key(pid,rid));

create table Supplies(
        sid varchar(6),
        rid varchar(6),
        foreign key(sid) references Supplier(sid),
        foreign key(rid) references Factory_warehouse(rid),
        primary key(sid,rid));

create table Stock(
        inven_id varchar(6),
        pid varchar(6),
        quantity decimal(10,2),
        foreign key(inven_id) references Inventory(inven_id),
        foreign key(pid) references Product(pid),
        primary key(inven_id,pid));

create table Orders(
        oid varchar(6) primary key,
        cust_id varchar(6),
        pid varchar(6),
        quantity decimal(10,2),
        status varchar(20) default 'Pending',
        o_date date,
        d_date date,
        foreign key(cust_id) references Customer(cust_id),
        foreign key(pid) references Product(pid));

create table Employees(
        eid varchar(6) primary key,
        ename varchar(20),
        works_in varchar(6),
        status varchar(20),
        joinig_date date,
        salary decimal(10,2),
        city varchar(20),
        ph_no bigint,
        foreign key(works_in) references Departments(depid));
```

```
--      Insert data into tables --
insert into Departments values
        ('dep001','Production'),
        ('dep002','HR'),
        ('dep003','Marketing'),
        ('dep004','Inventory'),
        ('dep005','Factory_warehouse'),
        ('dep006','R&D'),
        ('dep007','Accounting'),
        ('dep008','Logistics'),
        ('dep009','Workers');
select * from Departments;
```

depid	dep_name
dep001	Production
dep002	HR
dep003	Marketing
dep004	Inventory
dep005	Factory_warehouse
dep006	R&D
dep007	Accounting
dep008	Logistics
dep009	Workers

```
insert into Employees values
        ('Emp001','Abhijit','dep008','p','2022-07-07', 25000,'Purulia', 9932220491),
        ('Emp002','Abhishek','dep008','c','2022-09-11', 15000,'Siliguri', 9032120492),
        ('Emp003','Abir','dep002','P','2022-05-14', 20000,'Nabadwip', 9934420493),
        ('Emp004','Akshay','dep003','P','2022-07-11', 20000,'Bankura', 9935420474),
        ('Emp005','Ammrisha','dep004','P','2022-10-22', 20000,'Kolkata', 8735420275),
        ('Emp006','Ananya','dep002','P','2022-05-25', 20000,'Asansol', 9935420666),
        ('Emp007','Aritra','dep005','P','2022-04-10', 30000,'Siliguri', 9749942066),
        ('Emp008','Arnab','dep006','P','2022-02-13', 22000,'Kolkata', 9749781066),
        ('Emp009','Biman','dep009','c','2022-05-02', 15000,'Purulia', 9888942066),
        ('Emp010','Bipul','dep001','p','2022-11-02', 20000, 'Cooch Behar', 9788942022),
        ('Emp011','Biswanath','dep008','c','2022-11-25', 15000, ‘Kolkata’, 8894206695),
        ('Emp012','Chaitanya','dep003','c','2022-09-20', 15000,'Kolkata', 8942074466),
        ('Emp013','Chitra','dep009','c','2022-11-17', 15000,'Kolkata', 9288972066),
        ('Emp014','Dibyendu','dep009','c','2022-12-02', 15000,'Kolkata', 8288972055),
        ('Emp015','Farhan','dep009','c','2022-12-05', 15000,'Kalyani', 9288972066),
        ('Emp016','Gagandeep','dep004','p','2022-09-15', 20000,'Patna', 8897206692),
        ('Emp017','Gargi','dep005','p','2022-04-12', 22000,’Siliguri’, 9288972066),
        ('Emp018','Jagriti','dep003','p','2022-01-24', 25000,'Kolkata', 9288974166),
        ('Emp019','Jiban','dep007','p','2022-11-04', 28000,'Bankura', 9778972566),
        ('Emp020','Joy','dep001','p','2022-10-22', 18000,'Malda', 9725972066),
        ('Emp021','Jayanta','dep007','p','2022-11-07', 22000,'Siliguri', 9211972066),
        ('Emp022','Kushal','dep004','p','2022-01-12', 22000,'Siliguri', 9211972406),
        ('Emp023','Kingshuk','dep009','c','2022-09-02', 15000,'Kalyani', 9212972066),
        ('Emp024','Manish','dep001','p','2022-01-17', 20000,'Kolkata', 9214972066),
        ('Emp025','Maya','dep001','p','2022-09-11', 18000,'Medinipur', 9231242066),
        ('Emp026','Mouli','dep006','p','2022-02-21', 20000,'Kalyani', 9213172066),
        ('Emp027','Maitri','dep003','p','2022-03-05', 22000,'Siliguri', 8955197206),
        ('Emp028','Nabanita','dep009','p','2022-11-20', 25000,'Medinipur', 9214472066),
```

```
('Emp029','Noorain','dep001','p','2022-08-01', 18000,'Kalyani', 9255197206),
('Emp030','Preetha','dep006','p','2022-01-28', 28000,'Kolkata', 9256777173),
('Emp031','Pritoma','dep004','c','2022-12-07', 15000,'Kalyani', 9251955566),
('Emp032','Rajesh','dep009','p','2022-04-23', 20000,'Bankura', 9256777212),
('Emp033','Ramsankar','dep009','p','2022-11-24', 20000,'Medinipur', 925611173),
('Emp034','Sanjay','dep009','p','2022-08-27', 20000,'Kolkata', 9256123173),
('Emp035','Santosh','dep001','p','2022-05-18', 20000,'Purulia', 9156892173),
('Emp036','Souvik','dep008','p','2022-06-15', 20000,'Kolkata', 9356997173),
('Emp037','Suman','dep004','p','2022-11-15', 20000,'Kolkata', 9356774173),
('Emp038','Supriyo','dep001','p','2022-08-12', 18000,'Bankura', 9956552173),
('Emp039','Soumita','dep002','p','2022-12-17', 28000,'Siliguri', 9720177173),
('Emp040','Torsa','dep004','p','2022-06-08', 28000,'Siliguri', 9056722171),
('Emp041','Utsab','dep001','p','2022-01-29', 30000,'Malda', 9256007170);
```

select * from Employees;

eid	ename	works_in	status	joining date	salary	city	ph_no
Emp001	Abhijit	dep008	p	2022-07-07	25000.00	Purulia	9932220491
Emp002	Abhishek	dep008	c	2022-09-11	15000.00	Siliguri	9032120492
Emp003	Abir	dep002	p	2022-05-14	20000.00	Nabadwip	9934420493
Emp004	Akshay	dep003	p	2022-07-11	20000.00	Bankura	9935420474
Emp005	Ammrisha	dep004	p	2022-10-22	20000.00	Kolkata	8735420275
Emp006	Ananya	dep002	p	2022-05-25	20000.00	Asansol	9935420666
Emp007	Aritra	dep005	p	2022-04-10	30000.00	Siliguri	9749942066
Emp008	Arnab	dep006	p	2022-02-13	22000.00	Kolkata	9749781066
Emp009	Biman	dep009	c	2022-05-02	15000.00	Purulia	9888942066
Emp010	Bipul	dep001	p	2022-11-02	20000.00	Cooch Behar	9788942022
Emp011	Biswanath	dep008	c	2022-11-25	15000.00	Kolkata	8942074466
Emp012	Chaitanya	dep003	c	2022-09-20	15000.00	Kolkata	8942074466
Emp013	Chitra	dep009	c	2022-11-17	15000.00	Kolkata	9288972066
Emp014	Dibyendu	dep009	c	2022-12-02	15000.00	Kolkata	8288972055
Emp015	Farhan	dep009	c	2022-12-05	15000.00	Kalyani	9288972066
Emp016	Gagandeep	dep004	p	2022-09-15	20000.00	Patna	8897206692
Emp017	Gargi	dep005	p	2022-04-12	22000.00	Siliguri	9288972066
Emp018	Jagriti	dep003	p	2022-01-24	25000.00	Kolkata	9288974166
Emp019	Jiban	dep007	p	2022-11-04	28000.00	Bankura	9778972566
Emp020	Joy	dep001	p	2022-10-22	18000.00	Malda	9725972066
Emp021	Jayanta	dep007	p	2022-11-07	22000.00	Siliguri	9211972066
Emp022	Kushal	dep004	p	2022-01-12	22000.00	Siliguri	9211972406
Emp023	Kingshuk	dep009	c	2022-09-02	15000.00	Kalyani	9212972066
Emp024	Manish	dep001	p	2022-01-17	20000.00	Kolkata	9214972066
Emp025	Maya	dep001	p	2022-09-11	18000.00	Medinipur	9231242066
Emp026	Mouli	dep006	p	2022-02-21	20000.00	Kalyani	9213172066
Emp027	Maitri	dep003	p	2022-03-05	22000.00	Siliguri	8955197206
Emp028	Nabanita	dep009	p	2022-11-20	25000.00	Medinipur	9214472066
Emp029	Noorain	dep001	p	2022-08-01	18000.00	Kalyani	9255197206
Emp030	Preetha	dep006	p	2022-01-28	28000.00	Kolkata	9256777173
Emp031	Pritoma	dep004	c	2022-12-07	15000.00	Kalyani	9251955566
Emp032	Rajesh	dep009	p	2022-04-23	20000.00	Bankura	9256777212
Emp033	Ramsankar	dep009	p	2022-11-24	20000.00	Medinipur	9256111173
Emp034	Sanjay	dep009	p	2022-08-27	20000.00	Kolkata	9256123173
Emp035	Santosh	dep001	p	2022-05-18	20000.00	Purulia	9156892173
Emp036	Souvik	dep008	p	2022-06-15	20000.00	Kolkata	9356997173
Emp037	Suman	dep004	p	2022-11-15	20000.00	Kolkata	9356774173
Emp038	Supriyo	dep001	p	2022-08-12	18000.00	Bankura	9956552173
Emp039	Soumita	dep002	p	2022-12-17	28000.00	Siliguri	9720177173
Emp040	Torsa	dep004	p	2022-06-08	28000.00	Siliguri	9056722171
Emp041	Utsab	dep001	p	2022-01-29	30000.00	Malda	9256007170

```
alter table Departments add column eid varchar(6);
alter table Departments add foreign key(eid) references Employees(eid);

update Departments set eid= 'Emp041' where depid='dep001';
update Departments set eid= 'Emp039' where depid='dep002';
update Departments set eid= 'Emp018' where depid='dep003';
update Departments set eid= 'Emp040' where depid='dep004';
update Departments set eid= 'Emp007' where depid='dep005';
update Departments set eid= 'Emp030' where depid='dep006';
update Departments set eid= 'Emp019' where depid='dep007';
update Departments set eid= 'Emp001' where depid='dep008';
update Departments set eid= 'Emp028' where depid='dep009';
select * from Departments;
```

depid	dep_name	eid
dep001	Production	Emp041
dep002	HR	Emp039
dep003	Marketing	Emp018
dep004	Inventory	Emp040
dep005	Factory_warehouse	Emp007
dep006	R&D	Emp030
dep007	Accounting	Emp019
dep008	Logistics	Emp001
dep009	Workers	Emp028

```
insert into Customer values
        ('c001','Gabriel Costa','Santiago',' Chile','+56-9-87654321'),
        ('c002','Sofia Herrera','Quito','Ecuador','+593-9-87654321'),
        ('c003','Arjun Patel','Ahmedabad','India','+91-7654321098'),
        ('c004','Aanya Desai','Chennai','India','+91-2109876543'),
        ('c005','Mia Mitchell','Canberra','Australia','+61-489012345'),
        ('c006','Ahmed Diallo','Cairo','Egypt','+20-1012345678'),
        ('c007','Aisha Diop','Dakar',' Senegal','+221-701234567');
select * from Customer;
```

cust_id	cust_name	city	country	ph_no
c001	Gabriel Costa	Santiago	Chile	+56-9-87654321
c002	Sofia Herrera	Quito	Ecuador	+593-9-87654321
c003	Arjun Patel	Ahmedabad	India	+91-7654321098
c004	Aanya Desai	Chennai	India	+91-2109876543
c005	Mia Mitchell	Canberra	Australia	+61-489012345
c006	Ahmed Diallo	Cairo	Egypt	+20-1012345678
c007	Aisha Diop	Dakar	Senegal	+221-701234567

```
insert into Supplier values
        ('sup001','Global Chemicals Ltd','Houston','USA','+1-987-654-3210'),
        ('sup002','EcoAgro Industries','Toronto','Canada','+1-876-543-2109'),
        ('sup003','Green Crop Solutions','Sao Paulo','Brazil','+55-11-9876-5432'),
        ('sup004','AgriSupplies Co.','Buenos Aires','Argentina','+54-9-876-543-210'),
        ('sup005','NutriSource International','New Delhi','India','+91-987-654-3210'),
        ('sup006','AgroChem Enterprises','Amsterdam','Netherlands',' +31-6-5432-1098'),
        ('sup007','Fertile Fields Ltd','London','UK','+44-20-7654-3210'),
        ('sup008','AgroTrade GmbH','Berlin','Germany','+49-30-2109-8765');
```

select * from supplier;

sid	sname	city	country	ph_no
sup001	Global Chemicals Ltd	Houston	USA	+1-987-654-3210
sup002	EcoAgro Industries	Toronto	Canada	+1-876-543-2109
sup003	Green Crop Solutions	Sao Paulo	Brazil	+55-11-9876-5432
sup004	AgriSupplies Co.	Buenos Aires	Argentina	+54-9-876-543-210
sup005	NutriSource International	New Delhi	India	+91-987-654-3210
sup006	AgroChem Enterprises	Amsterdam	Netherlands	+31-6-5432-1098
sup007	Fertile Fields Ltd	London	UK	+44-20-7654-3210
sup008	AgroTrade GmbH	Germany	Germany	+49-30-2109-8765

```
insert into Factory_warehouse (rid,rname,quantity) values
        ('raw001','Ammonium Nitrate',500.25),
        ('raw002','Phosphorus',300.04),
        ('raw003','Potassium Nitrate',400.11),
        ('raw004','Urea',900.80),
        ('raw005','Micronutrients',500.08),
        ('raw006','Calcium Nitrate',300.50),
        ('raw007','Phosphate Rock',700.15),
        ('raw008','Ammonium Phosphate',400.14);
```

select * from factory_warehouse;

rid	rname	quantity	depid
raw001	Ammonium Nitrate	500.25	dep005
raw002	Phosphorus	300.04	dep005
raw003	Potassium Nitrate	400.11	dep005
raw004	Urea	900.80	dep005
raw005	Micronutrients	500.08	dep005
raw006	Calcium Nitrate	300.50	dep005
raw007	Phosphate Rock	700.15	dep005
raw008	Ammonium Phosphate	400.14	dep005

```
insert into Supplies values
        ('sup001','raw001'),
        ('sup002','raw002'),
        ('sup003','raw003'),
        ('sup004','raw004'),
        ('sup005','raw005'),
        ('sup006','raw006'),
        ('sup007','raw007'),
        ('sup008','raw008');
```

select * from supplies;

sid	rid
sup001	raw001
sup002	raw002
sup003	raw003
sup004	raw004
sup005	raw005
sup006	raw006
sup007	raw007
sup008	raw008

```
insert into Product (pid,pname,description,uses) values
        ('p001','PhosBloom','High-phosphorus fertilizer for vibrant blooms.','Promotes
        flowering and fruiting in various plants.'),
        ('p002','MicroPlus','Essential micronutrients for healthy plants.','Corrects
        micronutrient deficiencies in crops.'),
        ('p003','NitroGrow','Nitrogen-based fertilizer. Stimulates lush foliage growth.','Ideal
        for leafy greens, grasses, and ornamentals.'),
        ('p004','CalcoBoost','Calcium-enriched fertilizer. Strengthens plant structures.','
        Ideal for tomatoes, peppers, and fruit trees.'),
        ('p005','CalNitro+','Stronger plants, improved fruit quality.','Enhances fruit quality
        and plant resilience.'),
        ('p006','UreaPlus','Slow-release nitrogen fertilizer for steady growth.','Suitable for
        various crops and ensures sustained plant nutrition.');
select * from product;
```

pid	pname	description	uses	depid
p001	PhosBloom	High-phosphorus fertilizer for vibrant blooms.	Promotes flowering and fruiting in various plants.	dep001
p002	MicroPlus	Essential micronutrients for healthy plants.	Corrects micronutrient deficiencies in crops.	dep001
p003	NitroGrow	Nitrogen-based fertilizer. Stimulates lush foliage growth.	Ideal for leafy greens, grasses, and ornamentals.	dep001
p004	CalcoBoost	Calcium-enriched fertilizer. Strengthens plant structures.	Ideal for tomatoes, peppers, and fruit trees.	dep001
p005	CalNitro+	Stronger plants, improved fruit quality.	Enhances fruit quality and plant resilience.	dep001
p006	UreaPlus	Slow-release nitrogen fertilizer for steady growth.	Suitable for various crops and ensures sustained plant nutrition.	dep001

```
insert into Inventory (inven_id,location,capacity) values
        ('ivn001','Kolkata',50000.00),
        ('ivn002','Ahmedabad',50000.00),
        ('ivn003','Mumbai',60000.00),
        ('ivn004','Bhubaneswar',50000.00),
        ('ivn005','Ludhiana',60000.00);
select * from inventory;
```

invent_id	location	capacity	depid
ivn001	Kolkata	50000.00	dep004
ivn002	Ahmedabad	50000.00	dep004
ivn003	Mumbai	60000.00	dep004
ivn004	Bhubaneswar	50000.00	dep004
ivn005	Ludhiana	60000.00	dep004

```
insert into Composition values
        ('p001','raw005'),
        ('p001','raw007'),
        ('p001','raw008'),
        ('p002','raw005')
        ('p003','raw005'),
```

```
('p003','raw001'),
('p003','raw004'),
('p004','raw006'),
('p005','raw004'),
('p005','raw005'),
('p005','raw006'),
('p006','raw002'),
('p006','raw003'),
('p006','raw004');
```

select * from composition;

pid	rid
p001	raw005
p001	raw007
p001	raw008
p002	raw005
p003	raw001
p003	raw004
p004	raw005
p004	raw006
p005	raw004
p005	raw005
p005	raw006
p006	raw002
p006	raw003
p006	raw004

```
insert into Product_batch values
('pb001',100.00,'2023-07-01','p001','ivn004'),
('pb002',100.00,'2023-07-01','p001','ivn003'),
('pb003',200.00,'2023-07-02','p002','ivn001'),
('pb004',100.00,'2023-07-03','p003','ivn002'),
('pb005',100.00,'2023-07-03','p004','ivn005'),
('pb006',300.00,'2023-07-04','p006','ivn005'),
('pb007',100.00,'2023-07-05','p005','ivn001'),
('pb008',200.00,'2023-07-05','p002','ivn002'),
('pb009',400.00,'2023-07-06','p003','ivn003'),
('pb010',200.00,'2023-07-07','p004','ivn004');
```

select * from product_batch;

pbid	quantity	mfg_date	pid	inven_id
pb001	100.00	2023-07-01	p001	ivn004
pb002	100.00	2023-07-01	p001	ivn003
pb003	200.00	2023-07-02	p002	ivn001
pb004	100.00	2023-07-03	p003	ivn002
pb005	100.00	2023-07-03	p004	ivn005
pb006	300.00	2023-07-04	p006	ivn005
pb007	100.00	2023-07-05	p005	ivn001
pb008	200.00	2023-07-05	p002	ivn002
pb009	400.00	2023-07-06	p003	ivn003
pb010	200.00	2023-07-07	p004	ivn004

```
insert into Stock values
        ('ivn001','p001',300.00),
        ('ivn001','p002',200.00),
        ('ivn001','p006',600.00),
        ('ivn002','p002',300.00),
        ('ivn002','p003',200.00),
        ('ivn002','p006',300.00),
        ('ivn003','p005',300.00),
        ('ivn003','p003',400.00),
        ('ivn004','p004',500.00),
        ('ivn004','p003',300.00),
        ('ivn005','p002',400.00),
        ('ivn005','p004',300.00);
select * from stock;
```

inven_id	pid	quantity
ivn001	p001	300.00
ivn001	p002	200.00
ivn001	p006	600.00
ivn002	p002	300.00
ivn002	p003	200.00
ivn002	p006	300.00
ivn003	p005	300.00
ivn003	p003	400.00
ivn004	p004	500.00
ivn004	p003	300.00
ivn005	p002	400.00
ivn005	p004	300.00

```
insert into Orders (oid,cust_id,pid,quantity,status,o_date,d_date) values
        ('od001','c001','p001',50.00,'Delivered','2023-06-21','2023-07-02'),
        ('od002','c001','p004',50.00,'Cancelled','2023-06-23',null),
        ('od003','c002','p003',60.00,'Delivered','2023-06-23','2023-07-03'),
        ('od004','c003','p002',70.00,'Shipped','2023-06-28',null),
        ('od005','c004','p006',100.00,'Shipped','2023-06-29',null),
        ('od006','c005','p005',100.00,'Cancelled','2023-06-29',null),
        ('od007','c005','p005',60.00,'Shipped','2023-07-01',null),
        ('od008','c006','p003',60.00,'Pending','2023-07-01',null),
        ('od009','c001','p002',60.00,'Pending','2023-07-04',null),
        ('od010','c004','p003',70.00,'Pending','2023-07-07',null);
select * from orders;
```

oid	cust_id	pid	quantity	status	o_date	d_date
od001	c001	p001	50.00	Delivered	2023-06-21	2023-07-02
od002	c001	p004	50.00	Cancelled	2023-06-23	null
od003	c002	p003	60.00	Delivered	2023-06-23	2023-07-03
od004	c003	p002	70.00	Shipped	2023-06-28	null
od005	c004	p006	100.00	Shipped	2023-06-29	null
od006	c005	p005	100.00	Cancelled	2023-07-01	null
od007	c005	p005	60.00	Shipped	2023-07-01	null
od008	c006	p003	60.00	Pending	2023-07-01	null
od009	c001	p002	60.00	Pending	2023-07-04	null
od010	c004	p003	70.00	Pending	2023-07-07	null

- Queries:

1. **Find the names of the raw materials used in product ‘NitroGrow’.**

```
select rname from product, composition, factory_warehouse where product.pid=
composition.pid and composition.rid=factory_warehouse.rid and pname= 'NitroGrow';
```

rname
Ammonium Nitrate
Urea
Micronutrients

2. **Display the details of suppliers according to the raw materials supplied by them.**

```
select rname, sname, city, country, ph_no from supplier, supplies, factory_warehouse where
supplier.sid=supplies.sid and supplies.rid=factory_warehouse.rid;
```

rname	sname	city	country	ph_no
Ammonium Nitrate	Global Chemicals Ltd	Houston	USA	+1-987-654-3210
Phosphorus	EcoAgro Industries	Toronto	Canada	+1-876-543-2109
Potassium Nitrate	Green Crop Solutions	Sao Paulo	Brazil	+55-11-9876-5432
Urea	AgriSupplies Co.	Buenos Aires	Argentina	+54-9-876-543-210
Micronutrients	NutriSource International	New Delhi	India	+91-987-654-3210
Calcium Nitrate	AgroChem Enterprises	Amsterdam	Netherlands	+31-6-5432-1098
Phosphate Rock	Fertile Fields Ltd	London	UK	+44-20-7654-3210
Ammonium Phosphate	AgroTrade GmbH	Germany	Germany	+49-30-2109-8765

3. **Display the quantities of 'UreaPlus’ stored in different inventories.**

```
select inventory.inven_id, quantity, location from inventory, product, stock where
inventory.inven_id=stock.inven_id and stock.pid=product.pid and pname='UreaPlus';
```

invent_id	quantity	location
ivn001	600.00	Kolkata
ivn002	300.00	Ahmedabad

4. Find the names of the managers and total employees works in the departments mentioned within the table Departments.

```
create or replace view Employee_count as select dep_name,departments.eid,
count(employees.eid) as NOE from departments,employees where departments.depid=
employees.works_in group by departments.depid;

select dep_name,ename as Manager, NOE from employee_count, employees where
employee_count.eid= employees.eid;
```

dep_name	ename	NOE
Production	Utsab	8
HR	Soumita	3
Marketing	Jagriti	4
Inventory	Torsa	6
Factory_warehouse	Aritra	2
R&D	Preetha	3
Accounting	Jiban	2
Logistics	Abhijit	4
Workers	Nabanita	9

5. Display production details at a specific date.

```
select pbid, pname, mfg_date, quantity, location as inventory_loc from product, product_batch,
inventory where product_batch.pid= product.pid and product_batch.inven_id=
inventory.inven_id and mfg_date='2023-07-03';
```

pbid	pname	mfg_date	quantity	inventory_loc
pb004	NitroGrow	2023-07-03	100.00	Ahmedabad
pb005	CalcoBoost	2023-07-03	100.00	Ludhiana

6. Display the order details with customer name those status is ‘pending’.

```
select oid,cust_name,pname,quantity,o_date from orders, customer, product where
orders.cust_id= customer.cust_id and orders.pid= product.pid and status='Pending';
```

oid	cust_name	pname	quantity	o_date
od008	Ahmed Diallo	NitroGrow	60.00	2023-07-01
od009	Gabriel Costa	MicroPlus	60.00	2023-07-04
od010	Aanya Desai	NitroGrow	70.00	2023-07-07