DAMG 6210

PROJECT REPORT

Problem Statement:

A manufacturing company aims to streamline its operations and enhance efficiency across various departments involved in the production and supply chain processes. The company deals with the manufacturing of products using raw materials sourced from different suppliers. The primary objective is to optimize the order management system, inventory control, employee management, and procurement processes.

The key objectives of the database system are as follows:

Order Management Optimization: Develop a robust system for managing customer orders efficiently, including order placement, tracking, and fulfillment. Ensure seamless communication between customers and the production team to meet delivery deadlines and maintain customer satisfaction.

Inventory Control: Implement an inventory management system to track the availability of raw materials, products, and supplies in real-time. Minimize stockouts and overstock situations by establishing reorder points and optimizing inventory levels based on demand forecasts and production schedules.

Employee Management: Enhance employee productivity and satisfaction by streamlining HR processes, such as recruitment, training, performance evaluation, and payroll management. Ensure proper allocation of tasks and resources to maximize operational efficiency within each department.

Procurement Process Optimization: Improve the procurement process by establishing efficient workflows for sourcing raw materials from multiple suppliers. Strengthen supplier relationships, negotiate favorable terms, and monitor supplier performance to ensure timely delivery of quality materials at competitive prices.

Data Integration and Analysis: Integrate data from various departments and systems to gain insights into production efficiency, customer preferences, and market trends. Use advanced analytics to optimize production planning, resource allocation, and decision-making processes.

Quality Assurance: Implement quality control measures to ensure that products meet industry standards and customer expectations. Monitor production processes, conduct regular inspections, and implement corrective actions to minimize defects and ensure product reliability and safety.

Cost Management: Identify cost-saving opportunities across the production and supply chain processes. Analyze expenses related to materials, labor, and overheads to optimize resource utilization and maximize profitability.

Compliance and Risk Management: Ensure compliance with regulatory requirements and industry standards governing manufacturing operations, employee safety, and environmental sustainability. Mitigate risks associated with supply chain disruptions, market volatility, and other external factors that may impact business continuity.

By addressing these objectives, the manufacturing company aims to enhance operational efficiency, customer satisfaction, and profitability while maintaining a competitive edge in the market.

Users of the System:

In the context of a manufacturing company, each user role plays a crucial part in the overall operations and success of the business:

Customers:

They are the end-users who place orders for products manufactured by the company.

They provide valuable feedback on the quality of products and services received, helping the company improve its offerings.

Tracking order status is essential for customers to stay informed about the progress of their orders and expected delivery dates, enhancing their overall experience with the company.

Employees:

Manufacturing personnel are responsible for producing high-quality products according to specified standards and schedules, ensuring efficiency and meeting production targets.

Order processing staff handle customer orders from verification to shipping, ensuring accuracy and timeliness to maintain customer satisfaction.

Customer support employees play a crucial role in addressing customer inquiries, resolving issues, and providing assistance throughout the purchasing process, enhancing customer loyalty and retention.

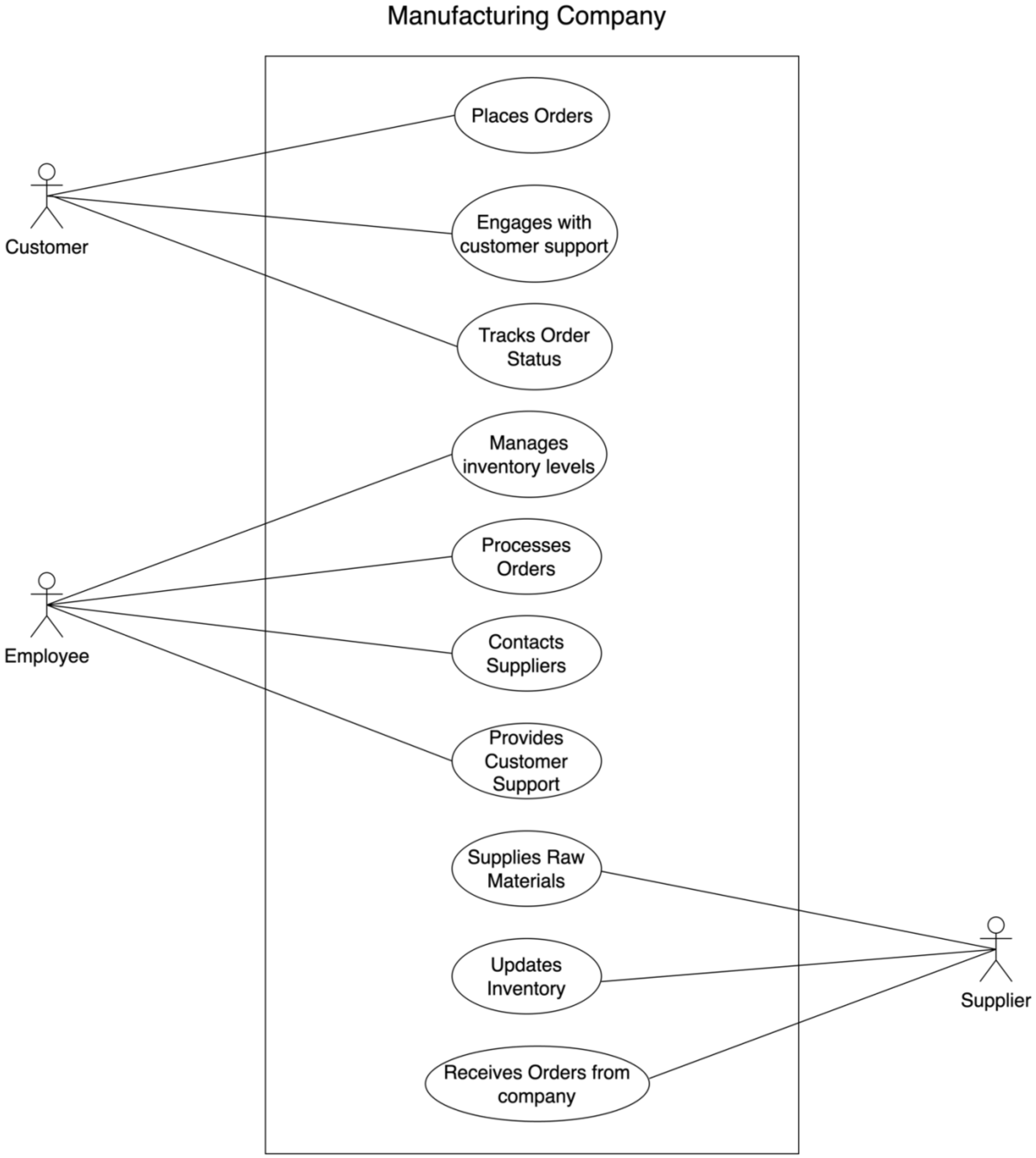
Suppliers:

They are essential partners who provide raw materials or components necessary for manufacturing products.

Managing orders efficiently ensures that the manufacturing process remains uninterrupted and that the company can fulfill customer demands on time.

Timely receipt of payments from the manufacturing company is vital for suppliers to maintain their own operations and sustain the supply chain.

Use-Case Diagram:



Entities and Relationships:

Entities:

Customer:

Description: Represents individuals or organizations who purchase products from the company. Customers are identified by unique IDs and have associated contact information such as name, address, phone number, and email. They play a pivotal role in the sales process by placing orders for products.

Attributes: CustomerID(PK), FirstName, LastName, CustomerCity, CustomerState, Zipcode, CustomerPhone, CustomerEmail

Product:

Description: Represents items or services offered by the company for sale. Each product is identified by a unique ID and has attributes such as name, description, price, and available quantity. Products form the core inventory of the business and are the primary items that customers purchase.

Attributes: ProductID(PK), ProductName, ProductDescription, ProductPrice, AvailableQuantity

Order:

Description: Represents individual orders placed by customers. Each order consists of one or more products selected by the customer for purchase. Orders are tracked from placement to fulfillment and may undergo various statuses such as pending, processing, shipped, or delivered.

Attributes: OrderID(PK), OrderDate, OrderStatus, TotalAmount, CustomerID(FK), ProductID(FK)

ProductOrder:

Description: Represents the association between products and orders in a many-to-many relationship. Each record in this table signifies the inclusion of a specific quantity of a product within an order.

Attributes: OrderID(FK), ProductID(FK), OrderedQuantity

Department:

Description: Represents distinct organizational units within the company, each responsible for specific functions or areas of operation. Departments are identified by unique IDs and have associated names. They help in structuring the company's internal operations and facilitate efficient management of resources and tasks.

Attributes: DepartmentID(PK), DepartmentName

Employee:

Description: Represents individuals employed by the company to perform various roles and responsibilities. Each employee is identified by a unique ID and has attributes such as name, position, contact information, and salary. Employees contribute to the day-to-day operations of the business and play essential roles in fulfilling orders, managing inventory, and other tasks.

Attributes: EmployeeID(PK), FirstName, LastName, EmployeePosition, EmployeeContact, EmployeeEmail, Salary, DepartmentID(FK)

Supplier:

Description: Represents external entities or businesses that provide raw materials or products to the company for resale or use in manufacturing processes. Suppliers are identified by unique IDs and have associated contact information such as name, address, email, and phone number. They are crucial partners in ensuring a steady supply of goods for the company's operations.

Attributes: SupplierID(PK), FirstName, LastName, SupplierEmail, SupplierCity, SupplierState, Zipcode, SupplierContact

RawMaterial:

Description: Represents basic materials or components used in the production or assembly of products. Each raw material is identified by a unique ID and has attributes such as name, description, price, and quantity. Raw materials are essential inputs in manufacturing processes and are sourced from suppliers for use in production.

Attributes:MaterialID(PK), MaterialName, MaterialDescription, MaterialPrice, MaterialQuantity, SupplierID(FK)

Purchase:

Description: Represents transactions involving the procurement of raw materials from suppliers by company employees. Each purchase transaction is identified by a unique ID and includes details such as the purchase date, quantity purchased, and total amount. Purchases enable the acquisition of necessary materials for the company's operations.

Attributes: PurchaseID(PK), EmployeeID(FK), SupplierID(FK), PurchaseDate, PurchasedQuantity, Amount, MaterialID(FK)

OrderItem:

Description: Represents individual line items or products within an order placed by a customer. Each order item is associated with a specific order and employee responsible for processing it. Order items help in tracking the products included in each order and assigning responsibilities to employees for order fulfillment.

Attributes: OrderItemID(PK), OrderID(FK), EmployeeID(FK), OrderAssignmentStatus

Relationships:

1. Customer-Order:

Description: This one-to-many relationship signifies that a customer can place multiple orders over time, but each order is associated with only one customer. It enables tracking the orders placed by individual customers.

2. Product-ProductOrder:

Description: In this one-to-many relationship, each product can appear in multiple orders, so there can be multiple records in the ProductOrder table corresponding to a single product.

3. Order-ProductOrder:

Description: In this one-to-many relationship, an order can consist of multiple products, so there can be multiple records in the ProductOrder table corresponding to a single order.

4. Employee-Department:

Description: This many-to-one relationship indicates that multiple employees can be assigned to the same department within the organization. It facilitates organizing and managing employees based on their respective departments, aiding in administrative tasks and resource allocation.

5. Employee-Purchase:

Description: This one-to-one relationship signifies that each employee is associated with a single purchase transaction. It helps in tracking the purchases made by individual employees, providing insights into procurement activities and expenditure.

6. Order-OrderItem:

Description: This relationship establishes a one-to-many association between an order and its corresponding order items. one order can contain multiple order items, but each order item belongs to only one order.

7. Employee-OrderItem:

Description: This relationship defines a one-to-many association between an employee and their assigned order items. One employee can be associated with multiple order items, but each order item is linked to only one employee.)

8. Supplier-RawMaterial:

Description: This one-to-many relationship indicates that a supplier can provide multiple types of raw materials. It allows for managing the procurement of various raw materials from different suppliers, ensuring a diversified and reliable supply chain.

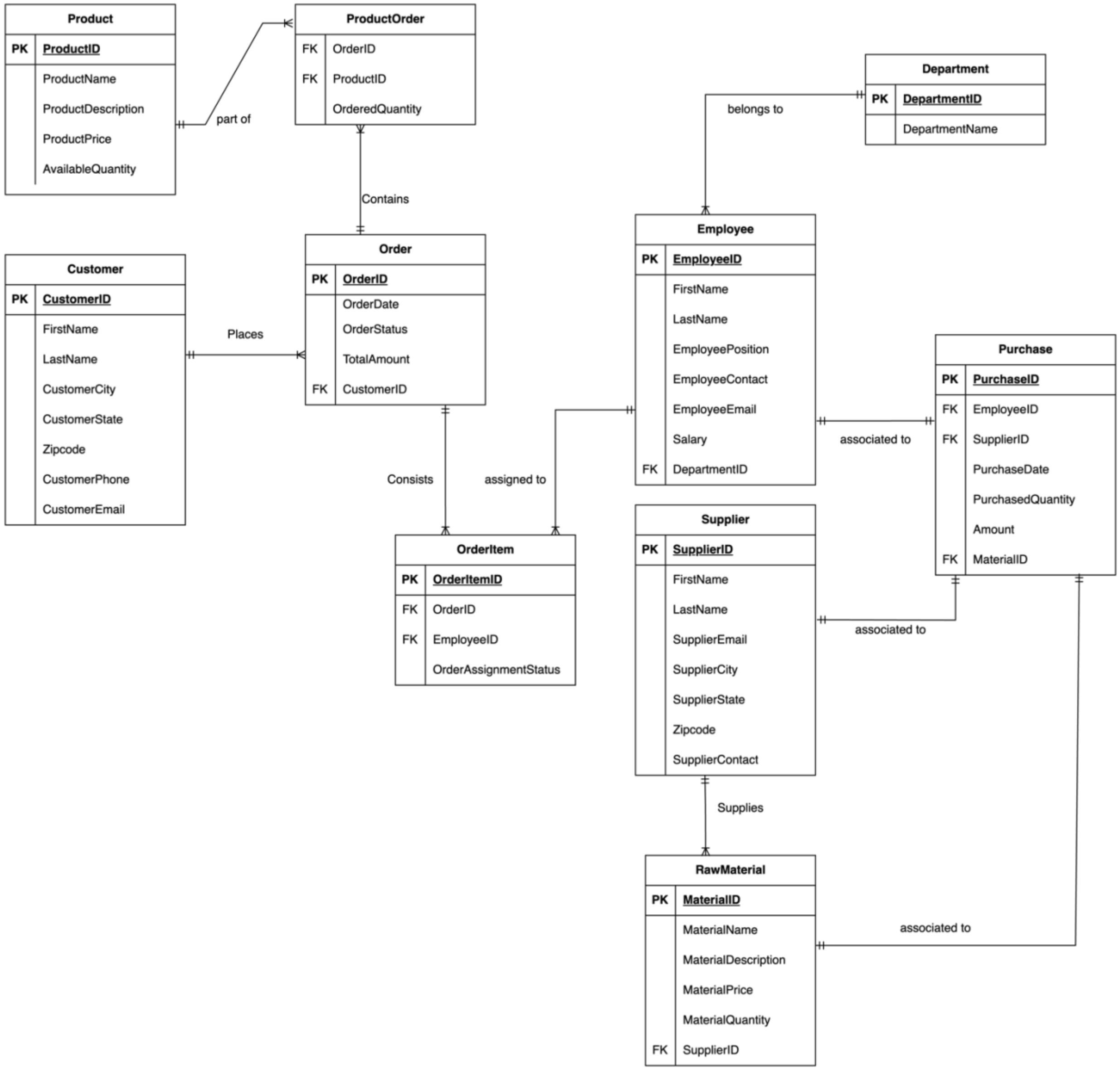
9. Supplier-Purchase:

Description: This one-to-one relationship signifies that each purchase transaction involves a specific supplier. It helps in tracking the suppliers associated with each procurement activity, facilitating supplier management and relationship tracking.

10. RawMaterial-Purchase:

Description: This one-to-one relationship indicates that each raw material is associated with a single purchase transaction. It enables tracking the procurement of individual raw materials, ensuring accurate inventory management and cost allocation.

E-R Diagram:


Product
PK ProductID
ProductName
ProductDescription
ProductPrice
AvailableQuantity
part of
ProductOrder
FK OrderID
FK ProductID
OrderedQuantity
Contains
Department
PK DepartmentID
DepartmentName
belongs to
Customer
PK CustomerID
FirstName
LastName
CustomerCity
CustomerState
Zipcode
CustomerPhone
CustomerEmail
Places
Order
PK OrderID
OrderDate
OrderStatus
TotalAmount
FK CustomerID
Employee
PK EmployeeID
FirstName
LastName
EmployeePosition
EmployeeContact
EmployeeEmail
Salary
FK DepartmentID
associated to
Purchase
PK PurchaseID
FK EmployeeID
FK SupplierID
PurchaseDate
PurchasedQuantity
Amount
FK MaterialID
Consists
assigned to
OrderItem
PK OrderItemID
FK OrderID
FK EmployeeID
OrderAssignmentStatus
Supplier
PK SupplierID
FirstName
LastName
SupplierEmail
SupplierCity
SupplierState
Zipcode
SupplierContact
associated to
Supplies
RawMaterial
PK MaterialID
MaterialName
MaterialDescription
MaterialPrice
MaterialQuantity
FK SupplierID
associated to

Normalization Steps:

Normalization is a crucial database design process that helps organize data efficiently, reduce redundancy, and maintain data integrity. Here are the normalization steps for the provided tables:

First Normal Form(1NF): All tables have atomic values in each column, so they are already in 1NF.

Second Normal Form(2NF): 2NF states that a table should be in 1NF and there should be no partial dependencies. All tables seem to be in 2NF as there are no partial dependencies.

Example: To demonstrate 2NF, let's consider the Order table: Here, OrderStatus is functionally dependent only on OrderID and not on any other non-prime attribute, fulfilling the requirement of 2NF.

Third Normal Form(3NF): 3NF states that a table should be in 2NF and there should be no transitive dependencies. All tables seem to be in 3NF as there are no transitive dependencies.

Example: To demonstrate 3NF, let's consider the Employee table: Here, Salary is functionally dependent only on EmployeeID and not on any other non-prime attribute, and DepartmentID is functionally dependent only on EmployeeID, fulfilling the requirement of 3NF.

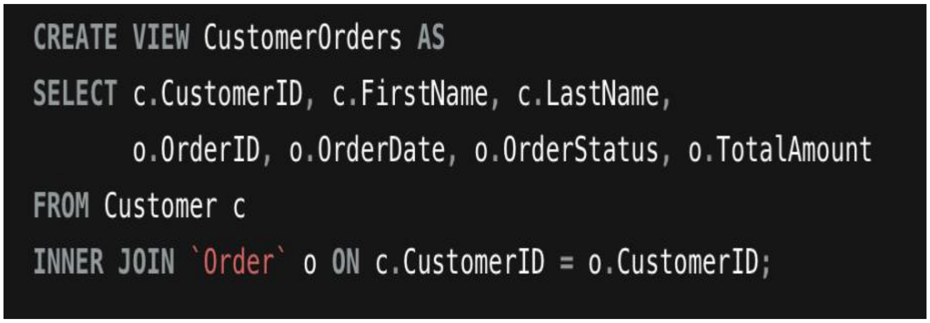
Boyce-Codd Normal Form(BCNF): To demonstrate Boyce-Codd Normal Form (BCNF), let's consider the ProductOrder table:

In BCNF, every determinant (attribute that determines another attribute's value) should be a candidate key. Here, the combination of (OrderID, ProductID) is a candidate key, and there are no attributes that are dependent on only a part of any candidate key. Thus, the ProductOrder table is already in BCNF.

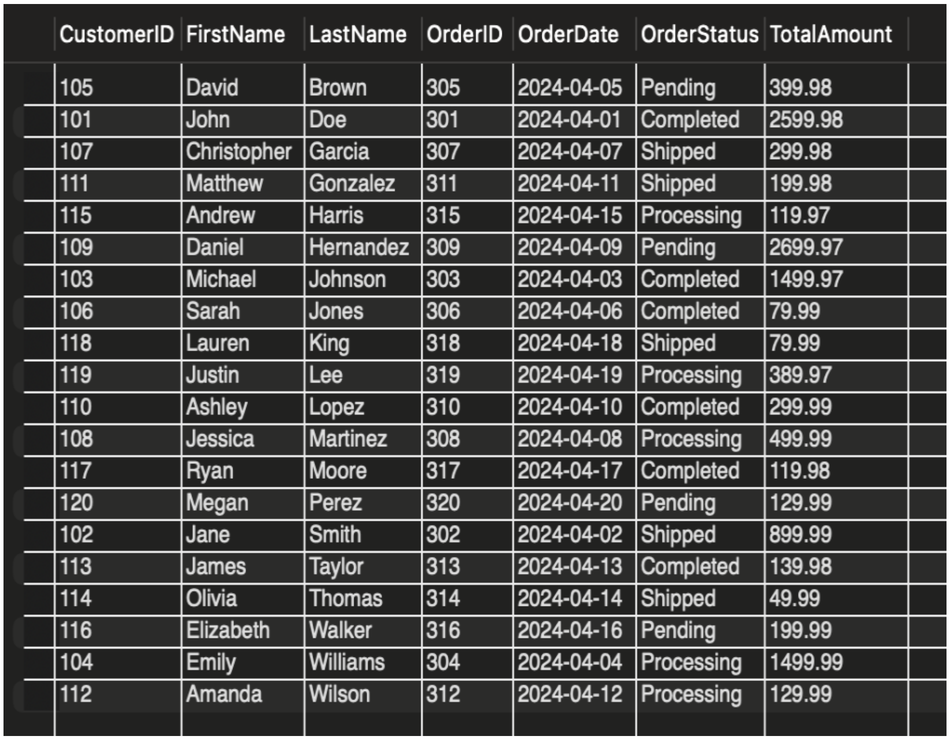
In this table, both OrderID and ProductID together uniquely identify each row, and OrderedQuantity is dependent on both attributes. Therefore, it satisfies BCNF.

Views:

1.

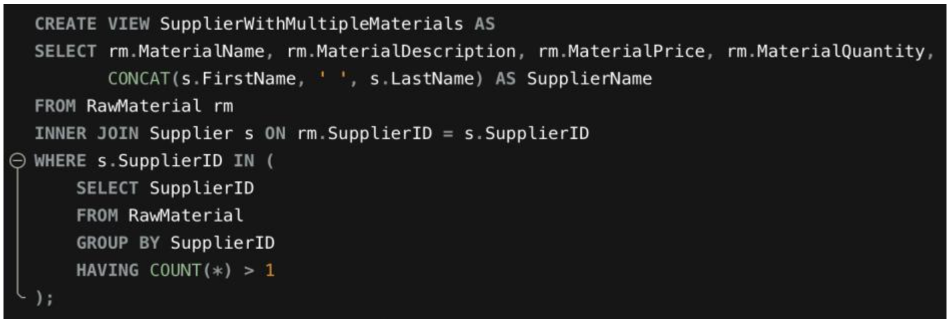


```sql
CREATE VIEW CustomerOrders AS
SELECT c.CustomerID, c.FirstName, c.LastName,
       o.OrderID, o.OrderDate, o.OrderStatus, o.TotalAmount
FROM Customer c
INNER JOIN `Order` o ON c.CustomerID = o.CustomerID;
```

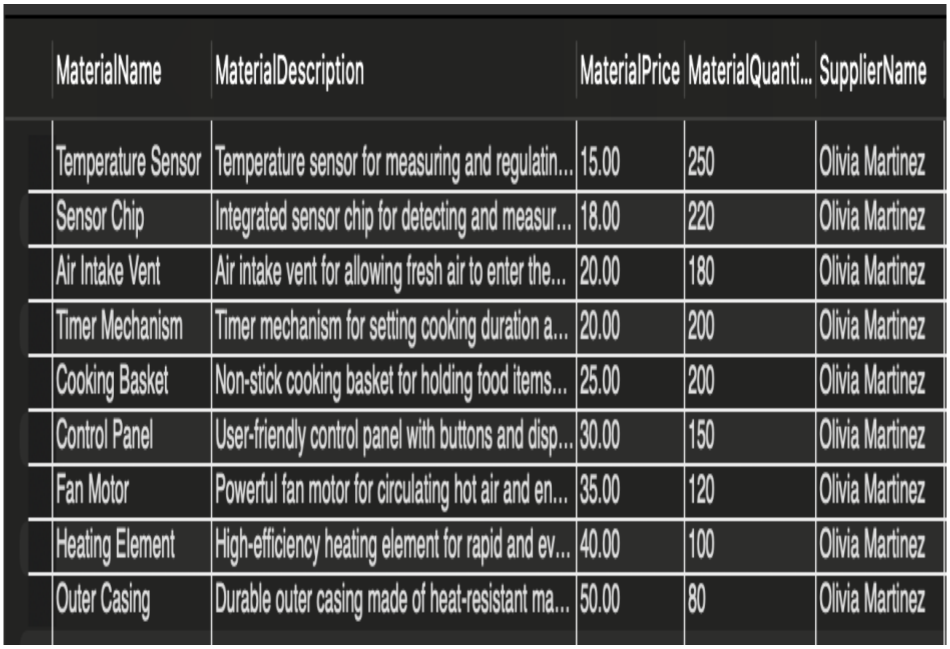


CustomerID	FirstName	LastName	OrderID	OrderDate	OrderStatus	TotalAmount
105	David	Brown	305	2024-04-05	Pending	399.98
101	John	Doe	301	2024-04-01	Completed	2599.98
107	Christopher	Garcia	307	2024-04-07	Shipped	299.98
111	Matthew	Gonzalez	311	2024-04-11	Shipped	199.98
115	Andrew	Harris	315	2024-04-15	Processing	119.97
109	Daniel	Hernandez	309	2024-04-09	Pending	2699.97
103	Michael	Johnson	303	2024-04-03	Completed	1499.97
106	Sarah	Jones	306	2024-04-06	Completed	79.99
118	Lauren	King	318	2024-04-18	Shipped	79.99
119	Justin	Lee	319	2024-04-19	Processing	389.97
110	Ashley	Lopez	310	2024-04-10	Completed	299.99
108	Jessica	Martinez	308	2024-04-08	Processing	499.99
117	Ryan	Moore	317	2024-04-17	Completed	119.98
120	Megan	Perez	320	2024-04-20	Pending	129.99
102	Jane	Smith	302	2024-04-02	Shipped	899.99
113	James	Taylor	313	2024-04-13	Completed	139.98
114	Olivia	Thomas	314	2024-04-14	Shipped	49.99
116	Elizabeth	Walker	316	2024-04-16	Pending	199.99
104	Emily	Williams	304	2024-04-04	Processing	1499.99
112	Amanda	Wilson	312	2024-04-12	Processing	129.99

2.

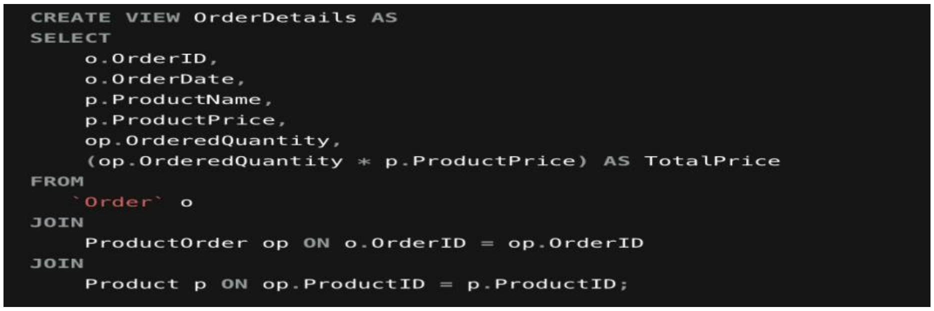


```
CREATE VIEW SupplierWithMultipleMaterials AS
SELECT rm.MaterialName, rm.MaterialDescription, rm.MaterialPrice, rm.MaterialQuantity,
       CONCAT(s.FirstName, ' ', s.LastName) AS SupplierName
FROM RawMaterial rm
INNER JOIN Supplier s ON rm.SupplierID = s.SupplierID
WHERE s.SupplierID IN (
    SELECT SupplierID
    FROM RawMaterial
    GROUP BY SupplierID
    HAVING COUNT(*) > 1
);
```

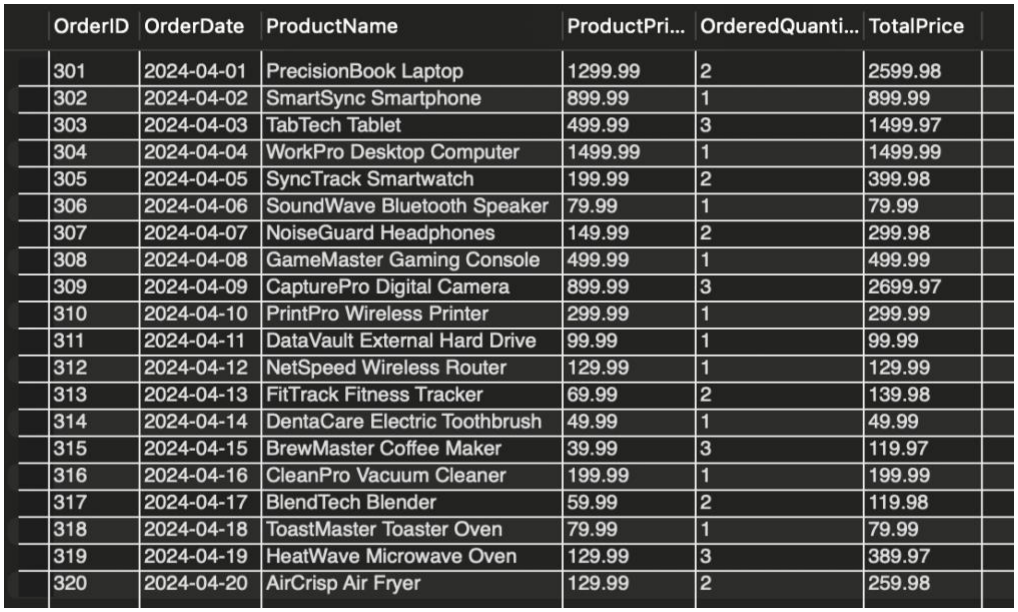


MaterialName	MaterialDescription	MaterialPrice	MaterialQuanti...	SupplierName
Temperature Sensor	Temperature sensor for measuring and regulatin...	15.00	250	Olivia Martinez
Sensor Chip	Integrated sensor chip for detecting and measur...	18.00	220	Olivia Martinez
Air Intake Vent	Air intake vent for allowing fresh air to enter the...	20.00	180	Olivia Martinez
Timer Mechanism	Timer mechanism for setting cooking duration a...	20.00	200	Olivia Martinez
Cooking Basket	Non-stick cooking basket for holding food items...	25.00	200	Olivia Martinez
Control Panel	User-friendly control panel with buttons and disp...	30.00	150	Olivia Martinez
Fan Motor	Powerful fan motor for circulating hot air and en...	35.00	120	Olivia Martinez
Heating Element	High-efficiency heating element for rapid and ev...	40.00	100	Olivia Martinez
Outer Casing	Durable outer casing made of heat-resistant ma...	50.00	80	Olivia Martinez

3.

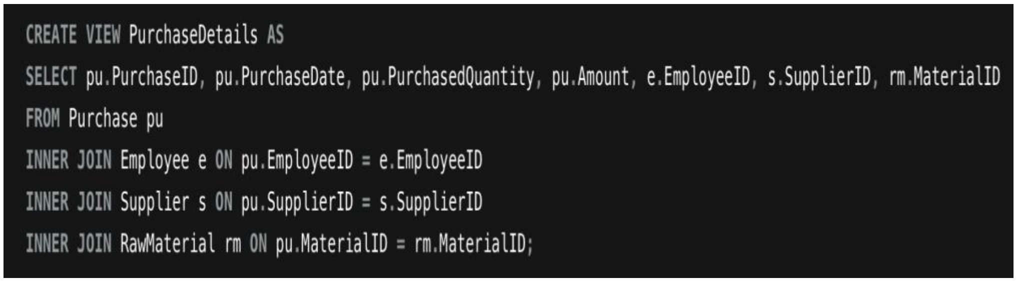


```
CREATE VIEW OrderDetails AS
SELECT
    o.OrderID,
    o.OrderDate,
    p.ProductName,
    p.ProductPrice,
    op.OrderedQuantity,
    (op.OrderedQuantity * p.ProductPrice) AS TotalPrice
FROM
   `Order` o
JOIN
    ProductOrder op ON o.OrderID = op.OrderID
JOIN
    Product p ON op.ProductID = p.ProductID;
```

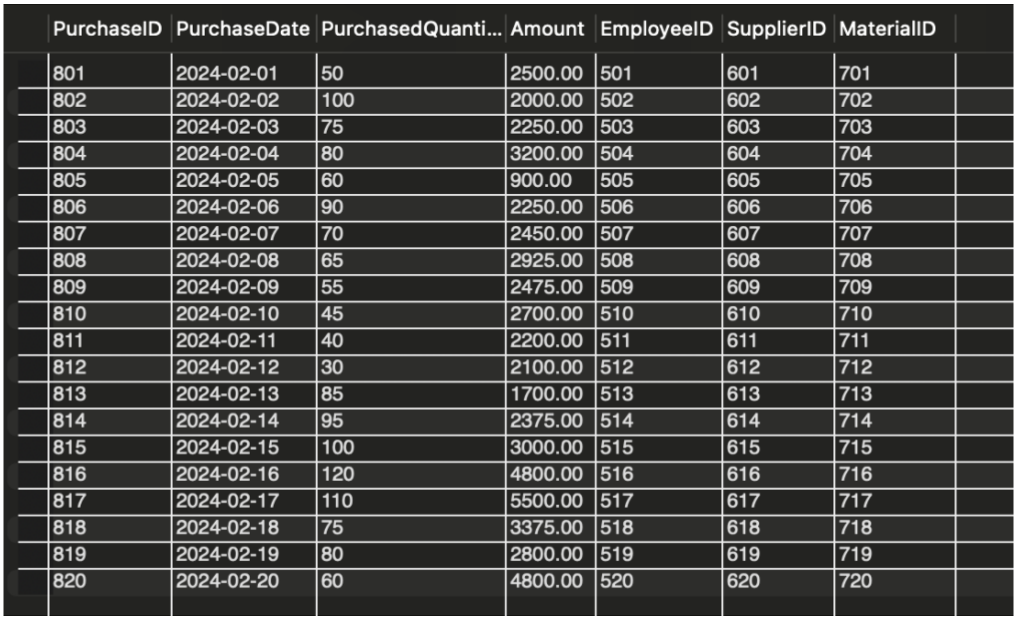


OrderID	OrderDate	ProductName	ProductPri…	OrderedQuanti…	TotalPrice
301	2024-04-01	PrecisionBook Laptop	1299.99	2	2599.98
302	2024-04-02	SmartSync Smartphone	899.99	1	899.99
303	2024-04-03	TabTech Tablet	499.99	3	1499.97
304	2024-04-04	WorkPro Desktop Computer	1499.99	1	1499.99
305	2024-04-05	SyncTrack Smartwatch	199.99	2	399.98
306	2024-04-06	SoundWave Bluetooth Speaker	79.99	1	79.99
307	2024-04-07	NoiseGuard Headphones	149.99	2	299.98
308	2024-04-08	GameMaster Gaming Console	499.99	1	499.99
309	2024-04-09	CapturePro Digital Camera	899.99	3	2699.97
310	2024-04-10	PrintPro Wireless Printer	299.99	1	299.99
311	2024-04-11	DataVault External Hard Drive	99.99	1	99.99
312	2024-04-12	NetSpeed Wireless Router	129.99	1	129.99
313	2024-04-13	FitTrack Fitness Tracker	69.99	2	139.98
314	2024-04-14	DentaCare Electric Toothbrush	49.99	1	49.99
315	2024-04-15	BrewMaster Coffee Maker	39.99	3	119.97
316	2024-04-16	CleanPro Vacuum Cleaner	199.99	1	199.99
317	2024-04-17	BlendTech Blender	59.99	2	119.98
318	2024-04-18	ToastMaster Toaster Oven	79.99	1	79.99
319	2024-04-19	HeatWave Microwave Oven	129.99	3	389.97
320	2024-04-20	AirCrisp Air Fryer	129.99	2	259.98

4.

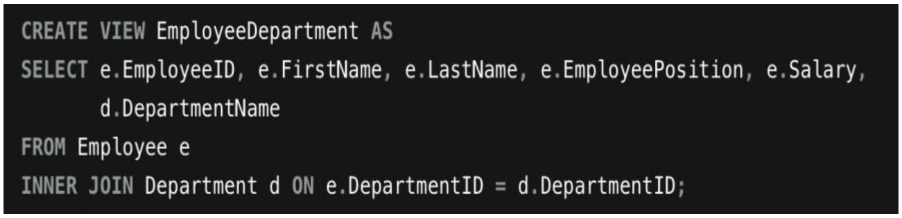


```sql
CREATE VIEW PurchaseDetails AS
SELECT pu.PurchaseID, pu.PurchaseDate, pu.PurchasedQuantity, pu.Amount, e.EmployeeID, s.SupplierID, rm.MaterialID
FROM Purchase pu
INNER JOIN Employee e ON pu.EmployeeID = e.EmployeeID
INNER JOIN Supplier s ON pu.SupplierID = s.SupplierID
INNER JOIN RawMaterial rm ON pu.MaterialID = rm.MaterialID;
```

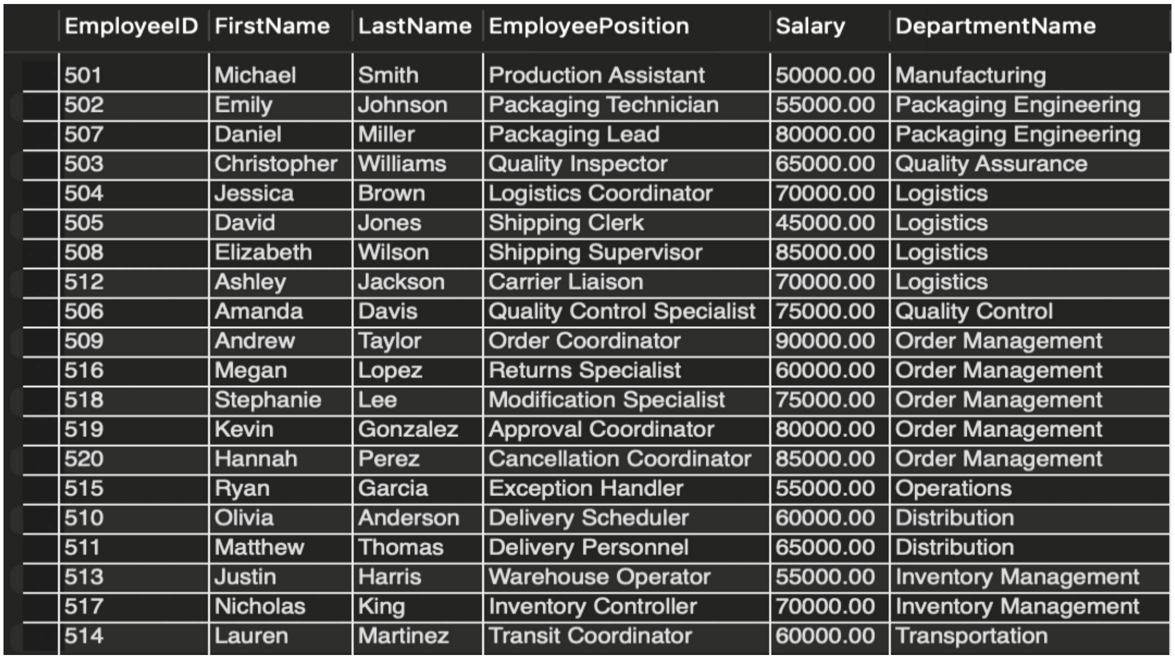


PurchaseID	PurchaseDate	PurchasedQuanti...	Amount	EmployeeID	SupplierID	MaterialID
801	2024-02-01	50	2500.00	501	601	701
802	2024-02-02	100	2000.00	502	602	702
803	2024-02-03	75	2250.00	503	603	703
804	2024-02-04	80	3200.00	504	604	704
805	2024-02-05	60	900.00	505	605	705
806	2024-02-06	90	2250.00	506	606	706
807	2024-02-07	70	2450.00	507	607	707
808	2024-02-08	65	2925.00	508	608	708
809	2024-02-09	55	2475.00	509	609	709
810	2024-02-10	45	2700.00	510	610	710
811	2024-02-11	40	2200.00	511	611	711
812	2024-02-12	30	2100.00	512	612	712
813	2024-02-13	85	1700.00	513	613	713
814	2024-02-14	95	2375.00	514	614	714
815	2024-02-15	100	3000.00	515	615	715
816	2024-02-16	120	4800.00	516	616	716
817	2024-02-17	110	5500.00	517	617	717
818	2024-02-18	75	3375.00	518	618	718
819	2024-02-19	80	2800.00	519	619	719
820	2024-02-20	60	4800.00	520	620	720

5.

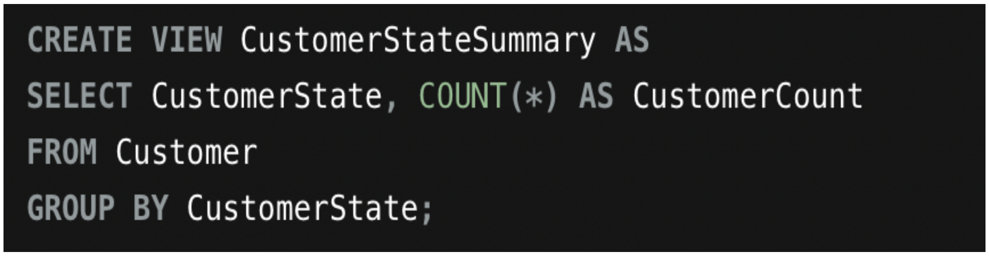


```
CREATE VIEW EmployeeDepartment AS
SELECT e.EmployeeID, e.FirstName, e.LastName, e.EmployeePosition, e.Salary,
       d.DepartmentName
FROM Employee e
INNER JOIN Department d ON e.DepartmentID = d.DepartmentID;
```

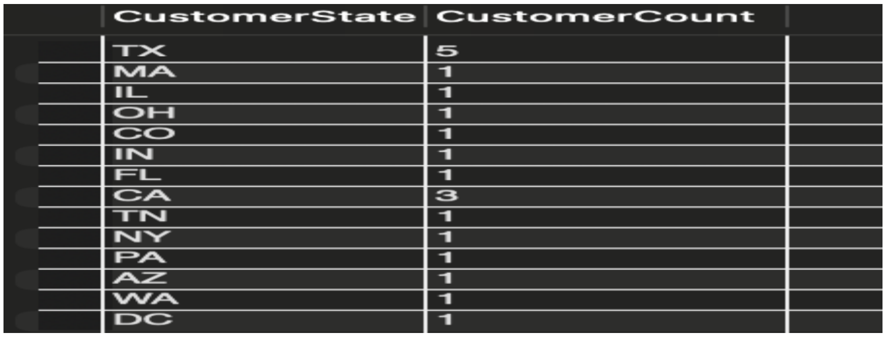


EmployeeID	FirstName	LastName	EmployeePosition	Salary	DepartmentName
501	Michael	Smith	Production Assistant	50000.00	Manufacturing
502	Emily	Johnson	Packaging Technician	55000.00	Packaging Engineering
507	Daniel	Miller	Packaging Lead	80000.00	Packaging Engineering
503	Christopher	Williams	Quality Inspector	65000.00	Quality Assurance
504	Jessica	Brown	Logistics Coordinator	70000.00	Logistics
505	David	Jones	Shipping Clerk	45000.00	Logistics
508	Elizabeth	Wilson	Shipping Supervisor	85000.00	Logistics
512	Ashley	Jackson	Carrier Liaison	70000.00	Logistics
506	Amanda	Davis	Quality Control Specialist	75000.00	Quality Control
509	Andrew	Taylor	Order Coordinator	90000.00	Order Management
516	Megan	Lopez	Returns Specialist	60000.00	Order Management
518	Stephanie	Lee	Modification Specialist	75000.00	Order Management
519	Kevin	Gonzalez	Approval Coordinator	80000.00	Order Management
520	Hannah	Perez	Cancellation Coordinator	85000.00	Order Management
515	Ryan	Garcia	Exception Handler	55000.00	Operations
510	Olivia	Anderson	Delivery Scheduler	60000.00	Distribution
511	Matthew	Thomas	Delivery Personnel	65000.00	Distribution
513	Justin	Harris	Warehouse Operator	55000.00	Inventory Management
517	Nicholas	King	Inventory Controller	70000.00	Inventory Management
514	Lauren	Martinez	Transit Coordinator	60000.00	Transportation

6.

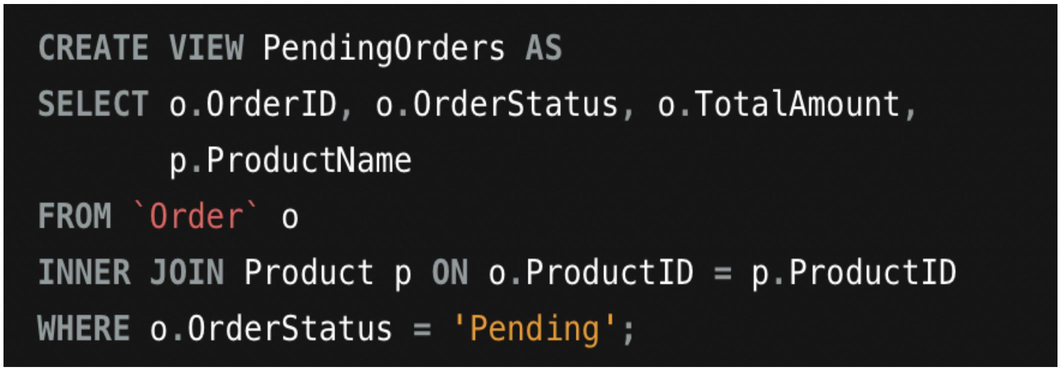


```
CREATE VIEW CustomerStateSummary AS
SELECT CustomerState, COUNT(*) AS CustomerCount
FROM Customer
GROUP BY CustomerState;
```

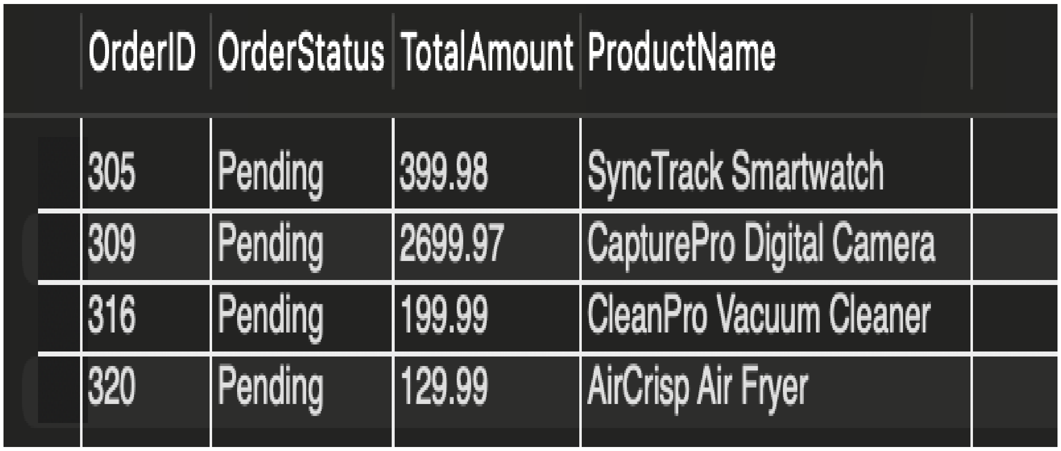


CustomerState	CustomerCount
TX	5
MA	1
IL	1
OH	1
CO	1
IN	1
FL	1
CA	3
TN	1
NY	1
PA	1
AZ	1
WA	1
DC	1

7.

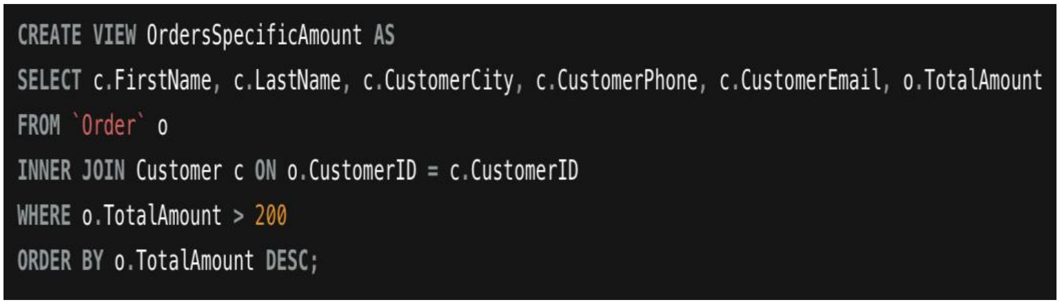


```sql
CREATE VIEW PendingOrders AS
SELECT o.OrderID, o.OrderStatus, o.TotalAmount,
       p.ProductName
FROM `Order` o
INNER JOIN Product p ON o.ProductID = p.ProductID
WHERE o.OrderStatus = 'Pending';
```

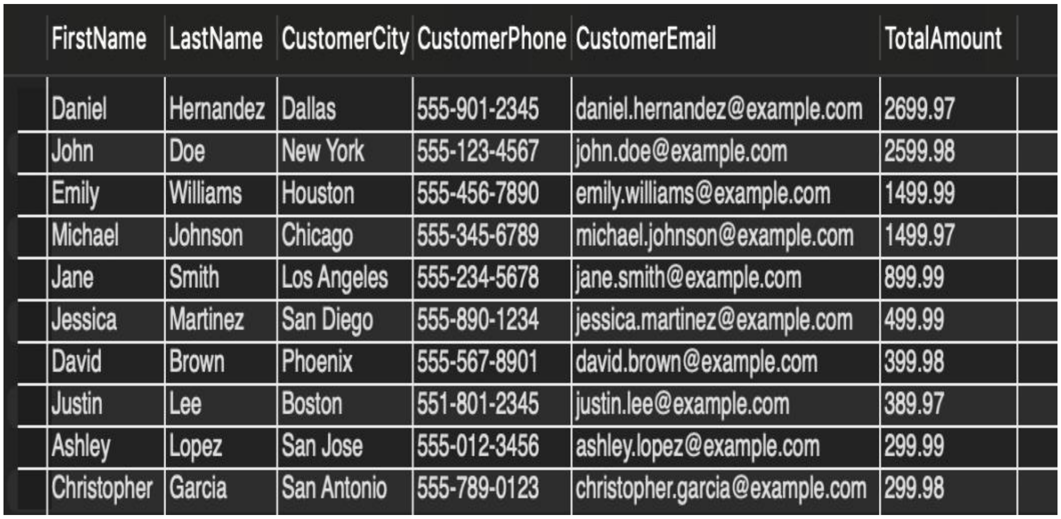


OrderID	OrderStatus	TotalAmount	ProductName
305	Pending	399.98	SyncTrack Smartwatch
309	Pending	2699.97	CapturePro Digital Camera
316	Pending	199.99	CleanPro Vacuum Cleaner
320	Pending	129.99	AirCrisp Air Fryer

8.

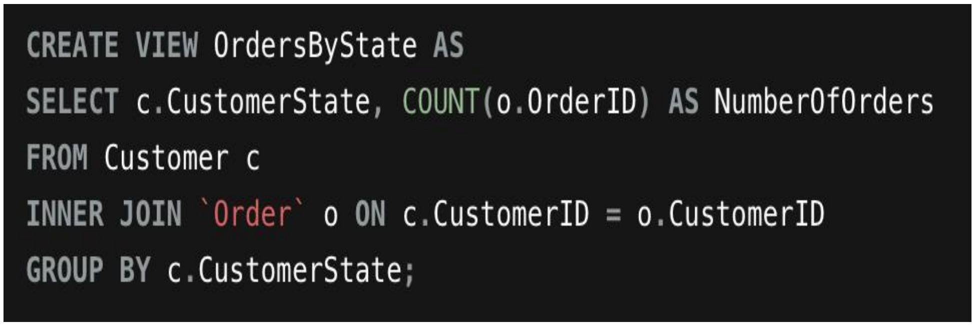


```
CREATE VIEW OrdersSpecificAmount AS
SELECT c.FirstName, c.LastName, c.CustomerCity, c.CustomerPhone, c.CustomerEmail, o.TotalAmount
FROM `Order` o
INNER JOIN Customer c ON o.CustomerID = c.CustomerID
WHERE o.TotalAmount > 200
ORDER BY o.TotalAmount DESC;
```

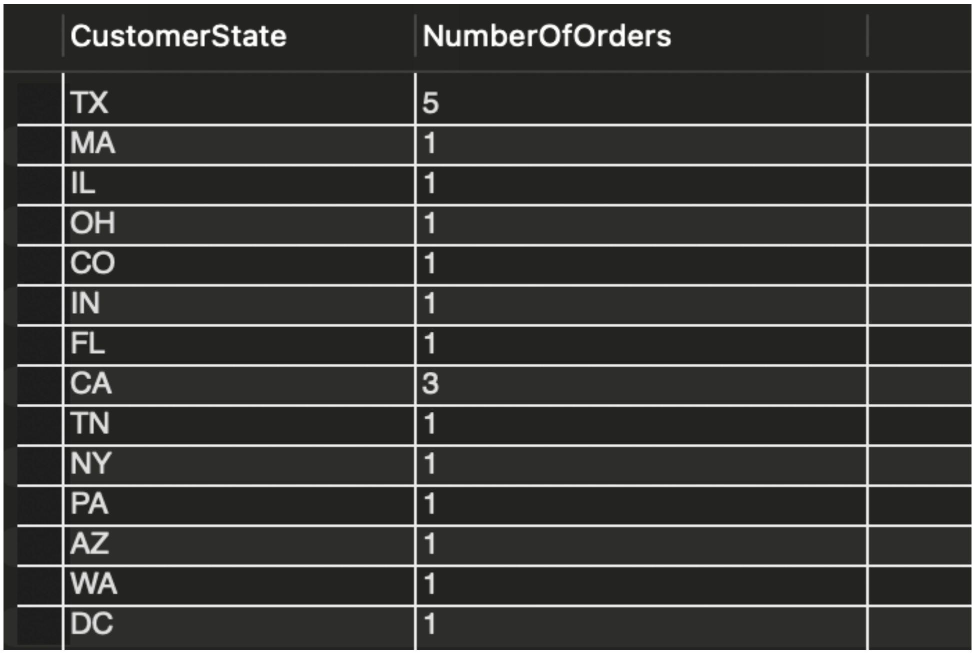


FirstName	LastName	CustomerCity	CustomerPhone	CustomerEmail	TotalAmount
Daniel	Hernandez	Dallas	555-901-2345	daniel.hernandez@example.com	2699.97
John	Doe	New York	555-123-4567	john.doe@example.com	2599.98
Emily	Williams	Houston	555-456-7890	emily.williams@example.com	1499.99
Michael	Johnson	Chicago	555-345-6789	michael.johnson@example.com	1499.97
Jane	Smith	Los Angeles	555-234-5678	jane.smith@example.com	899.99
Jessica	Martinez	San Diego	555-890-1234	jessica.martinez@example.com	499.99
David	Brown	Phoenix	555-567-8901	david.brown@example.com	399.98
Justin	Lee	Boston	551-801-2345	justin.lee@example.com	389.97
Ashley	Lopez	San Jose	555-012-3456	ashley.lopez@example.com	299.99
Christopher	Garcia	San Antonio	555-789-0123	christopher.garcia@example.com	299.98

9.

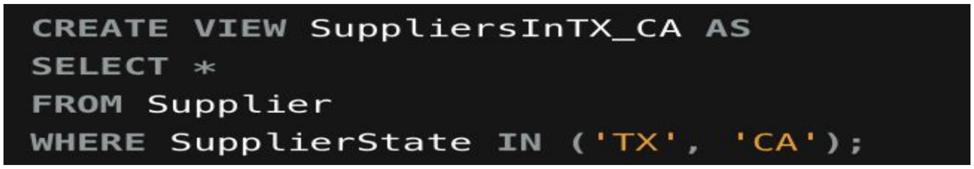


```
CREATE VIEW OrdersByState AS
SELECT c.CustomerState, COUNT(o.OrderID) AS NumberOfOrders
FROM Customer c
INNER JOIN `Order` o ON c.CustomerID = o.CustomerID
GROUP BY c.CustomerState;
```

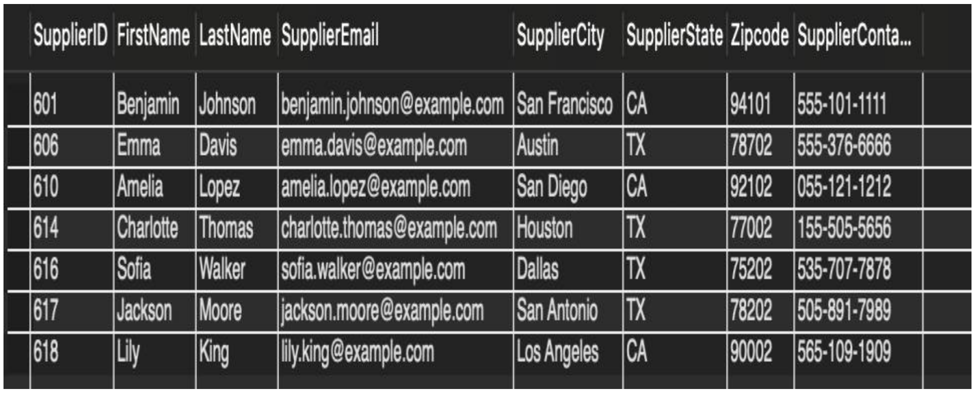


CustomerState	NumberOfOrders
TX	5
MA	1
IL	1
OH	1
CO	1
IN	1
FL	1
CA	3
TN	1
NY	1
PA	1
AZ	1
WA	1
DC	1

10.

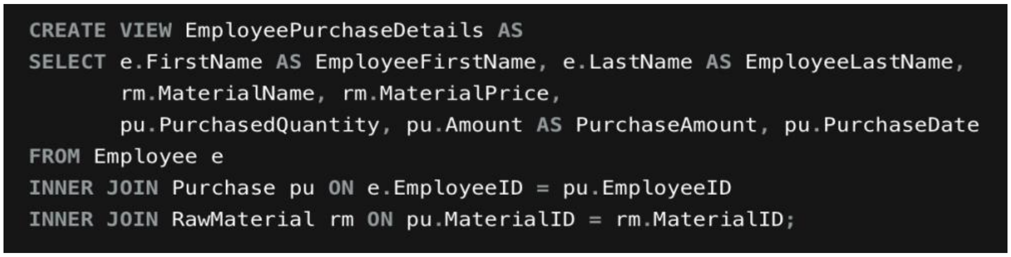


```
CREATE VIEW SuppliersInTX_CA AS
SELECT *
FROM Supplier
WHERE SupplierState IN ('TX', 'CA');
```

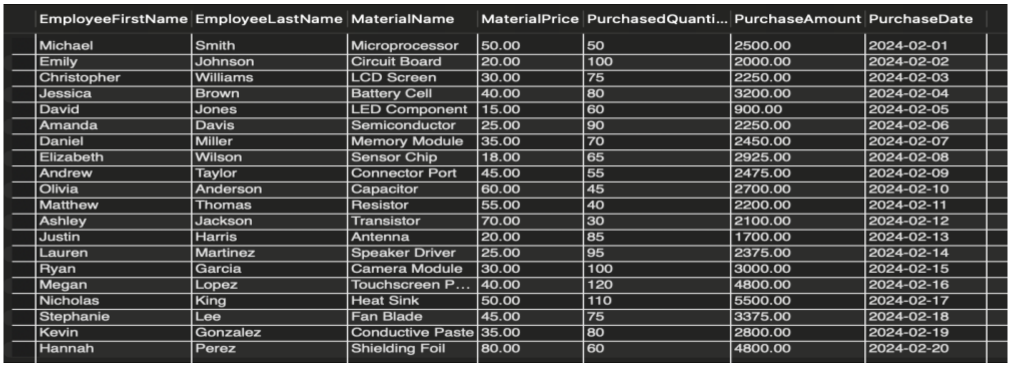


SupplierID	FirstName	LastName	SupplierEmail	SupplierCity	SupplierState	Zipcode	SupplierConta...
601	Benjamin	Johnson	benjamin.johnson@example.com	San Francisco	CA	94101	555-101-1111
606	Emma	Davis	emma.davis@example.com	Austin	TX	78702	555-376-6666
610	Amelia	Lopez	amelia.lopez@example.com	San Diego	CA	92102	055-121-1212
614	Charlotte	Thomas	charlotte.thomas@example.com	Houston	TX	77002	155-505-5656
616	Sofia	Walker	sofia.walker@example.com	Dallas	TX	75202	535-707-7878
617	Jackson	Moore	jackson.moore@example.com	San Antonio	TX	78202	505-891-7989
618	Lily	King	lily.king@example.com	Los Angeles	CA	90002	565-109-1909

11.

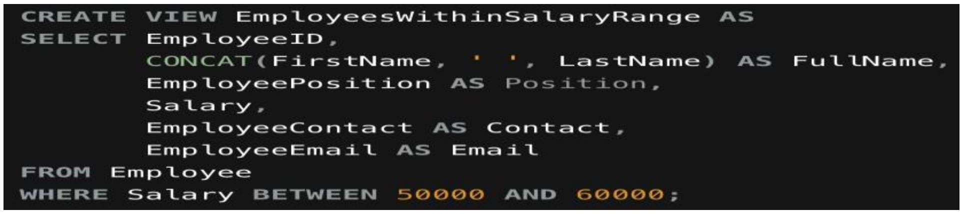


```sql
CREATE VIEW EmployeePurchaseDetails AS
SELECT e.FirstName AS EmployeeFirstName, e.LastName AS EmployeeLastName,
       rm.MaterialName, rm.MaterialPrice,
       pu.PurchasedQuantity, pu.Amount AS PurchaseAmount, pu.PurchaseDate
FROM Employee e
INNER JOIN Purchase pu ON e.EmployeeID = pu.EmployeeID
INNER JOIN RawMaterial rm ON pu.MaterialID = rm.MaterialID;
```

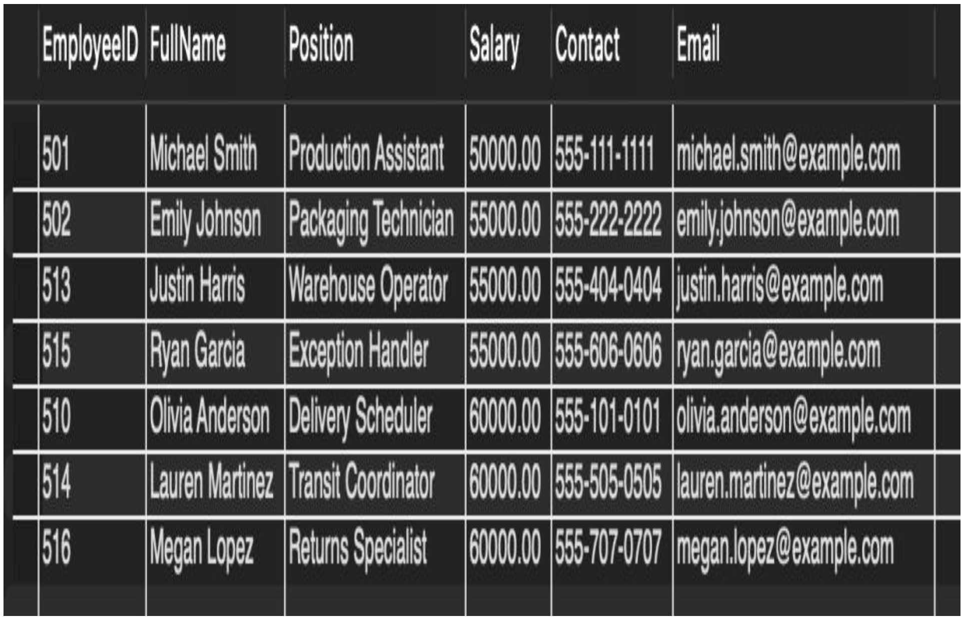


EmployeeFirstName	EmployeeLastName	MaterialName	MaterialPrice	PurchasedQuanti...	PurchaseAmount	PurchaseDate
Michael	Smith	Microprocessor	50.00	50	2500.00	2024-02-01
Emily	Johnson	Circuit Board	20.00	100	2000.00	2024-02-02
Christopher	Williams	LCD Screen	30.00	75	2250.00	2024-02-03
Jessica	Brown	Battery Cell	40.00	80	3200.00	2024-02-04
David	Jones	LED Component	15.00	60	900.00	2024-02-05
Amanda	Davis	Semiconductor	25.00	90	2250.00	2024-02-06
Daniel	Miller	Memory Module	35.00	70	2450.00	2024-02-07
Elizabeth	Wilson	Sensor Chip	18.00	65	2925.00	2024-02-08
Andrew	Taylor	Connector Port	45.00	55	2475.00	2024-02-09
Olivia	Anderson	Capacitor	60.00	45	2700.00	2024-02-10
Matthew	Thomas	Resistor	55.00	40	2200.00	2024-02-11
Ashley	Jackson	Transistor	70.00	30	2100.00	2024-02-12
Justin	Harris	Antenna	20.00	85	1700.00	2024-02-13
Lauren	Martinez	Speaker Driver	25.00	95	2375.00	2024-02-14
Ryan	Garcia	Camera Module	30.00	100	3000.00	2024-02-15
Megan	Lopez	Touchscreen P...	40.00	120	4800.00	2024-02-16
Nicholas	King	Heat Sink	50.00	110	5500.00	2024-02-17
Stephanie	Lee	Fan Blade	45.00	75	3375.00	2024-02-18
Kevin	Gonzalez	Conductive Paste	35.00	80	2800.00	2024-02-19
Hannah	Perez	Shielding Foil	80.00	60	4800.00	2024-02-20

12.



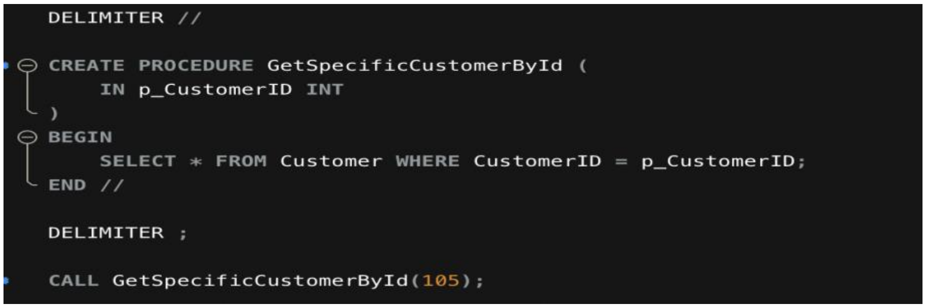
```sql
CREATE VIEW EmployeesWithinSalaryRange AS
SELECT EmployeeID,
       CONCAT(FirstName, ' ', LastName) AS FullName,
       EmployeePosition AS Position,
       Salary,
       EmployeeContact AS Contact,
       EmployeeEmail AS Email
FROM Employee
WHERE Salary BETWEEN 50000 AND 60000;
```



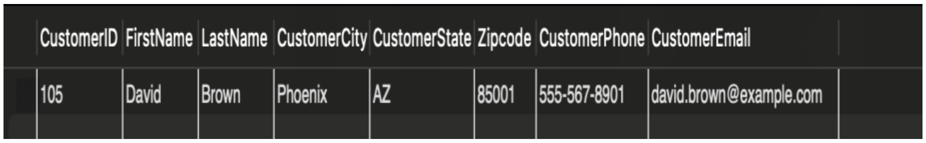
EmployeeID	FullName	Position	Salary	Contact	Email
501	Michael Smith	Production Assistant	50000.00	555-111-1111	michael.smith@example.com
502	Emily Johnson	Packaging Technician	55000.00	555-222-2222	emily.johnson@example.com
513	Justin Harris	Warehouse Operator	55000.00	555-404-0404	justin.harris@example.com
515	Ryan Garcia	Exception Handler	55000.00	555-606-0606	ryan.garcia@example.com
510	Olivia Anderson	Delivery Scheduler	60000.00	555-101-0101	olivia.anderson@example.com
514	Lauren Martinez	Transit Coordinator	60000.00	555-505-0505	lauren.martinez@example.com
516	Megan Lopez	Returns Specialist	60000.00	555-707-0707	megan.lopez@example.com

Stored Procedures:

1.

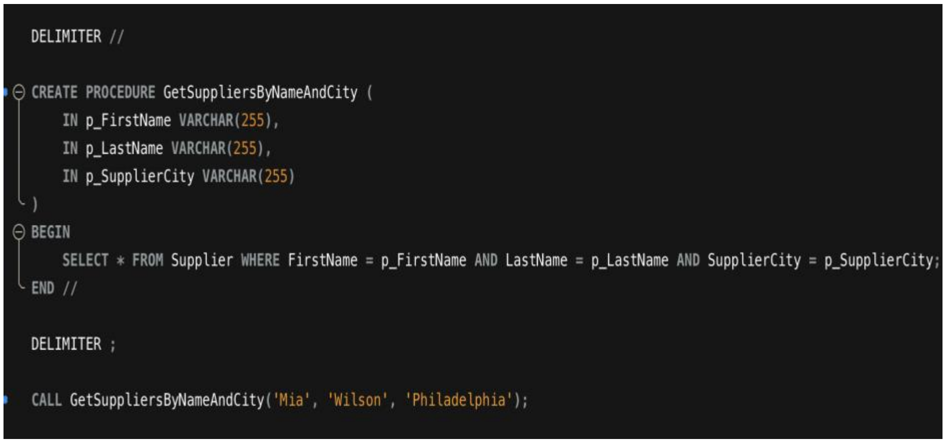


```
DELIMITER //

CREATE PROCEDURE GetSpecificCustomerById (
    IN p_CustomerID INT
)
BEGIN
    SELECT * FROM Customer WHERE CustomerID = p_CustomerID;
END //

DELIMITER ;

CALL GetSpecificCustomerById(105);
```

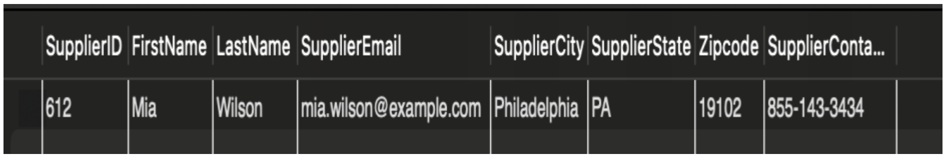


CustomerID	FirstName	LastName	CustomerCity	CustomerState	Zipcode	CustomerPhone	CustomerEmail
105	David	Brown	Phoenix	AZ	85001	555-567-8901	david.brown@example.com

2.

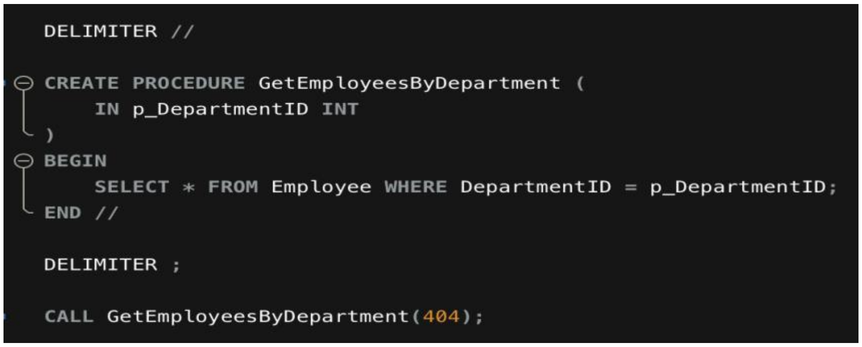


```
DELIMITER //

CREATE PROCEDURE GetSuppliersByNameAndCity (
    IN p_FirstName VARCHAR(255),
    IN p_LastName VARCHAR(255),
    IN p_SupplierCity VARCHAR(255)
)
BEGIN
    SELECT * FROM Supplier WHERE FirstName = p_FirstName AND LastName = p_LastName AND SupplierCity = p_SupplierCity;
END //

DELIMITER ;

CALL GetSuppliersByNameAndCity('Mia', 'Wilson', 'Philadelphia');
```

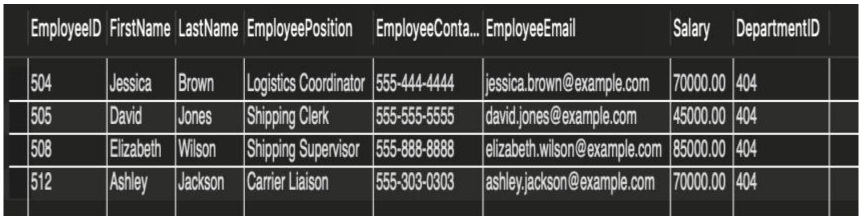


SupplierID	FirstName	LastName	SupplierEmail	SupplierCity	SupplierState	Zipcode	SupplierConta...
612	Mia	Wilson	mia.wilson@example.com	Philadelphia	PA	19102	855-143-3434

3.

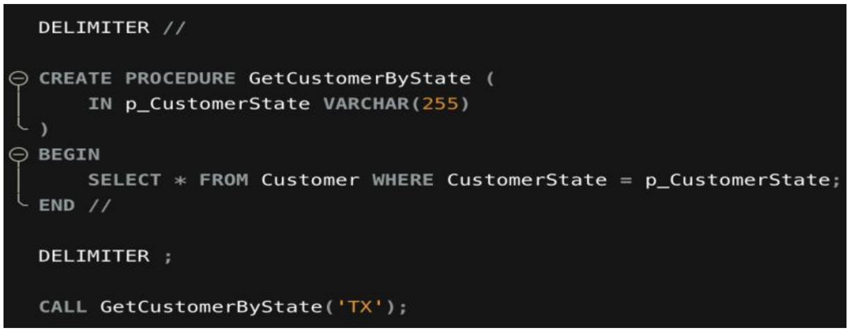


```
DELIMITER //

CREATE PROCEDURE GetEmployeesByDepartment (
    IN p_DepartmentID INT
)
BEGIN
    SELECT * FROM Employee WHERE DepartmentID = p_DepartmentID;
END //

DELIMITER ;

CALL GetEmployeesByDepartment(404);
```

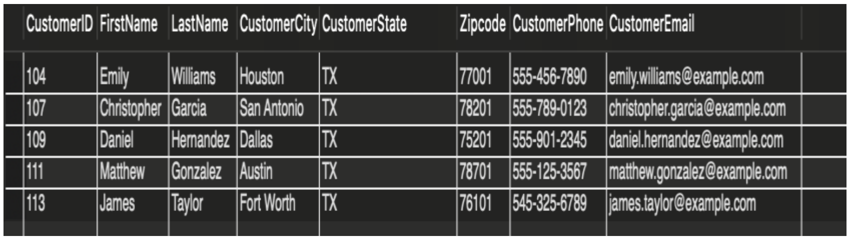


EmployeeID	FirstName	LastName	EmployeePosition	EmployeeConta...	EmployeeEmail	Salary	DepartmentID
504	Jessica	Brown	Logistics Coordinator	555-444-4444	jessica.brown@example.com	70000.00	404
505	David	Jones	Shipping Clerk	555-555-5555	david.jones@example.com	45000.00	404
508	Elizabeth	Wilson	Shipping Supervisor	555-888-8888	elizabeth.wilson@example.com	85000.00	404
512	Ashley	Jackson	Carrier Liaison	555-303-0303	ashley.jackson@example.com	70000.00	404

4.

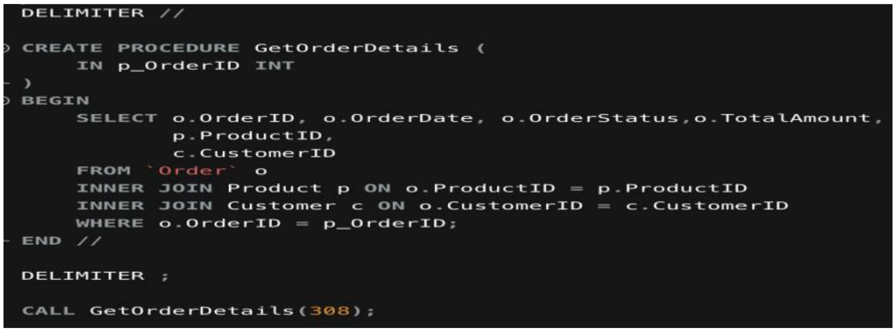


```
DELIMITER //

CREATE PROCEDURE GetCustomerByState (
    IN p_CustomerState VARCHAR(255)
)
BEGIN
    SELECT * FROM Customer WHERE CustomerState = p_CustomerState;
END //

DELIMITER ;

CALL GetCustomerByState('TX');
```

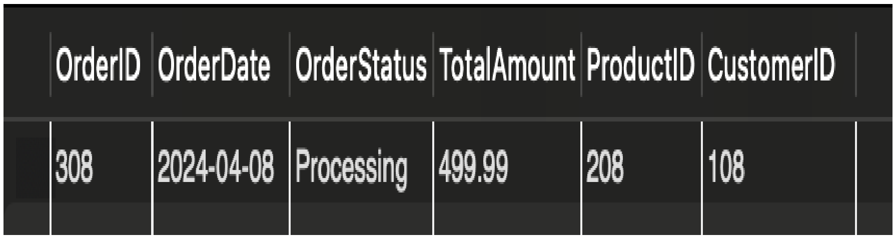


CustomerID	FirstName	LastName	CustomerCity	CustomerState	Zipcode	CustomerPhone	CustomerEmail
104	Emily	Williams	Houston	TX	77001	555-456-7890	emily.williams@example.com
107	Christopher	Garcia	San Antonio	TX	78201	555-789-0123	christopher.garcia@example.com
109	Daniel	Hernandez	Dallas	TX	75201	555-901-2345	daniel.hernandez@example.com
111	Matthew	Gonzalez	Austin	TX	78701	555-125-3567	matthew.gonzalez@example.com
113	James	Taylor	Fort Worth	TX	76101	545-325-6789	james.taylor@example.com

5.

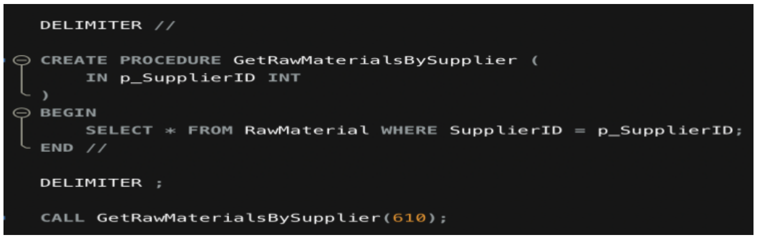


```
DELIMITER //

CREATE PROCEDURE GetOrderDetails (
    IN p_OrderID INT
)
BEGIN
    SELECT o.OrderID, o.OrderDate, o.OrderStatus,o.TotalAmount,
           p.ProductID,
           c.CustomerID
    FROM `Order` o
    INNER JOIN Product p ON o.ProductID = p.ProductID
    INNER JOIN Customer c ON o.CustomerID = c.CustomerID
    WHERE o.OrderID = p_OrderID;
END //

DELIMITER ;

CALL GetOrderDetails(308);
```

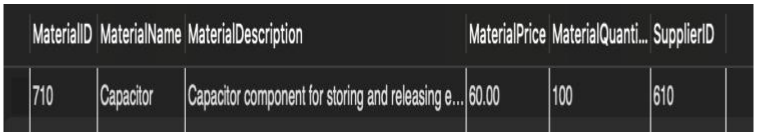


OrderID	OrderDate	OrderStatus	TotalAmount	ProductID	CustomerID
308	2024-04-08	Processing	499.99	208	108

6.



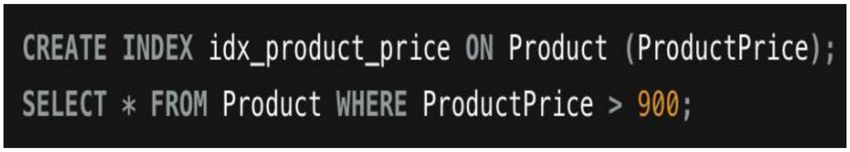
```
DELIMITER //

CREATE PROCEDURE GetRawMaterialsBySupplier (
    IN p_SupplierID INT
)
BEGIN
    SELECT * FROM RawMaterial WHERE SupplierID = p_SupplierID;
END //

DELIMITER ;

CALL GetRawMaterialsBySupplier(610);
```



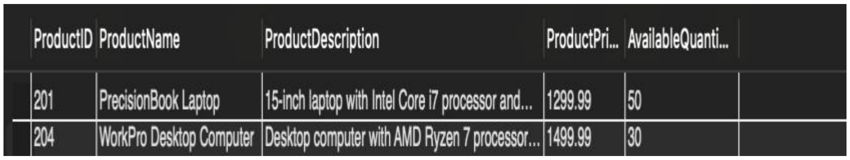
MaterialID	MaterialName	MaterialDescription	MaterialPrice	MaterialQuanti...	SupplierID
710	Capacitor	Capacitor component for storing and releasing e...	60.00	100	610

Indexes:

1.

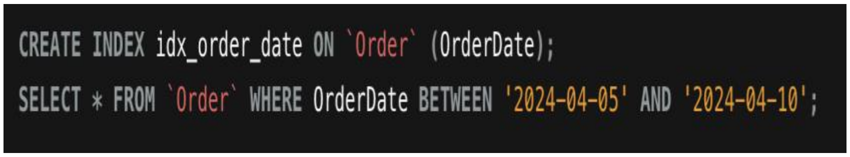


```
CREATE INDEX idx_product_price ON Product (ProductPrice);
SELECT * FROM Product WHERE ProductPrice > 900;
```

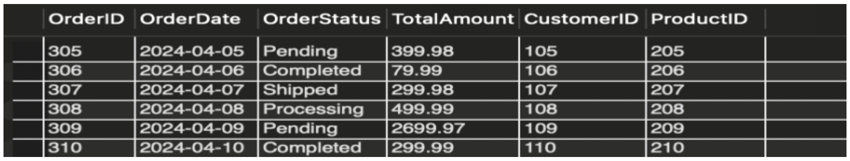


ProductID	ProductName	ProductDescription	ProductPri...	AvailableQuanti...
201	PrecisionBook Laptop	15-inch laptop with Intel Core i7 processor and...	1299.99	50
204	WorkPro Desktop Computer	Desktop computer with AMD Ryzen 7 processor...	1499.99	30

2.

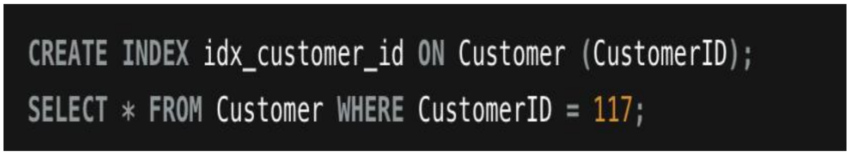


```
CREATE INDEX idx_order_date ON `Order` (OrderDate);
SELECT * FROM `Order` WHERE OrderDate BETWEEN '2024-04-05' AND '2024-04-10';
```

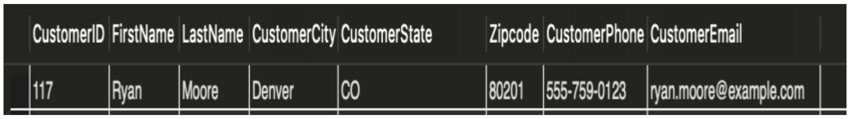


OrderID	OrderDate	OrderStatus	TotalAmount	CustomerID	ProductID
305	2024-04-05	Pending	399.98	105	205
306	2024-04-06	Completed	79.99	106	206
307	2024-04-07	Shipped	299.98	107	207
308	2024-04-08	Processing	499.99	108	208
309	2024-04-09	Pending	2699.97	109	209
310	2024-04-10	Completed	299.99	110	210

3.

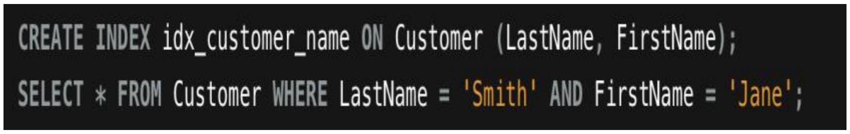


```
CREATE INDEX idx_customer_id ON Customer (CustomerID);
SELECT * FROM Customer WHERE CustomerID = 117;
```

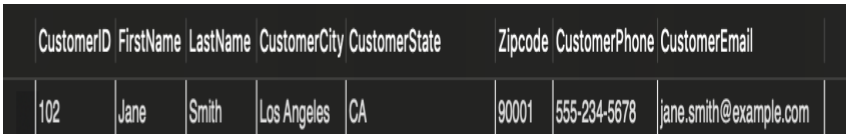


CustomerID	FirstName	LastName	CustomerCity	CustomerState	Zipcode	CustomerPhone	CustomerEmail
117	Ryan	Moore	Denver	CO	80201	555-759-0123	ryan.moore@example.com

4.



```
CREATE INDEX idx_customer_name ON Customer (LastName, FirstName);
SELECT * FROM Customer WHERE LastName = 'Smith' AND FirstName = 'Jane';
```



CustomerID	FirstName	LastName	CustomerCity	CustomerState	Zipcode	CustomerPhone	CustomerEmail
102	Jane	Smith	Los Angeles	CA	90001	555-234-5678	jane.smith@example.com