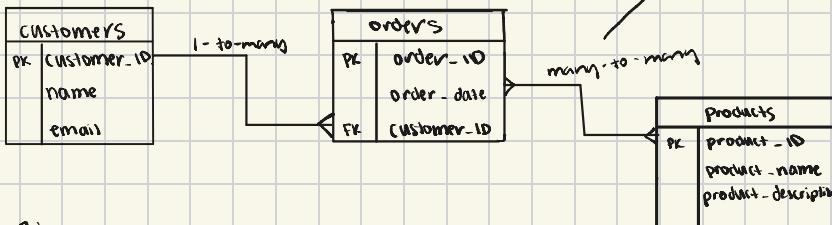


LAB 3: ER modeling, ER → relational, 3. join queries

part A:

- online store: customer places Orders that contain Products.
Track quantity and price-at-purchase for each order item

relational attributes:
quantity & price-at-purchase



part B:

table: customers

columns:

- customer_id integer
- name varchar (150)
- email varchar (150)

primary key: customer_id

table: products

columns:

- product_id integer
- product_name varchar (150)
- product_description (text - can be null)

primary key: product_id

foreign keys: none

where relational attributes are stored: a product can be in different orders

table: Orders

columns:

- Order_id integer
- Order_date date
- customer_id integer

primary key: order_id

foreign keys: customer_id references customer - customer_id
where relational attributes are stored:

due to the foreign key - customer_id.
one customer can place many
orders & each order is for one customer
∴ 1 to many

table: Order_Items

columns:

- order_id integer
- product_id integer
- quantity integer
- price_at_purchase integer

primary key: composite (order_id, product_id)

foreign keys: order_id references Orders(order_id),
product_id references products(product_id)

* quantity & price-at-purchase are stored here
as relational attributes. they are specific
to a product in the order.

Part C: Implement in PostgreSQL

• SQL table statements:

Object Explorer File × Dependents × Processes × cmpt308_lab2/pos... × cmpt308_lab03/postgres@PostgreSQL 18* × cmpt308_lab03/p... × cmpt308_lab03/p... × cmpt308_lab03/p... × cmpt308_lab03/p...

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Query History

```
1 CREATE TABLE Customers (
2     customer_id INT PRIMARY KEY,
3     name VARCHAR(150),
4     email VARCHAR(150)
5 );
6
7 CREATE TABLE Orders (
8     order_id INT PRIMARY KEY,
9     order_date DATE,
10    customer_id INT REFERENCES Customers(customer_id)
11 );
12
13 CREATE TABLE Products (
14     product_id INT PRIMARY KEY,
15     product_name VARCHAR(100),
16     description TEXT
17 );
18
19 CREATE TABLE Order_Items (
20     order_id INT REFERENCES Orders(order_id),
21     product_id INT REFERENCES Products(product_id),
22     quantity INT CHECK (quantity > 0),
23     price_at_purchase NUMERIC(10, 2),
24     PRIMARY KEY (order_id, product_id)
25 );
26
27
28 }
```

utilized gemini to help me create the join-table & return "DATE" is "TEXT" are options that can be used in SQL.

SQL insert into statements

* referenced openmin to make sure table is inputed correctly

The screenshot shows the pgAdmin 4 interface. The left sidebar is the Object Explorer, displaying the database structure for 'cmpt308_lab03' under 'PostgreSQL 18'. The 'Tables' section is expanded, showing various system tables like 'Customer', 'Products', 'Orders', and 'Order_items'. The 'Tables(4)' section is also expanded, showing 'customers', 'order_items', 'orders', and 'products'. The right pane is a query editor window titled 'Query' with the identifier 'cmpt308_lab03/postgres@PostgreSQL 18'. It contains a multi-line SQL script for inserting data into these tables. The script includes three main sections: inserting into 'Customer', 'Products', and 'Orders'. The 'Customer' section has 18 rows. The 'Products' section has 28 rows. The 'Orders' section has 8 rows. The 'Order_items' section has 46 rows. The bottom of the query editor shows tabs for 'Data Output', 'Messages', and 'Notifications', with 'Messages' selected. A status bar at the bottom indicates 'Total rows: Query complete 00:00:00.226'.

```
1  INSERT INTO Customer (customer_id, name, email) VALUES
2  (101, 'Seema Khan', 'seema.khan@gmail.com'),
3  (102, 'Sienna Cruz', 'sienna.cruz@gmail.com'),
4  (103, 'Joseph Verdi', 'joseph.verdi@gmail.com'),
5  (104, 'Matthew Eiler', 'matthew.eiler@gmail.com'),
6  (105, 'Marina Denezza', 'marina.denezza@gmail.com'),
7  (106, 'Daniel Narweski', 'daniel.narweski@gmail.com'),
8  (107, 'Julianne Arnold', 'julianne.arnold@gmail.com' ),
9  (108, 'Saif Khan', 'saif.khan@gmail.com');
10
11 INSERT INTO Products (product_id, product_name, description) VALUES
12 (201, 'Laptop', 'High performance'),
13 (202, 'Mouse', 'Wireless'),
14 (203, 'Keyboard', NULL),
15 (204, 'Monitor', '4K Resolution'),
16 (205, 'USB Cable', NULL),
17 (206, 'Webcam', '1080p'),
18 (207, 'Desk Lamp', 'LED'),
19 (208, 'Chair', NULL);
20
21 INSERT INTO Orders (order_id, order_date, customer_id) VALUES
22 (1001, '2026-01-01', 101),
23 (1002, '2026-01-02', 102),
24 (1003, '2026-01-03', 103),
25 (1004, '2026-01-04', 104),
26 (1005, '2026-01-05', 105),
27 (1006, '2026-01-06', 106),
28 (1007, '2026-01-07', 107),
29 (1008, '2026-01-08', 108);
30
31 INSERT INTO Order_items (order_id, product_id, quantity, price_at_purchase) VALUES
32 (1001, 201, 1, 1200.00),
33 (1001, 202, 1, 25.00),
34 (1001, 203, 1, 45.00),
35 (1002, 204, 1, 300.00),
36 (1002, 205, 2, 10.00),
37 (1003, 201, 1, 1200.00),
38 (1003, 206, 1, 60.00),
39 (1004, 207, 3, 30.00),
40 (1004, 208, 1, 150.00),
41 (1005, 202, 2, 25.00),
42 (1005, 203, 1, 45.00),
43 (1006, 204, 1, 300.00),
44 (1007, 201, 1, 1200.00),
45 (1008, 208, 1, 150.00),
46 (1008, 205, 5, 8.00);
```

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Object Explorer Query History

```

1 two table join
2 SELECT o.order_id, o.order_date, c.name, c.email
3 FROM orders o
4 JOIN customers c ON o.customer_id = c.customer_id;
5
6

```

Data Output Messages Notifications

	order_id	order_date	name	email
1	1001	2026-01-01	Seema Khan	seema.khan@gmail.com
2	1002	2026-01-01	Sienna Cruz	sienna.cruz@gmail.com
3	1003	2026-01-01	Joseph Verdi	joseph.verdi@gmail.com
4	1004	2026-01-04	Matthew Eller	matthew.eller@gmail.com
5	1005	2026-01-05	Marina Denezza	marina.denezza@gmail.com
6	1006	2026-01-06	Daniel Narweski	daniel.narweski@gmail.com
7	1007	2026-01-07	Julianna Arnold	julianna.arnold@gmail.com
8	1008	2026-01-08	Saif Khan	saif.khan@gmail.com

Total rows: 8 Query complete 00:00:00.114

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Object Explorer Query History

```

1 three table join
2 SELECT c.name, p.product_name, oi.quantity
3 FROM
4 JOIN orders o ON c.customer_id = o.customer_id
5 JOIN order_items oi ON o.order_id = oi.order_id
6 JOIN products p ON oi.product_id = p.product_id;
7

```

*{referenced
renamed
for help
on the three
table join}*

Data Output Messages Notifications

	name	product_name	quantity
1	Seema Khan	Laptop	1
2	Seema Khan	Mouse	1
3	Seema Khan	Keyboard	1
4	Sienna Cruz	Monitor	1
5	Sienna Cruz	USB Cable	2
6	Joseph Verdi	Laptop	1
7	Joseph Verdi	Webcam	1
8	Matthew Eller	Desk Lamp	3
9	Matthew Eller	Chair	1
10	Marina Denezza	Mouse	2
11	Marina Denezza	Keyboard	1
12	Daniel Narweski	Monitor	1
13	Julianna Arnold	Laptop	1
14	Saif Khan	Chair	1
15	Saif Khan	USB Cable	5

Total rows: 15 Query complete 00:00:00.168

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Query

```
-- join & filter
SELECT o.order_id, p.product_name, oi.quantity
FROM orders o
JOIN order_items oi ON o.order_id = oi.order_id
JOIN products p ON oi.product_id = p.product_id
WHERE oi.quantity > 2;
```

Scratch Pad

Data Output Messages Notifications

order_id	product_name	quantity	
1	1004	Desk Lamp	3
2	1008	USB Cable	5

Showing rows: 1 to 2 | Page No: 1 of 1 | 14

Total rows: 2 Query complete 00:00:00.091

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Query

```
-- join & projection search
SELECT p.product_name, oi.price_at_purchase
FROM products p
JOIN order_items oi ON p.product_id = oi.product_id
ORDER BY oi.price_at_purchase DESC;
```

Scratch Pad

Data Output Messages Notifications

product_name	price_at_purchase
Laptop	1200.00
Laptop	1200.00
Laptop	1200.00
Monitor	300.00
Monitor	300.00
Chair	150.00
Chair	150.00
Webcam	60.00
Keyboard	45.00
Keyboard	45.00

Showing rows: 1 to 15 | Page No: 1 of 1 | 14 <>

Total rows: 15 Query complete 00:00:00.098

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Query History

```
1 -- null query
2 SELECT product_id, product_name
3   FROM products
4 WHERE description IS NULL;
```

Data Output Messages Notifications

product_id	product_name
203	Keyboard
205	USB Cable
208	Chair

Total rows: 3 Query complete 00:00:00.110

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Query History

```
1 --foreign key violation
2 INSERT INTO Order_items(order_id, product_id, quantity, price_at_purchase)VALUES
3 (2000, 501, 1, 1999)
```

Data Output Messages Notifications

ERROR: insert or update on table "order_items" violates foreign key constraint "order_items_order_id_fkey"
Key (order_id)=(2000) is not present in table "orders".
SQL state: 23503
Detail: Key (order_id)=(2000) is not present in table "orders".

Total rows: 0 Query complete 00:00:00.094

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Query History

```
1 --constraints
2 INSERT INTO Order_items(order_id, product_id, quantity, price_at_purchase)VALUES
3 (2000, 501, 0, 1999)
4
```

Scratch Pad

Data Output Messages Notifications

ERROR: new row for relation "order_items" violates check constraint "order_items_quantity_check"
Failing row contains (2000, 501, 0, 1999.00).

SQL state: 23514
Detail: Failing row contains (2000, 501, 0, 1999.00).

Total rows: Query complete 00:00:00.142