```
SELECT * FROM book WHERE current_stock != 0
```

σ(current_stock ≠ 0 (book))

```
SELECT * FROM orders inner join order_book WHERE order_status != 'Closed' AND
orders.order_num = order_book.order_num
```

σ(orders ⋈ orders.order_num = order_book.order_num (order_book) AND (order_status != 'Closed')

```
SELECT * FROM client
```

σ(true)(client)

```
SELECT * FROM supplier
```

σ(true)(supplier)

```
SELECT * FROM deal WHERE deal.deal_date BETWEEN ? AND ?;
```

σ(deal.deal_date BETWEEN ? AND ? (deal))

```
"SELECT * FROM book WHERE book.global_discount > 0
```

σ(book.global_discount > 0 (book))

```
SELECT * FROM book WHERE book.name = ?
```

σ(book.name = ? (book))

```
SELECT supplier.supplier_num, supplier_name FROM temp inner join supplier where
temp.supplier_num = supplier.supplier_num
```

π supplier.supplier_num, supplier_name σ((temp)⋈ temp.supplier_num = supplier.supplier_num (supplier))

```
SELECT * FROM deal INNER JOIN deal_book WHERE deal.deal_num = deal_book.deal_num
AND book_name = ? AND deal_date >= ?
```

σ((deal)⋈ deal.deal_num = deal_book.deal_num (deal_book) AND deal_date >= ?)

```
SELECT * FROM deal INNER JOIN deal_book WHERE deal.deal_num = deal_book.deal_num
AND deal.client_id = ? AND deal.deal_date >= ?
```

σ((deal)⋈ deal.deal_num = deal_book.deal_num (deal_book) AND deal.client_id = ? AND deal.deal_date >= ?)

```
SELECT first_name, last_name FROM client WHERE client_id = ?
```

π first_name, last_name σ(client_id = ?(client))

```
SELECT * FROM client WHERE join_date >= ?
```

σ(join_date >= ?(client))

```
SELECT client.first_name, client.last_name, SUM(deal_books_count.count_books) as
counter FROM client INNER JOIN(SELECT deal.client_id, COUNT(*) AS count_books FROM
deal INNER JOIN deal_book WHERE deal_book.deal_num = deal.deal_num AND
deal.deal_date >= ? GROUP BY deal.deal_num) AS deal_books_count ON
deal_books_count.client_id = client.client_id group by first_name ORDER BY counter
desc
```

N ← ρ(counter) π (client.first_name, client.last_name,
SUM(deal_books_count.count_books)(σ(client ⋈ S)))

S ← ρ(count_books)(π(deal.client_id, COUNT(*)(A)

A ← ρ(deal_books_count) σ(deal.deal_num γ ((deal) ⋈ deal_book.deal_num =
deal.deal_num AND deal.deal_date >= ? (deal_book) ⋈ (B))

B ← first_name γ (deal_books_count.client_id = client.client_id))

Res ← τ counter desc (B)

```
SELECT * FROM orders where order_date >= ? AND order_date <= ?
```

σ(order_date >= ? AND order_date <= ?(orders))

```
SELECT first_name, last_name, SUM(deal_val) as sales FROM deal inner join worker
where worker.id = ? AND emp_id = ? AND deal.deal_date >= ? AND deal.deal_date <= ?
AND is_canceled = false
```

ρ(sales) π(first_name, last_name, SUM(deal_val)) σ((deal) ⋈ worker.id = ? AND emp_id = ? AND deal.deal_date >= ? AND deal.deal_date <= ? AND is_canceled = false (worker))

```
("SELECT supplier.supplier_num,
supplier.supplier_name,
SUM(order_books_count.count_books)
as counter     FROM supplier INNER
JOIN (SELECT orders.supplier_num,
COUNT(*) AS count_books FROM
orders "

        "INNER JOIN order_book WHERE
order_book.order_num = orders.order_num AND
orders.order_date >= ? "

        "GROUP BY orders.order_num) AS
order_books_count WHERE
order_books_count.supplier_num =
supplier.supplier_num "

        "group by supplier_num ORDER BY
counter desc;");
```

A ← ρ(counter) π(supplier.supplier_num, supplier.supplier_name, SUM(order_books_count.count_books)) σ((supplier)⋈ (B))

B ← ρ(count_books) π(orders.supplier_num, COUNT(*)) σ((orders)⋈ order_book.order_num = orders.order_num AND orders.order_date >= ? (order_book))

C ← (B) ρ(order_books_count) orders.order_num γ σ(order_books_count.supplier_num = supplier.supplier_num)

D ← (C) supplier_num γ

E ← τ counter desc (A)

```
SELECT first_name,
last_name,
SUM(ceiling(deal_val
* deal.discount)) AS
total_discount FROM
deal INNER JOIN
client WHERE "
                                                        "deal_date >=
? AND deal.client_id = ? AND client.client_id =
deal.client_id ;");
```

ρ(total_discount) π (first_name, last_name, SUM(ceiling(deal_val * deal.discount)))
σ((deal)⋈ deal_date >= ? AND deal.client_id = ? AND client.client_id = deal.client_id (client))

```
("SELECT
deal_book.book_name,
COUNT(*) AS
book_count FROM deal
INNER JOIN deal_book
WHERE deal.deal_num
= deal_book.deal_num
"
                                                        "AND
deal.deal_date >= ? AND deal.deal_date <= ? AND
deal.is_canceled = false group by book_name ORDER BY
book_count DESC;");
```

A ← ρ(book_count) π (deal_book.book_name, COUNT(*)) σ((deal)⋈deal.deal_num = deal_book.deal_num AND deal.deal_date >= ? AND deal.deal_date <= ? AND deal.is_canceled = false(deal_book))

B ← (book_name) γ (A)

C ← τ book_count DESC (B)

```
SELECT book_name,
supplier_price FROM
order_book INNER
JOIN orders INNER
JOIN book WHERE
order_book.book_name
= book.name "

                                                    "AND
                    orders.order_date BETWEEN ? AND ? AND orders.order_num =
                    order_book.order_num AND orders.supplier_num = ?;");
```

π (book_name, supplier_price) σ((order_book)⋈ order_book.book_name = book.name(orders) AND (orders)⋈ orders.order_date BETWEEN ? AND ? AND orders.order_num = order_book.order_num AND orders.supplier_num = ? (book)

```
SELECT supplier_name FROM supplier WHERE supplier.supplier_num = ?
```

π supplier_name σ(supplier.supplier_num = ?(supplier))

```
"SELECT
orders.order_num,
orders.order_date,
first_name,
last_name FROM
orders inner join
order_book inner
join client WHERE
order_date BETWEEN
? AND ? AND
order_status =
'Closed'"

                                                "AND orders.order_num
                    = order_book.order_num AND orders.client_id =
                    client.client_id group by order_num;");
```

π (orders.order_num, orders.order_date, first_name, last_name) σ(order_date BETWEEN ? AND ? AND order_status = 'Closed' AND orders.order_num = order_book.order_num AND orders.client_id = client.client_id group by order_num (orders) ⋈ (order_book) ⋈ (client))

```
SELECT deal_val,
SUM(book.supplier_price)
AS price FROM deal INNER
JOIN deal_book INNER
JOIN book WHERE
deal_date BETWEEN ? AND
? "
                                                                    "AND
                          deal.deal_num = deal_book.deal_num AND book.name =
                          deal_book.book_name group by deal.deal_num;");
```

ρ(price) π (deal_val, SUM(book.supplier_price)) deal.deal_num γ(σ ((deal_date BETWEEN ? AND ?)(deal)⋈(deal_book)⋈(book) AND deal.deal_num = deal_book.deal_num AND book.name = deal_book.book_name))