

Transactions

ACID Properties

- **Atomicity** - All statements succeed or none succeed.
- **Consistency** - Data moves from one valid state to another.
- **Isolation** - Parallel transactions don't interfere.
- **Durability** - Committed data is permanently saved.

Transactions

Disable autocommit

SET *autocommit* = 0;

Enable autocommit

SET *autocommit* = 1;

Transactions

Start & Commit

START TRANSACTION;

UPDATE accounts SET balance = balance - 50 WHERE id = 1;

UPDATE accounts SET balance = balance + 50 WHERE id = 2;

COMMIT;

Transactions

Rollback

```
START TRANSACTION;
```

```
UPDATE accounts SET balance = balance - 100 WHERE id = 1;
```

```
UPDATE accounts SET balance = balance + 100 WHERE id = 3;
```

```
ROLLBACK;
```

Transactions

Savepoint

```
START TRANSACTION;
```

```
UPDATE accounts SET balance = balance + 1000 WHERE id = 1;
```

```
SAVEPOINT after_wallet_topup;
```

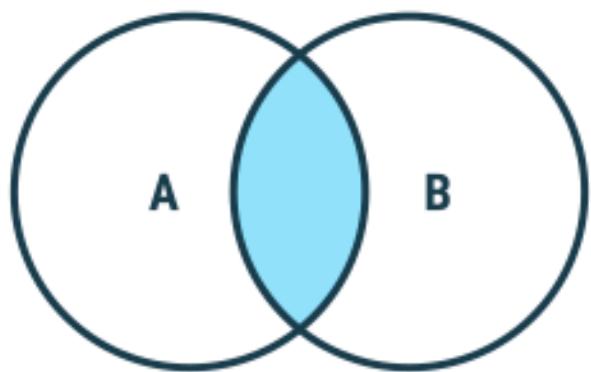
```
UPDATE accounts SET balance = balance + 10 WHERE id = 1;
```

```
ROLLBACK TO after_wallet_topup;
```

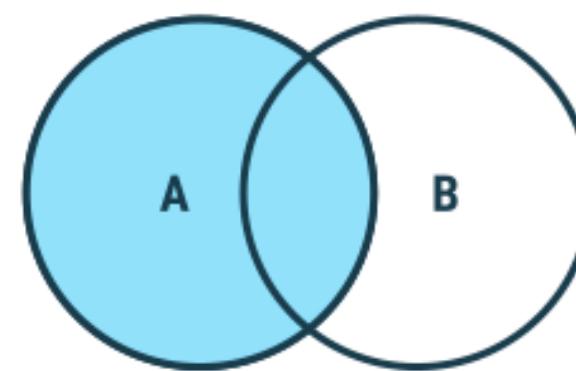
```
COMMIT;
```

JOINS

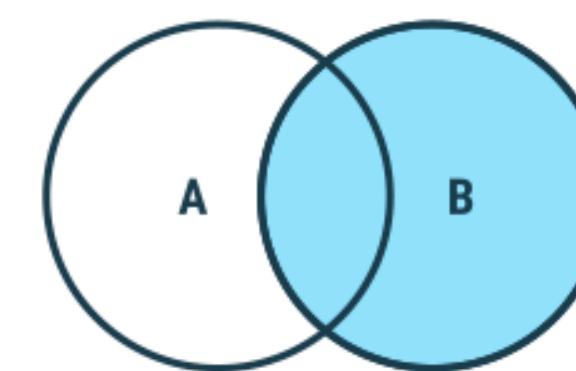
JOINS are used to combine rows from two or more tables based on a related column between them.



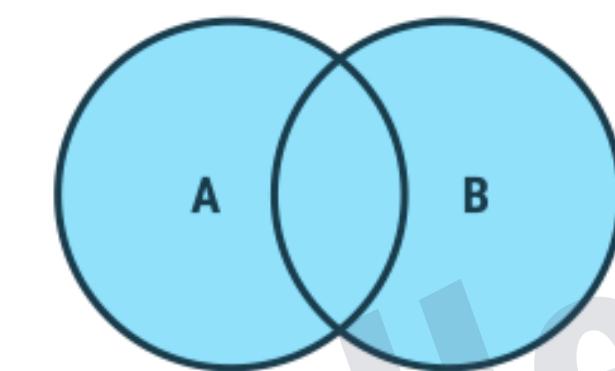
Inner Join



Left Join



Right Join

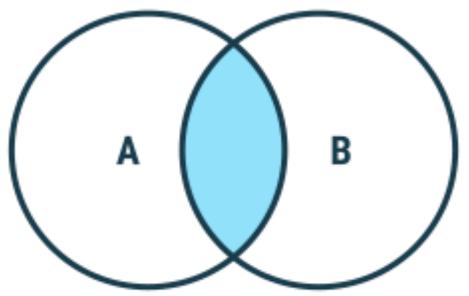


Full Join

Outer Joins

JOINS

INNER JOIN



customer_id	name	city
1	Alice	Mumbai
2	Bob	Delhi
3	Charlie	Bangalore
4	David	Mumbai

customers

order_id	customer_id	amount
101	1	500
102	1	900
103	2	300
104	5	700

orders

Syntax

SELECT column(s)

FROM tableA

INNER JOIN tableB

ON tableA.col_name = tableB.col_name;

```
-- inner join
```

```
SELECT c.name, o.order_id, o.amount
```

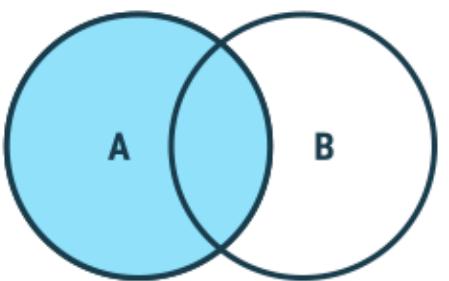
```
FROM customers c
```

```
INNER JOIN orders o
```

```
ON c.customer_id = o.customer_id;
```

JOINS

LEFT JOIN



customer_id	name	city
1	Alice	Mumbai
2	Bob	Delhi
3	Charlie	Bangalore
4	David	Mumbai

customers

order_id	customer_id	amount
101	1	500
102	1	900
103	2	300
104	5	700

orders

Syntax

SELECT column(s)

FROM tableA

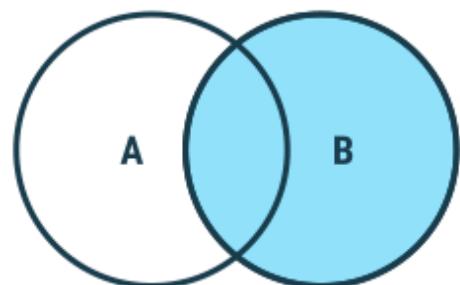
LEFT JOIN tableB

ON tableA.col_name = tableB.col_name;

```
-- left join
SELECT *
FROM customers c
LEFT JOIN orders o
ON c.customer_id = o.customer_id;
```

JOINS

RIGHT JOIN



customer_id	name	city
1	Alice	Mumbai
2	Bob	Delhi
3	Charlie	Bangalore
4	David	Mumbai

customers

order_id	customer_id	amount
101	1	500
102	1	900
103	2	300
104	5	700

orders

Syntax

SELECT column(s)

FROM tableA

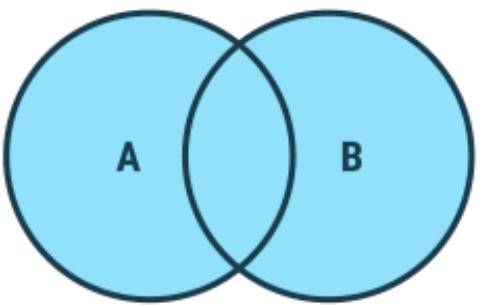
RIGHT JOIN tableB

ON tableA.col_name = tableB.col_name;

```
-- right join
SELECT *
FROM customers c
RIGHT JOIN orders o
ON c.customer_id = o.customer_id;
```

JOINS

OUTER JOIN



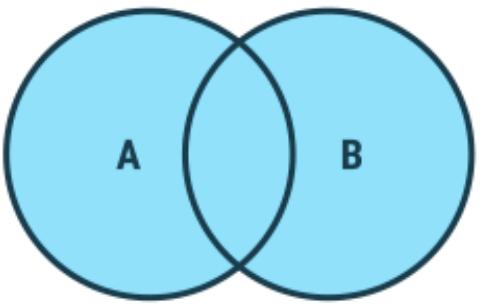
LEFT JOIN
UNION
RIGHT JOIN

Syntax in MySQL

```
-  
SELECT * FROM customers as c  
LEFT JOIN orders as o  
ON c.customer_id = o.customer_id  
UNION  
SELECT * FROM customers as c  
RIGHT JOIN orders as o  
ON c.customer_id = o.customer_id;
```

JOINS

CROSS JOIN



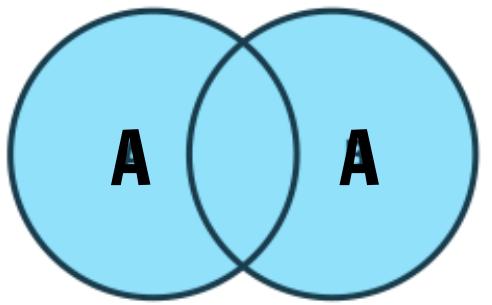
Syntax

```
SELECT column(s)  
FROM tableA  
CROSS JOIN tableB;
```

```
-- cross join  
SELECT *  
FROM customers as c  
CROSS JOIN orders as o;  
  
-- inner join  
SELECT *  
FROM customers as A  
JOIN customers as B  
ON A.customer_id = B.customer_id;
```

JOINS

SELF JOIN



It is a regular join but the table is joined with itself.

Syntax

SELECT column(s)

FROM *table as a*

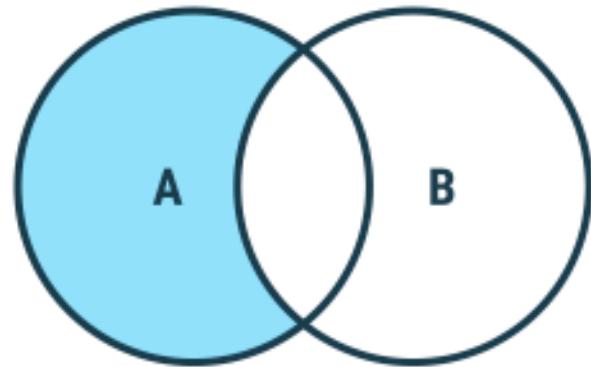
JOIN *table as b*

ON *a.col_name = b.col_name;*

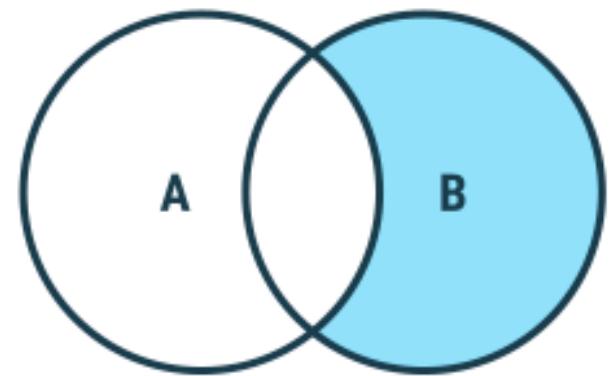
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Practice Qs

Write SQL command to display the exclusive joins :



Left Exclusive Join



Right Exclusive Join

```
-- left exclusive
SELECT *
FROM customers as c
LEFT JOIN orders as o
ON c.customer_id = o.customer_id
WHERE o.customer_id IS NULL;
```

```
-- right exclusive
SELECT *
FROM customers as c
RIGHT JOIN orders as o
ON c.customer_id = o.customer_id
WHERE c.customer_id IS NULL;
```

customer_id	name	city
1	Alice	Mumbai
2	Bob	Delhi
3	Charlie	Bangalore
4	David	Mumbai

customers

order_id	customer_id	amount
101	1	500
102	1	900
103	2	300
104	5	700

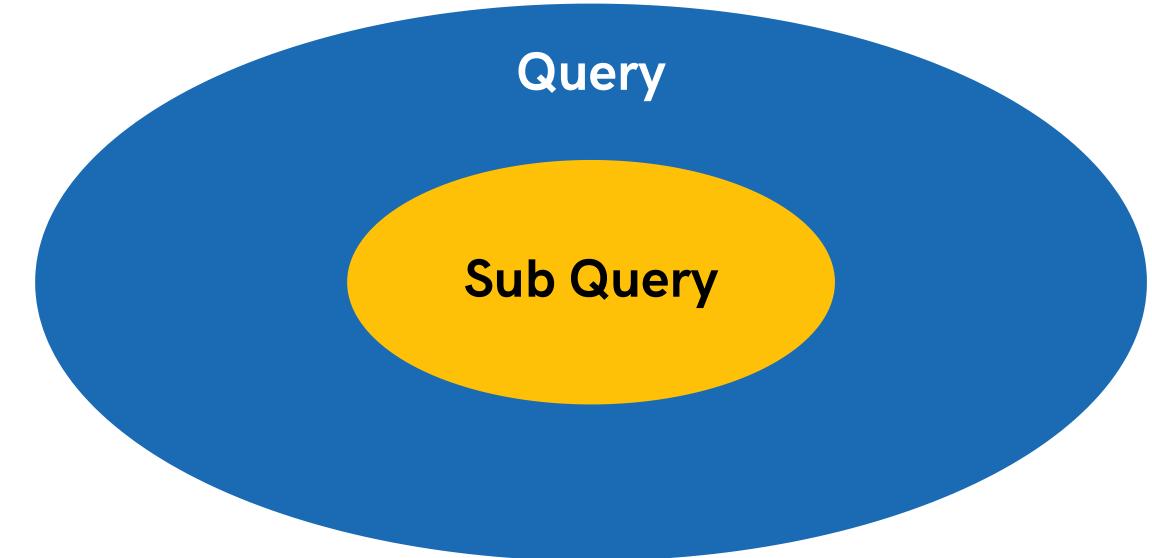
orders

Sub-Queries

A Subquery or Inner query or a Nested query is a query within another SQL query. It involves 2 select statements.

Syntax

```
SELECT column(s)  
FROM table_name  
WHERE col_name operator  
( subquery );
```



Sub-Queries

With WHERE

```
SELECT *
FROM orders
WHERE amount > (
    SELECT AVG(amount)
    FROM orders
);
```

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Sub-Queries

With SELECT

```
SELECT name,  
       (   SELECT COUNT(*)  
            FROM orders o  
           WHERE o.customer_id = c.customer_id  
       ) as order_count  
  FROM customers c;
```

Sub-Queries

With FROM

```
SELECT  
    summary.customer_id,  
    summary.avg_amount  
FROM  
(  
    SELECT  
        customer_id,  
        AVG(amount) AS avg_amount  
    FROM orders  
    GROUP BY customer_id  
) AS summary;
```

Views in SQL

A view is a virtual table based on the result-set of an SQL statement.

Syntax

```
CREATE VIEW view1 AS  
SELECT col1, col2 FROM table_name;
```

*A view always shows up-to-date data.

The database engine recreates the view,
every time a user queries it.

Views in SQL

- No data is stored physically (unless it's a materialized view in some DBs).
- Can include columns from one or more tables.
- Can be used in SELECT, JOIN, or even WHERE clauses like a normal table.
- Helps with security by exposing only certain columns to users.

Index in SQL

indexes are special database objects that make data retrieval faster.

Syntax (single col & multi-col)

CREATE INDEX *idx_name* ON *table(col)*;

CREATE INDEX *idx_name* ON *table(col1, col2)*;

SHOW INDEX FROM *table*;

DROP INDEX *idx_name* ON *table*;

Stored Procedures

Predefined set of SQL statements that you can save in the database and execute whenever needed.

Syntax (Create)

CREATE PROCEDURE *procedure_name (parameters)*

BEGIN

-- SQL statements

END;

```
DELIMITER $$

CREATE PROCEDURE check_balance(IN acc_id INT, OUT bal DECIMAL(10, 2))
BEGIN
    SELECT balance INTO bal
    FROM bank_accounts as b
    WHERE b.account_id = acc_id;
END $$

DELIMITER ;

CALL check_balance(2, @balance);
SELECT @balance;|
```

Stored Procedures

Syntax (Call)

CALL *procedure_name (arguments);*

Syntax (Drop)

DROP PROCEDURE IF EXISTS *procedure_name;*