

SQL - FULL

Back End - responsible for the business logic, codes that will send the right request to the DataBase

Database - there is no logic, just information

We took the key word from the Front End → back end taking those keywords and deciding what is this, what belongs to, where is coming from, what is the business logic for it → and moving to the database (give me all the products that related to the book and return it to the UI.

BackEnd testing tools:

- API
- Oracle DataBase
- Restful API
- Java JDBC
- SQL
- Postman

What is Data:

- Piece of information
- For example:
 - Account number → 123
 - Account Type → Checking
 - User Firstname → John

Database:

- Systematic collection of data
- Support storage and manipulation of the data
- Make data management easy

IQ:

[What is the primary key?](#)

One column that makes each column unique, it can not be null and can not be duplicated.
THIS IS A Unique identifier.

| | |
|--------------------|------------------|
| Primary key | DEPARTMENTS |
| department_id | departments_name |
| 10 | HR |
| 20 | IT |
| 30 | Finance |

RELATION OF DATABASE SYSTEM

RELATION (CONNECTION) BETWEEN TABLES

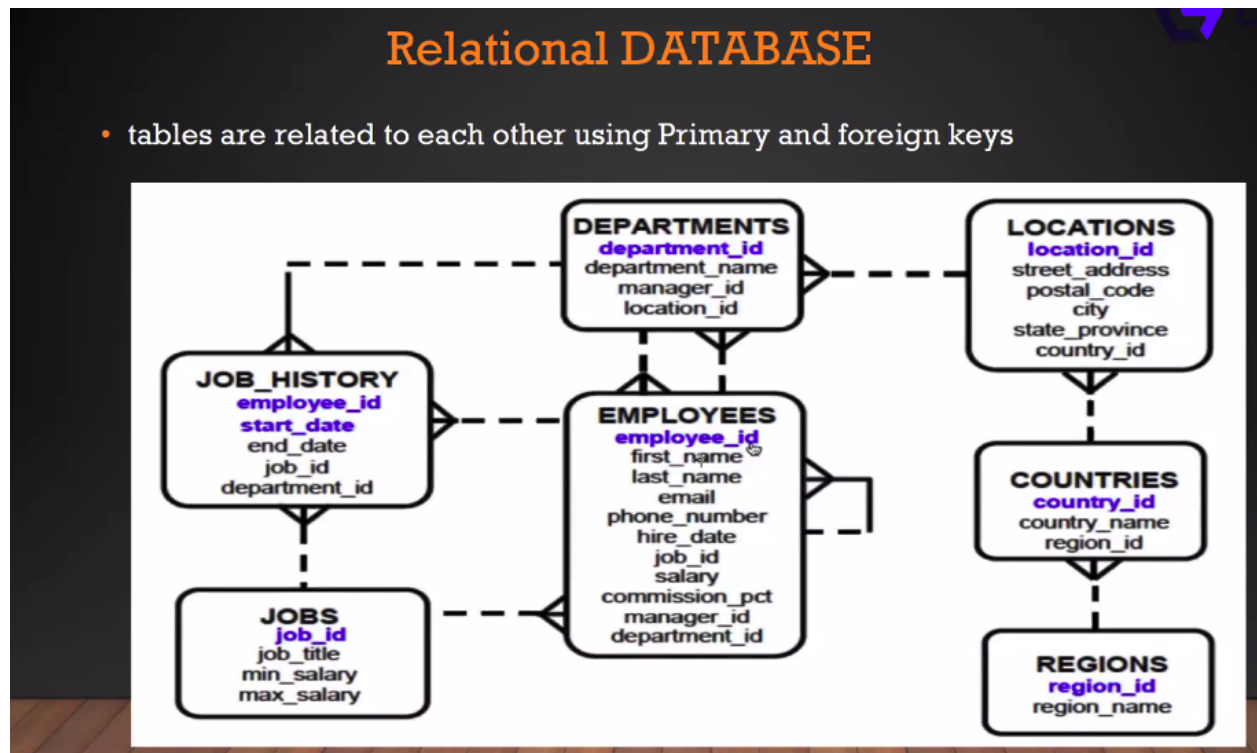
| | | | | | | |
|--------------------|------------|-----------|------------|--------------|---------------|--------------------|
| Primary key | EMPLOYEES | | | | | foreign key |
| emp_id | first_name | last_name | title | salary | department_id | |
| 1 | Mike | Smith | tester | 130000 | 20 | |
| 2 | Murodil | Sdet | developer | 200000 | 20 | |
| 3 | John | Doe | accountant | 70000 | 30 | |
| | 123213 | 123asd | manage | ten thousand | | |
| 4 | Mike | Smith | tester | 130000 | 20 | |

| | |
|--------------------|------------------|
| Primary key | DEPARTMENTS |
| department_id | departments_name |
| 10 | HR |
| 20 | T |
| 30 | Finance |

When you have one table with unique primary key and in another table you have a reference there, in the table where is the reference can be duplicates

If you use the **primary key** in one table in another table → another table is using **foreign key** (can be duplicate and null) because there might be employees that are not assigned to any department yet.

Table can have one primary key and multiple foreign key



BLUE ON THE PICTURE ABOVE IS PRIMARY KEY AND FOREIGN KEY IS BLACK

- (RDBMS) - RELATIONAL DATABASE MANAGEMENT SYSTEM
- All RDBMS using SQL language
- Relational Database - tables are related to each other using Primary and foreign keys

EC2 machine - we always instal the database inside

SQL - Structured query language

SQL is a language that is used to work with Databases and manipulate data

SQL - is not testing tool

| SQL language: | |
|-----------------|--|
| - Select | - not manipulating any data, it will just show the result in the query |

| | |
|---|---|
| | <pre> select * from employees; --reads all columns from the employees table select * from departments; -- reads all column departments table select first_name from employees; --get only firstname from employee --display city names select city from locations; --display everything from the location select * from locations; --display multiple colloms select first_name,last_name,salary from employees; </pre> |
| Choche the specific information from the DataBase | <pre> --I want to see firstname, lastname, phone number of David(s) select first_name,last_name,phone_number from employees where first_name = 'David'; --I want to see firstname, lastname, phone number of David(s) select first_name,last_name,phone_number from employees where first_name = 'David' and last_name = 'Lee'; </pre> |
| - "*" | - all (select * - I wanna select everything from the table) |
| - Employees | - name of the table(can vary)If you want to run specific line, first click on the line then Run |
| -- | - means comment |
| - Between | <p>Get information in between specific ranges . And is used just for adding</p> <pre> --making more than 5000 and less then 10000 select first_name,last_name,salary from employees where salary >5000 and salary<10000; --where salary between 5000 and 10000 - same as I wrote above select first_name,last_name,salary from employees where salary between 5000 and 10000; </pre> |
| - Distinct | <p>- Remove duplicates from the view query (How to understand if it takes the first or last duplicate? - it take the last one)</p> <pre> --how many name unique first names we have? select distinct count(first_name) from employee </pre> |
| - in | Get for me specific one |

| | |
|--|---|
| | <pre>--get me all info where employee_id 135,176,154,129 select * from employees where employee_id=129 or employee_id=135 or employee_id=154 or employee_id=176; --same result in keyword select * from employees where employee_id in(135,176,154,129); </pre> |
| count(*) or count(name) | <p>Retrieve one cell and give the result, number of the result. - 35 lines is a result</p> <pre>--how many employee working as IT_PROG or SA_REP select count(*) from employees where job_id in('IT_PROG','SA_REP'); </pre> <p>Unique names</p> <pre>--how many name unique first names we have? select count(distinct first_name) from employees; select distinct count(first_name) --wrong </pre> |
| Order by ... asc/desc Default order is asc. | |
| Desc : - 9-0 - Z-A | <pre>--get me all employees information based on who is making --more salary to low select * from employees order by salary desc;</pre> |
| Asc: - 0-9 - A-Z | <pre>--low to more select * from employees order by salary asc; --get me all emp inf order by alphabetical based on firstname select * from employees order by first_name asc;</pre> |
| Like: - If letter is in the middle - case sensitive | |
| Like + % (% any sequence of character) | <pre>--get me all employees whose first name starts with C select * from employees where first_name like 'C%';</pre> <p>so that % means that there could be anywhere from 1 to infinity characters after the first letter</p> |

| | |
|--|--|
| Like + _ _ - represent the character | <pre>--get me all employees whose first name starts with C select * from employees where first_name like 'C_____';</pre> |
| <pre>--get me all employees whose first name starts with C select * from employees where first_name like 'C_r%'; -- c_(one empty)r%(and anything after it) -- where first_name like 'C%'; - any sequence of the character -- where first_name like 'C_____'; - each _ is one letter -- get me 5 letter first names where the middle char is z select * from employees where first_name like '__u__'; --in the middle letter has to be lowecase --get me first name where second char is u select * from employees where first_name like '_u%';</pre> | |
| AGGREGATE Function | |
| min | From a lot of lines it will return one |
| max | <pre>--find minimum/max salary select min(salary) from employees; -- 1200 select max(salary) from employees; --24000 </pre> |
| avg (average) | <p>It will take the whole amount of all the salaries and divide by the number of employees to get average</p> <pre>--find avarage salary select avg(salary) from employees; --6461.12432342124 --round select round(avg(salary)) from employees; --6462 --round with desimal select round(avg(salary),2) from employees; --6462</pre> |
| sum | <pre>--find sum of all salaries select sum(salary) from employees;</pre> |
| GROUP BY | |
| Group by job_id and get avg salary | <pre>-- get the avg salary for all the kind of jobs select job_id, avg(salary), count(*), sum(salary) from employees group by job_id;</pre> <p>For group based on job_id</p> <p>Give me the avg(sal), count(*) and sum(salary)</p> |

- What is the process inside:
It-prog is one box which keep (group) all the employees inf that are working as IT_Prog), count the avg(salary)

| | JOB_ID | AVG(SALARY) | COUNT(*) | |
|---|------------|-------------|----------|-----------------------------------|
| 1 | IT_PROG | 5760 | 5 | avg salary of the group of people |
| 2 | AC_MGR | 12008 | 1 | |
| 3 | AC_ACCOUNT | 8300 | 1 | |
| 4 | ST_MAN | 7280 | 5 | |
| 5 | PU_MAN | 11000 | 1 | |
| 6 | AD_ASST | 4400 | 1 | |
| 7 | AD_VP | 17000 | 2 | |
| 8 | SH CLERK | 3215 | 20 | |

HAVING / WHERE -
Group by with condition

1. Eliminate the people **before** putting them into group

```
--get me job_ids where their avg salary is more than 5k before
--group the people into group
select job_id, avg(salary), count(*), sum(salary)
from employees
where salary > 5000
group by job_id;
```

2. **After** we created the group

```
--get me job_ids where their avg salary is more than 5k after
-- you will place people into group
select job_id, avg(salary), count(*), sum(salary)
from employees
group by job_id
having avg(salary) > 5000;
```

Group by example

Show all job_id and average salary who work as any of these jobs IT_PROG, SA_REP, FI_ACCOUNT, AD_VP

```
select JOB_ID, avg(salary) from EMPLOYEES
where JOB_ID in ('IT_PROG', 'SA_REP', 'FI_ACCOUNT', 'AD_VP') group by JOB_ID ;
```

The having statement sets the condition for group rows created by the **GROUP BY** clause
after the GROUP BY applies.

WHERE clause sets the condition for individual rows
BEFORE GROUP BY clause applies.

QUERY/SUBQUERY

| | |
|--|---|
| Subquery | <p>- inner query always will be executed first, next outer query will be executed. How to find a person who is making the highest salary in the company - dynamically (no hardcoding):</p> <pre>select * Outer query - second from employees inner query - first (result 24 k) where salary = (select max(salary) from employees);</pre> <p>We could do it in two steps static - not practical</p> <pre>--how to find employees information who is making high salary select * from employees order by salary desc; --get me higher salary select * from employees WHERE salary = 24000;</pre> |
| <p>IQ get me the information of the person who is getting the second highest salary</p> <pre>-- find the employee inf who is getting second highest salary select * from employees where salary= (select max(salary) from employees where salary 2 < (select max(salary) from employees)); 1</pre> <p>WE COMBINED 3 QUERY TOGETHER 3</p> <p>EXAMPLE COMBINES 3 QUERY TOGETHER</p> | |
| Do order by asc, desc | <pre>--order all empl based on salary high to low then display first 10 result select * from (select * from employees order by salary desc) where rownum < 11; Giving order by desc</pre> |
| rownum | <p>Allows you to sort after the result of any condition that you need in your query. Limits the number of results displayed in the query.</p> <pre>WHERE rownum < 11</pre> <p>If we want to order table first based on our needs(salary high to low) then use query as a table to get number of rows</p> |

| how we rename the column that we displayed | <pre>-- how we rename the column that we displayed select first_name as "Given_name" from employees;</pre> <p>Query Result x</p> <p>SQL Fetched 50 rows in 0.0</p> <table><thead><tr><th>Given_name</th></tr></thead><tbody><tr><td>1 Ellen</td></tr><tr><td>2 Sundar</td></tr><tr><td>3 Mozhe</td></tr><tr><td>4 David</td></tr></tbody></table> <p>If you will write without double quotes - it wil write all UpperCase. is not changing the table name, this is just for the view purpose</p> | Given_name | 1 Ellen | 2 Sundar | 3 Mozhe | 4 David | |
|--|--|------------|--------------|---------------|------------------|----------|---|
| Given_name | | | | | | | |
| 1 Ellen | | | | | | | |
| 2 Sundar | | | | | | | |
| 3 Mozhe | | | | | | | |
| 4 David | | | | | | | |
| Concatenatio n in the SQL | <pre>--text functions, string manipulation --java first_name+" "+last_name --in sql concatination is --get the first name concatenate, gave a space between --add the last name and assign to full_name select first_name ' ' last_name as full_name from employees;</pre> <p>Query Result x</p> <p>SQL Fetched 50 rows in 0.018 seconds</p> <table><thead><tr><th>FULL_NAME</th></tr></thead><tbody><tr><td>1 Ellen Abel</td></tr><tr><td>2 Sundar Ande</td></tr><tr><td>3 Mozhe Atkinson</td></tr></tbody></table> | FULL_NAME | 1 Ellen Abel | 2 Sundar Ande | 3 Mozhe Atkinson | | |
| FULL_NAME | | | | | | | |
| 1 Ellen Abel | | | | | | | |
| 2 Sundar Ande | | | | | | | |
| 3 Mozhe Atkinson | | | | | | | |
| Make LOWER_CAS E | <p>Make the new column with full email and make it lowercase (same to upper), just word upper</p> <pre>--add @gmail.com and name new column to full_email select lower(email '@gmail.com') as "full_email" from employees;</pre> | | | | | | |
| Length | <pre>--length(value) of the first name select first_name, length(first_name) as "lenght" from employees;</pre> <p>Query Result x</p> <p>SQL Fetched 50 rows in 0.011 seconds</p> <table><thead><tr><th>FIRST_NAME</th><th>lenght</th></tr></thead><tbody><tr><td>1 Ellen</td><td>5</td></tr><tr><td>2 Sundar</td><td>6</td></tr></tbody></table> | FIRST_NAME | lenght | 1 Ellen | 5 | 2 Sundar | 6 |
| FIRST_NAME | lenght | | | | | | |
| 1 Ellen | 5 | | | | | | |
| 2 Sundar | 6 | | | | | | |

| | <pre>--length(value) of the first name select first_name, length(first_name) as "lenght" from employees order by "lenght" desc; Desc order</pre> | | | | | | | | | | | | |
|--|--|-------------|-----------------|-----------|------------|---|-----|------------|-----------------|---|-----|-------------|-----------------|
| SubString substr | <pre>--substr(colName, begIndex, NumberOfChar) select substr(first_name,0,1) '-' substr(last_name,0,1) as "intials" from employees;</pre> | | | | | | | | | | | | |
| <p>Combination of the 3 Concatenated requirements</p> <pre>select substr(first_name,0,1) '-' substr(last_name,0,1) as "intials", first_name ' ' last_name as full_name, lower(email '@gmail.com') as "full_email" from employees;</pre> <div><div>Query Result x</div><div> SQL Fetched 50 rows in 0.025 seconds</div><table><thead><tr><th></th><th>intials</th><th>FULL_NAME</th><th>full_email</th></tr></thead><tbody><tr><td>1</td><td>E-A</td><td>Ellen Abel</td><td>eabel@gmail.com</td></tr><tr><td>2</td><td>S-A</td><td>Sundar Ande</td><td>sande@gmail.com</td></tr></tbody></table></div> | | | intials | FULL_NAME | full_email | 1 | E-A | Ellen Abel | eabel@gmail.com | 2 | S-A | Sundar Ande | sande@gmail.com |
| | intials | FULL_NAME | full_email | | | | | | | | | | |
| 1 | E-A | Ellen Abel | eabel@gmail.com | | | | | | | | | | |
| 2 | S-A | Sundar Ande | sande@gmail.com | | | | | | | | | | |
| VIEW | <p>Virtual tables. View does not contains the query</p> <pre>--VIEW - Virtual Table CREATE VIEW Emaillist as select substr(first_name,0,1) '-' substr(last_name,0,1) as "intials", first_name ' ' last_name as "full_name", lower(email '@gmail.com') as "full_email" from employees; select full_name from Emaillist;</pre> <div><div>Script Output x</div><div>Query Result x</div><div> SQL Fetched 50 rows in 0.013 seconds</div><table><thead><tr><th></th><th>FULL_NAME</th></tr></thead><tbody><tr><td>1</td><td>Ellen Abel</td></tr></tbody></table></div> | | FULL_NAME | 1 | Ellen Abel | | | | | | | | |
| | FULL_NAME | | | | | | | | | | | | |
| 1 | Ellen Abel | | | | | | | | | | | | |
| Get min salary from 14 highest salary | <pre>--find the highest 14th salary - no duplicates select min(salary) from (select DISTINCT salary from employees order by salary desc) where rownum <15;</pre> | | | | | | | | | | | | |

IQ find employee info who is making 14th highest salary without duplicates

```
--find employee info who is making 14th highest salary
--without duplicates
select first_name, salary
from employees
where salary =
(select min(salary)
from (select distinct salary from employees order by salary desc)
where rownum <15);
```

STEPS

1. List salary high to low (desc) without duplicates - *order by salary desc*
2. Cut my list after 14 high salary - *where rownum <15*
3. Get the lowest from the 14th highest salary - *select min(salary)*
4. Now I need to find the employees in who is making lowest salary from 14th low salary
→ I will create new query - *select first_name, last_name from employee where salary (ADD THE PREVIOUS 3 STEPS (PREVIOUS QUERY THAT FOUNDED LOWEST SALARY FROM 14TH))*

CREATE TABLE/JOIN

DDL: Data Definition Language - used to define data structures:

- CREATE
- DROP
- TRUNCATE
- ALTER

DML: Data Manipulation language - used to manipulate data itself (most likely we will not work with this, but we will learn it):

- SELECT
- INSERT
- UPDATE
- DELETE

Create table:

- Create a new table SQL, you use the CREATE TABLE statement
- First you specify the name of the new table after the create table clause.
- CONSTRAINT (LIMITATION) IS NOT MANDATORY

```
CREATE TABLE table name
(column name DATATYPE constraint);
```

COLUMN CONSTRAINTS(limitations/some rules):

- NOT NULL - the value of the column cannot be NULL
- UNIQUE - value must be unique across the whole table
- PRIMARY KEY - Combination of both NOT NULL and UNIQUE constraints
- REFERENCES - another table (PKColumn) - used to give foreign keys to the column. We give the foreign key to the column by making Other table primary key column as the reference column

In order to have foreign key, we must have the primary key in other table

| | |
|---------|---|
| | <pre>≡ Create table ScrumTeam(Emp_ID Integer primary key, FirstName varchar(30) not null, LastName varchar(30), JobTitle varchar(20));</pre> |
| varchar | <pre>LastName varchar(30)</pre> <p>Varchar - Data type for accepting any character. 30 - is limitation</p> |
| INSERT | <ul style="list-style-type: none">- Value list must be in the same order as you have in the table <pre>INSERT INTO tableName (column1, column2,...) VALUES (value1, value2 ...);</pre> |
| UPDATE | <pre>UPDATE table_name SET column1 = value1, column2 = value2 , ... WHERE condition;</pre> |

| | |
|--------|--|
| | <pre>update newteam set salary = 120000 where emp_id = 2;</pre> |
| DELETE | <pre>Delete from NewTeam where emp_id = 1;</pre> |
| COMMIT | <div>Save the information</div> <pre>commit;</pre> |
| ALTER | <p>ADD COLUMN</p> <pre>select * from NewTeam; --adding new column alter table newteam add salary Integer; Name of the new Column --rename column alter table newteam RENAME column salary to annual_salary; --remove(delete) the column alter table newteam DROP COLUMN annual_salary; --TRUNCATE, if we want to delete all data but still want to -- keep the table structure, we use TRUNCATE -- delete the data, but still keep the table TRUNCATE TABLE agileteam;</pre> |

```
--how to change table name?  
alter table newteam RENAME TO agileteam;
```

```
select * from agileteam; CREATE new SELECT
```

Script Output x Query Result x
SQL | Executing:select * from NewTeam in 0 seconds

ORA-00942: table or view does not exist
00942. 00000 - "table or view does not exist"

*Cause:

*Action:

Error at Line: 1 Column: 15

**When you change the name
and you RUN with old
SELECT it will give you
ERROR.**

```
--If you want to delete the table and data together  
DROP TABLE agileteam;
```

Script Output x Query Result x
SQL | Executing:select * from agileteam in 0 seconds

ORA-00942: table or view does not exist
00942. 00000 - "table or view does not exist"

*Cause:

*Action:

Error at Line: 18 Column: 15

**If you DROPED the table , and run
old SELECT - ERROR**

- The popular actions that we can do with alter keyword:
 - **ADD COLUMN** : adds column to the table
 - **DROP COLUMN** : drops the column from the table
 - **RENAME COLUMN** : renames the column name
 - **RENAME TO** : renames the table name

JOIN

In order to get F, L, phone num from first table, by comparing the address id. In Customer table you have foreign key for address_id. In Address table primary key address_id

```
select first_name, last_name, address, phone  
from customer join address on customer.address_id = address.address_id;
```

I want to get information from two tables and put them in one new table.

They are connected by the ADDRESS_ID

| Customer | | | | Address | | |
|----------|------------|-----------|----------------|------------|-------------------|----------|
| c_id | first_name | last_name | address_id | address_id | address | phone |
| 1 | Mary | Smith | 5 | 5 | 1913 Hanoi Way | 28303384 |
| 2 | Patricia | Johnson | NULL | 7 | 692 Joliet Street | 44847719 |
| 3 | Linda | Williams | 7 | 8 | 1566 Inegl Manor | 70581400 |
| 4 | Barbara | Jones | 8 | 10 | 1795 Santiago | 86045262 |
| 5 | Elizabeth | Brown | NULL | 11 | 900 Santiago | 16571220 |
| | | | | | | |
| | | | | | | |
| | first_name | last_name | address | phone | | |
| | Mary | Smith | 1913 Hanoi Way | 28303384 | | |

- Customer has FOREIGN key - for the ADDRESS_ID
- Address has PRIMARY key - from the ADDRESS_ID
- ON is the KEY word

on customer.address_id = address.address_id;

THIS IS TEMPORARY, WE ARE NOT CHANGING THE NAME OF THE TABLE

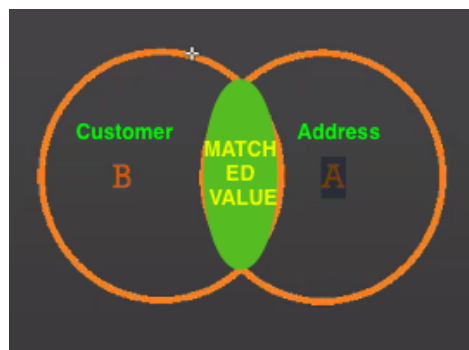
```
select first_name, last_name, address, phone
from customer "CUST" join address a
on CUST.address_id = a.address_id;
```

We are making custom name, in order not type whole class
name - IS NOT CHANGING THE TABLE NAME - TEMPORARY

INNER JOIN

INNER JOIN: If the value that is matching from both side, it will get the value from the INNER join

INNER JOIN - produce only the set of records that match in both Table Customer and Table Address



```
SELECT customer_id, first_name, last_name, address, phone
FROM customer INNER JOIN address
ON customer.address_id = address.address_id;
```



LEFT JOIN

LEFT OUTER JOIN -

When we have records that are not match it will still take it but → it will create the value by default - NULL - left is what after FROM and BEFORE the JOIN Word

```
select first_name,last_name,c.address_id,a.address,phone
from customer c left join address a
on c.address_id = a.address_id;
```

Query Result x

SQL | All Rows Fetched: 5 in 0.047 seconds

| | FIRST_NAME | LAST_NAME | ADDRESS_ID | ADDRESS | PHONE |
|---|------------|-----------|------------|-------------------|----------|
| 1 | Mary | Smith | 5 | 1913 Hanoi Way | 28303384 |
| 2 | Patricia | Johnson | (null) | (null) | (null) |
| 3 | Linda | Williams | 7 | 692 Joliet Street | 44847719 |
| 4 | Barbara | Jones | 8 | 1566 Inegl Manor | 70581400 |
| 5 | Elizabeth | Brown | (null) | (null) | (null) |

LEFT OUTER JOIN

| Customer | | | | Address | | |
|----------|------------|-----------|------------|------------|-------------------|----------|
| c_id | first_name | last_name | address_id | address_id | address | phone |
| 1 | Mary | Smith | 5 | 5 | 1913 Hanoi Way | 28303384 |
| 2 | Patricia | Johnson | NULL | NULL | NULL | NULL |
| 3 | Linda | Williams | 7 | 7 | 692 Joliet Street | 44847719 |
| 4 | Barbara | Jones | 8 | 8 | 1566 Inegl Manor | 70581400 |
| 5 | Elizabeth | Brown | NULL | NULL | NULL | NULL |

```
SELECT * FROM customer LEFT OUTER JOIN address
ON customer.address_id = address.address_id;
```



RIGHT JOIN

RIGHT OUTER JOIN - After JOIN

When we have records that are not match it will still take it but → it will create the value by default - NULL

RIGHT OUTER JOIN

| Customer | | | | Address | | |
|----------|------------|-----------|------------|------------|-------------------|----------|
| c_id | first_name | last_name | address_id | address_id | address | phone |
| 1 | Mary | Smith | 5 | 5 | 1913 Hanoi Way | 28303384 |
| 3 | Linda | Williams | 7 | 7 | 692 Joliet Street | 44847719 |
| 4 | Barbara | Jones | 8 | 8 | 1566 Inegl Manor | 70581400 |
| NULL | NULL | NULL | NULL | 10 | 1795 Santiago | 86045262 |
| NULL | NULL | NULL | NULL | 11 | 900 Santiago | 16571220 |

```
SELECT * FROM customer RIGHT OUTER JOIN address
ON customer.address_id = address.address_id;
```



```
select first_name,last_name,c.address_id,a.address,phone
from customer c right join address a
on c.address_id = a.address_id;
```

Query Result x

SQL | All Rows Fetched: 5 in 0.02 seconds

| FIRST_NAME | LAST_NAME | ADDRESS_ID | ADDRESS | PHONE |
|------------|-----------|------------|-------------------|----------|
| 1 Mary | Smith | 5 | 1913 Hanoi Way | 28303384 |
| 2 Linda | Williams | 7 | 692 Joliet Street | 44847719 |
| 3 Barbara | Jones | 8 | 1566 Inegl Manor | 70581400 |
| 4 (null) | (null) | (null) | 1795 Santiago | 86045262 |
| 5 (null) | (null) | (null) | 900 Santiago | 16571220 |

FULL JOIN

FULL JOIN - will show the information for the RIGHT, LEFT side

```
select first_name,last_name,c.address_id,a.address,phone
from customer c full join address a
on c.address_id = a.address_id;
```

Query Result x

SQL | All Rows Fetched: 7 in 0.019 seconds

| FIRST_NAME | LAST_NAME | ADDRESS_ID | ADDRESS | PHONE |
|-------------|-----------|------------|-------------------|----------|
| 1 Mary | Smith | 5 | 1913 Hanoi Way | 28303384 |
| 2 Linda | Williams | 7 | 692 Joliet Street | 44847719 |
| 3 Barbara | Jones | 8 | 1566 Inegl Manor | 70581400 |
| 4 (null) | (null) | (null) | 1795 Santiago | 86045262 |
| 5 (null) | (null) | (null) | 900 Santiago | 16571220 |
| 6 Elizabeth | Brown | (null) | (null) | (null) |
| 7 Patricia | Johnson | (null) | (null) | (null) |

FULL OUTER JOIN

- **Full outer join** produces the set of all records in Table Customer and Table Address with matching records from both sides where available. If there is no match, the missing side will contain null.



JOIN/SELF JOIN/SET OPERATORS

JOINS

INNER JOIN

Inner join (definition) intersections between the tables. Matching information from the both Tables

If you only use a join key word by default is - INNER JOIN

Left - you wanna have everything from the left table (LEFT OUTER or LEFT - KEY WORD)

Left join with WHERE - to produce the set of records only in Customer Table, but not in Address Table. WHERE KEY WORD - giving specification to what you want to have in the table.

(I want rows WHERE ID value is 5)

WE ARE JUST INTERESTED TO GET INFORMATION FOR THE LEFT SIDE PEOPLE WHO IS VALUE IS NULL

```

Select customer_id, first_name, last_name, c
address.address_id address, phone
from customer Left OUTER JOIN address
on customer.address_id = address.address_id
where customer.address_id is NULL;
    
```

There is no 6 value, it will also include the table WHERE value is NULL, it has address id, but it is missing other information, and also address_id does not exist in Address table.

Therefore even when we requested to add just value which is

address_id NULL, it will still add it, because address value is not exist so by default it will be added

| Customer | | | | Address | | |
|----------|------------|-----------|------------|------------|-------------------|----------|
| c_id | first_name | last_name | address_id | address_id | address | phone |
| 1 | Mary | Smith | 5 | 5 | 1913 Hanoi Way | 28303384 |
| 2 | Patricia | Johnson | NULL | 7 | 692 Joliet Street | 44847719 |
| 3 | Linda | Williams | 7 | 8 | 1566 Inegl Manor | 70581400 |
| 4 | Barbara | Jones | 8 | 10 | 1795 Santiago | 86045262 |
| 5 | Elizabeth | Brown | NULL | 11 | 900 Santiago | 16571220 |
| 6 | harold | finch | 6 | | | |

If the case, when you do want to see everything from both table, but you are puting flexible condition

**WHERE customer.address_id is NULL or
address.address_id is NULL**

```
Select *
from customer Full OUTER JOIN address
on customer.address_id = address.address_id
where customer.address_id is NULL OR
address.address_id is NULL;
```

JOIN ONE 3 AND MORE TABLES

```
--get first, last and dep_name, city, country_name for all empl
select first_name,last_name, department_name, city, country_name
from employees e join departments d
on e.department_id=d.department_id
join locations l
on d.location_id = l.location_id
join countries c
on l.country_id = c.country_id;
```

We have 3 INNER JOIN,
and 3 connections ON

SELF JOIN

SELF JOIN - JOIN THE SAME TABLE

Relations between two tables

If employees table Manager ID has same value in the Employees ID, get the First name and Last Name of the Manager

```
select e1.employee_id,e1.first_name,e1.last_name,
e1.manager_id,e2.employee_id,e2.first_name,e2.last_name
from employees e1 left join employees e2
on e1.manager_id = e2.employee_id
order by e1.employee_id;
```

| EMPLOYEES | | | | | | |
|-----------|------------|-----------|------------|--------|-------------|-------------|
| emp_id | first_name | last_name | manager_id | emp_id | manager_f_n | manager_l_n |
| 100 | Steven | King | | | | |
| 101 | Neena | Kochhar | 100 | 100 | Steven | King |
| 102 | Lex | De Haan | 100 | 100 | Steven | King |

| emp_id | first_name | last_name | manager_id |
|--------|------------|-----------|------------|
| 100 | Steven | King | |
| 101 | Neena | Kochhar | 100 |
| 102 | Lex | De Haan | 100 |
| 103 | Alexander | Hunold | 102 |

**Steven is ID == To Manager ID
Steven is manager Nenna and
Lex. Steven does not have
manager**

SET OPERATORS

- You need 2 independent queries
- Same number of columns in the select statement
- Same data type in the same order

There is not connections between table no foreign key

How are we gonna connect?

UNION - operator combines result sets of two or more SELECT statements.

The **UNION** operator removes all duplicates rows unless the **UNION ALL**
UNION - sorts the results directly if there is duplicate it will be removed

IN THIS EXAMPLE - STEVEN IS HAVING DIFFERENT SALARY AND ID - SO IS NOT COUNT AS DUPLICATES, BUT IF YOU WILL ONLY CALL NAME WITHOUT SALARY AND ID IT WILL BE REMOVED

```
1 select * from Testers
2 union
3 select * from Developers;
```

| ID_NUMBER | NAMES | SALARY |
|-----------|--------|--------|
| 1 | Mike | 155000 |
| 2 | Steven | 110000 |
| 3 | Adam | 105000 |
| 4 | John | 142000 |
| 5 | Lex | 100000 |
| 6 | Steven | 850000 |
| 7 | Maria | 120000 |

```
1 select testers.names from Testers
2 union
3 select developers.names from Developers;
```

| NAMES |
|----------|
| 1 Adam |
| 2 John |
| 3 Lex |
| 4 Maria |
| 5 Mike |
| 6 Steven |

UNION ALL - will not sort, will not delete duplicates - will keep ALL

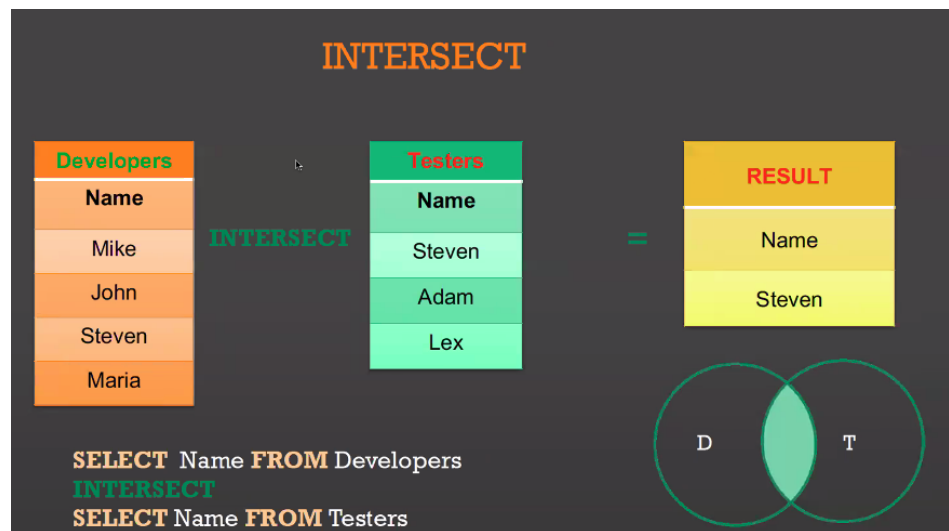
| | <div><pre>1 select * from Testers 2 union all 3 select * from Developers;</pre><div>Query Result x</div><div>SQL All Rows Fetched: 7 in 0.0</div><table><tr><th>ID_NUMBER</th><th>NAMES</th><th>SALARY</th></tr><tr><td>1</td><td>1 Steven</td><td>110000</td></tr><tr><td>2</td><td>2 Adam</td><td>105000</td></tr><tr><td>3</td><td>3 Lex</td><td>100000</td></tr><tr><td>4</td><td>1 Mike</td><td>155000</td></tr><tr><td>5</td><td>2 John</td><td>142000</td></tr><tr><td>6</td><td>3 Steven</td><td>850000</td></tr><tr><td>7</td><td>4 Maria</td><td>120000</td></tr></table></div> | ID_NUMBER | NAMES | SALARY | 1 | 1 Steven | 110000 | 2 | 2 Adam | 105000 | 3 | 3 Lex | 100000 | 4 | 1 Mike | 155000 | 5 | 2 John | 142000 | 6 | 3 Steven | 850000 | 7 | 4 Maria | 120000 | | | | | | | | | | |
|-----------|---|-----------|--------|--------|-------|----------|---------|--------|-----------|--------|--------|-------|----------|--------|--------|--------|--------|--------|--------|--------|-----------|--------|--------|---------|--------|--------|---|--------|--------|---|----------|--------|---|---------|--------|
| ID_NUMBER | NAMES | SALARY | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 1 Steven | 110000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | 2 Adam | 105000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | 3 Lex | 100000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | 1 Mike | 155000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | 2 John | 142000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | 3 Steven | 850000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | 4 Maria | 120000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MINUS | <div><div><div>TESTER FIRST - Second DEVELOPERS</div><div><pre>select names from Testers minus select names from Developers;</pre><div>Query Result x</div><div>SQL All Rows Fetched: 2 in 0.014 sec</div><table><tr><th>NAMES</th></tr><tr><td>1 Adam</td></tr><tr><td>2 Lex</td></tr></table></div><div><div>DEVELOPERS FIRST - Second TESTERS</div><div><pre>select names from Developers minus select names from Testers;</pre><div>Query Result x</div><div>SQL All Rows Fetched: 3 in 0.01</div><table><tr><th>NAMES</th></tr><tr><td>1 John</td></tr><tr><td>2 Maria</td></tr><tr><td>3 Mike</td></tr></table></div></div><div>STEVEN is still in the query, because the ID and SALARY is UNIQUE</div><div><div><pre>select * from Testers minus select * from Developers;</pre><div>Query Result x</div><div>SQL All Rows Fetched: 3 in 0</div><table><tr><th>ID_NUMBER</th><th>NAMES</th><th>SALARY</th></tr><tr><td>1</td><td>1 Steven</td><td>110000</td></tr><tr><td>2</td><td>2 Adam</td><td>105000</td></tr><tr><td>3</td><td>3 Lex</td><td>100000</td></tr></table></div><div><pre>select * from Developers minus select * from Testers;</pre><div>Query Result x</div><div>SQL All Rows Fetched: 4 in 0</div><table><tr><th>ID_NUMBER</th><th>NAMES</th><th>SALARY</th></tr><tr><td>1</td><td>1 Mike</td><td>155000</td></tr><tr><td>2</td><td>2 John</td><td>142000</td></tr><tr><td>3</td><td>3 Steven</td><td>850000</td></tr><tr><td>4</td><td>4 Maria</td><td>120000</td></tr></table></div></div></div></div> | NAMES | 1 Adam | 2 Lex | NAMES | 1 John | 2 Maria | 3 Mike | ID_NUMBER | NAMES | SALARY | 1 | 1 Steven | 110000 | 2 | 2 Adam | 105000 | 3 | 3 Lex | 100000 | ID_NUMBER | NAMES | SALARY | 1 | 1 Mike | 155000 | 2 | 2 John | 142000 | 3 | 3 Steven | 850000 | 4 | 4 Maria | 120000 |
| NAMES | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 Adam | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 Lex | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NAMES | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 John | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 Maria | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 Mike | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ID_NUMBER | NAMES | SALARY | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 2 | 2 Adam | 105000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | 3 Lex | 100000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 4 | 4 Maria | 120000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

INTERSECT

Will keep what is common, the only common thing is name, so if we will call ID and SALARY it will not work

```
select names from Testers  
INTERSECT  
select names from Developers;
```

| Query Result x |
|--------------------------------------|
| SQL All Rows Fetched: 1 in 0.012 s |
| NAMES |
| 1 Steven |



SUMMARY OF SET OPERATORS

- **UNION** -> combines, removes duplicates, sorts
- **UNION ALL** -> combines, does not remove duplicates, does not sort
- **MINUS** -> show records from query1 that are not present in query2
- **INTERSECT** -> show common records from 2 queries

IQ - How to find duplicate names in employees table

- NO - DISTINCT or GROUP BY - because it will remove the duplicates

We need:

1. Select just First names

2. Count of each first name
3. Group by first name
4. Having count(*)>1

```
select first_name, count(*)
from employees
group by first_name
having count (*)>1;
```

ery Result x

SQL | All Rows Fetched: 13 in

| FIRST_NAME | COUNT(*) |
|------------|----------|
| Peter | 3 |
| Michael | 2 |
| Steven | 2 |
| John | 3 |
| Julia | 2 |
| William | 2 |
| Karen | 2 |
| Kevin | 2 |
| David | 3 |
| Jennifer | 2 |
| Randall | 2 |
| Alexander | 2 |
| James | 2 |

```
select first_name, count(*)
from employees
group by first_name;
```

ery Result x

SQL | Fetched 50 rows in 0.05 s

| FIRST_NAME | COUNT(*) |
|-------------|----------|
| Peter | 3 |
| Michael | 2 |
| Shelley | 1 |
| Steven | 2 |
| Samuel | 1 |
| Christopher | 1 |
| Lindsey | 1 |
| Sigal | 1 |

Statement:

= → equal

>/< → greater than/ less then

>= / <= → greater.equal/less.equal

<> or != → not equal

AND → logical AND (both has to be), unless its working with keyword *between*

OR → logical OR (one or another)

SQL:

- Case NOT Sensitive
- Statements end at the semicolon, you can go to the second line...

WE WILL NOT WORK WITH NON-RELATION-DATABASE

Non Relational DATABASE

- All Data are in Key & Value format

```
{
  first_name: 'Dexter',
  last_name: 'Lanas',
  city: 'Vancouver',
  location: [45.123,47.232],
  phones: [
    { phone_number: '111-111-1111',
      type: mobile,
      person_id: 1, ... },
    { phone_number: '444-444-4444',
      type: home,
      person_id: 1, ... },
    { phone_number: '777-777-7777',
      type: office,
      person_id: 1, ... },
  ]
}
```