

# BASE DE DATOS PARA INTELIGENCIA ARTIFICIAL

• 08/07/2023

# Esquema de hoy

- Repaso
- Normalización
- Data Languages
- SQL Basics
- SQL Advanced
- Postgres (Chinook)
- Prácticas

# REPASO

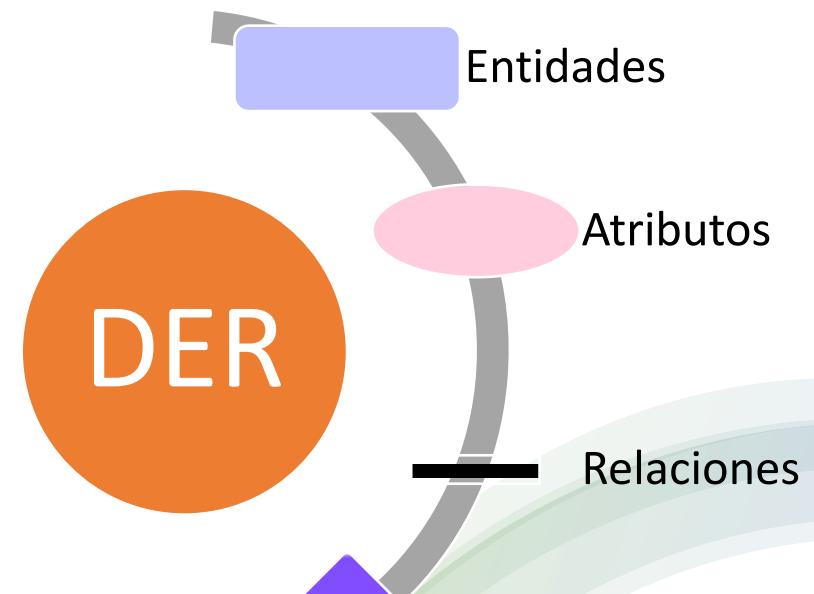
# Conceptos básicos

## Diagrama Entidad Relación (DER/ERD)

El modelo Entidad-Relación (E-R) es una manera de representar nuestra percepción del sistema que vamos a modelar.

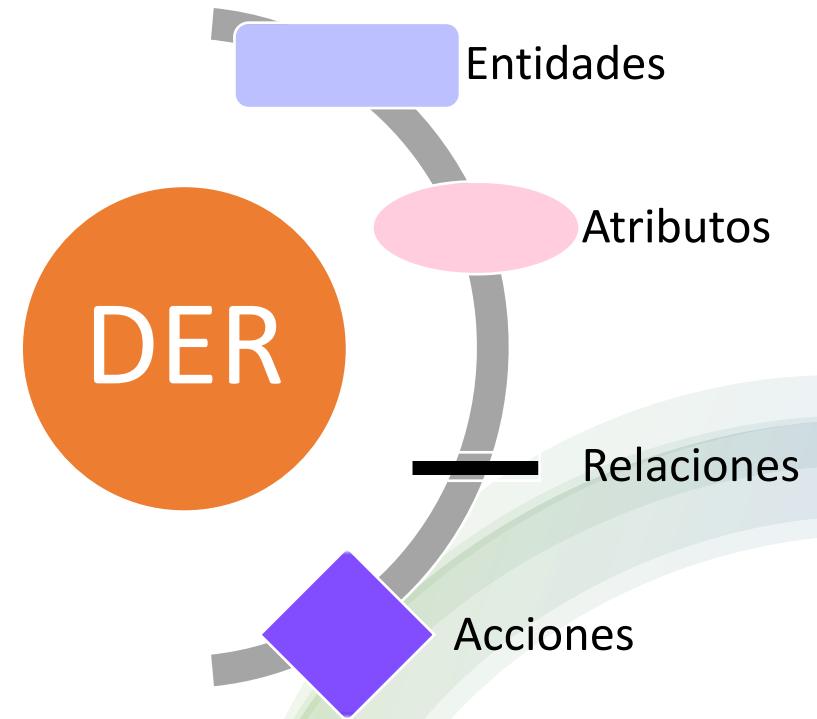
Este consiste en un conjunto de objetos básicos:

- **Entidades**
- **Atributos**
- **Interrelaciones**
- **Acciones**



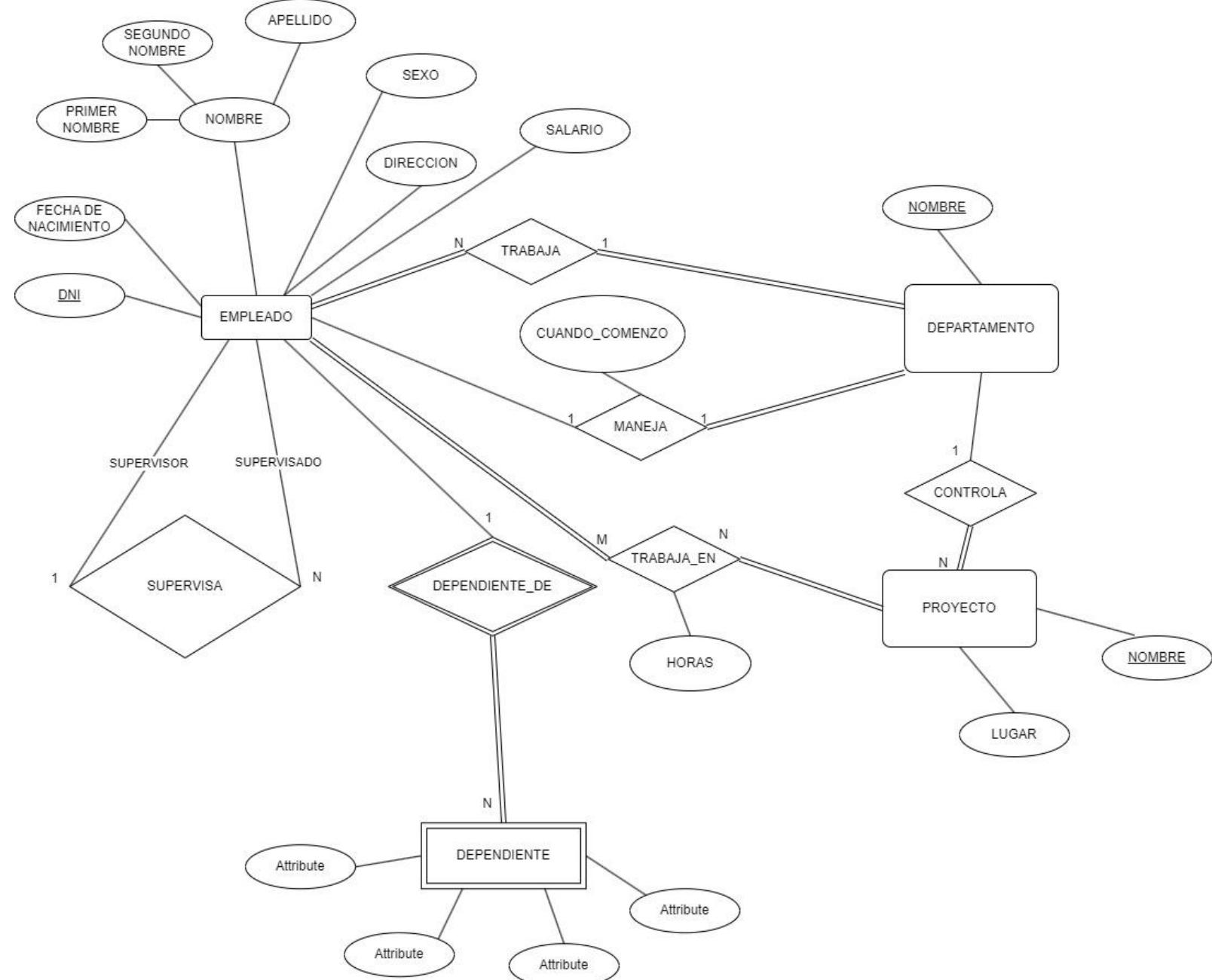
# Repaso

- Atributos
  - Simples
  - compuestos
- Interrelaciones
  - Grado
    - Unaria
    - Binaria
  - Cardinalidad
    - 1:1
    - 1:N
    - N:M
  - Participación
    - Total
    - Parcial
- Entidades
  - Fuertes o Debiles



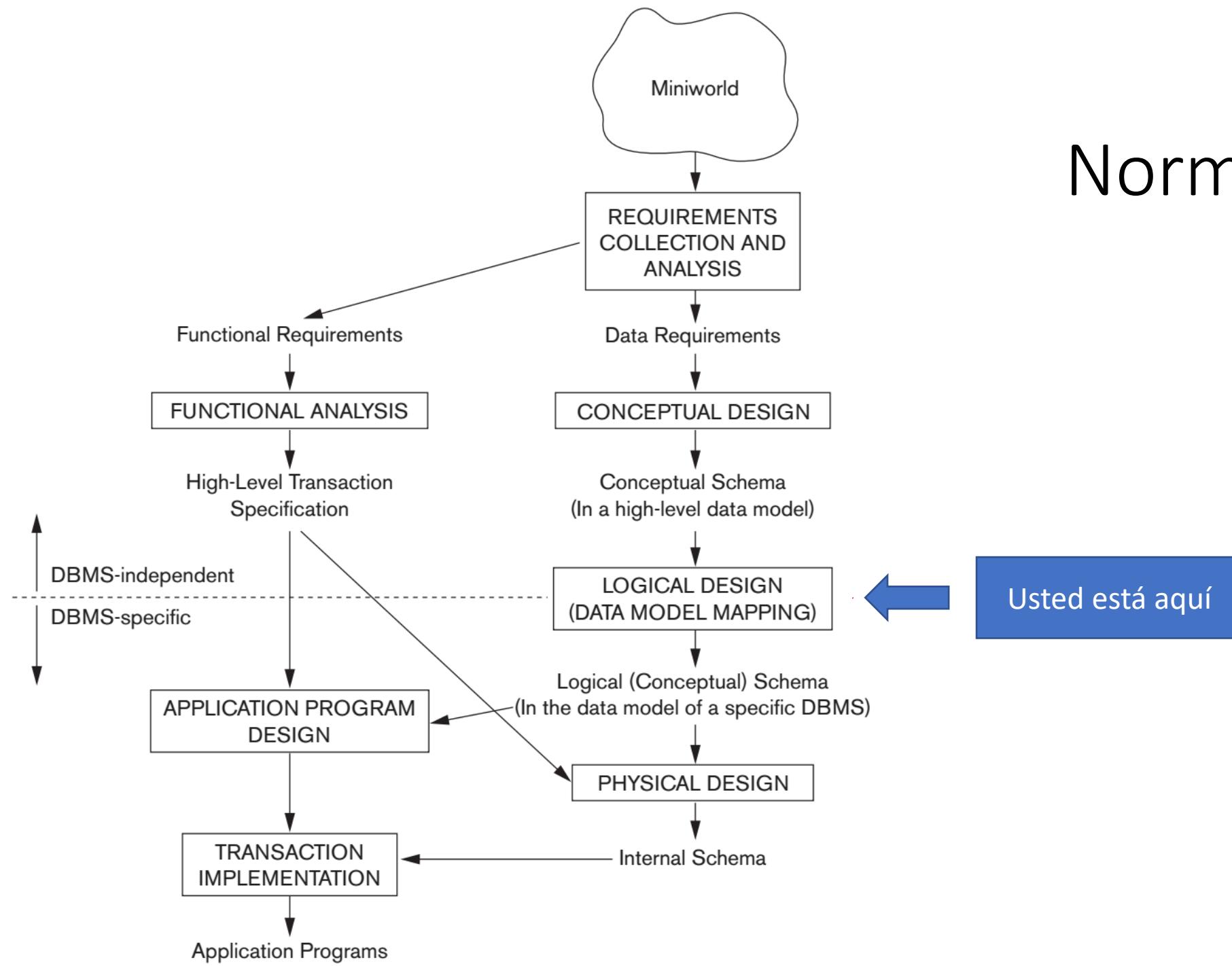
# Repaso

- DER
- MER



# NORMALIZACION

# Normalización



# Guía informal de diseño de esquemas

- Asegurarnos que la semántica de los atributos sea la correcta
- Reducir información redundante en las tablas
- Reducir la cantidad de valores NULL en las tuplas
- No permitir la posibilidad de generar tuplas espurias o anomalías
  - Anomalías por Inserción
  - Anomalías por Borrado
  - Anomalías por Modificación

SALES
ITEMS
PRICE
CREATED_AT
QUANTITY
FULL_NAME
ADDRESS
...



## Normalización

- Proceso de aplicar una serie de reglas para minimizar (o eliminar) la redundancia de datos
- Evita anomalías sobre los datos
- Separa grandes tablas en tablas mas pequeñas y las une a través de relaciones

# Normalización

SALES
ITEMS
PRICE
CREATED_AT
QUANTITY
FULL_NAME
ADDRESS
...



ORDERS
ORDER_ITEMS_ID
CUSTOMER_ID
CREATED_AT
QUANTITY
...

CUSTOMER
EMAIL
ID
FULL_NAME
ADDRESS
...

ORDER ITEMS
ITEM
PRICE
CATEGORY
DESCRIPTION
ID
...



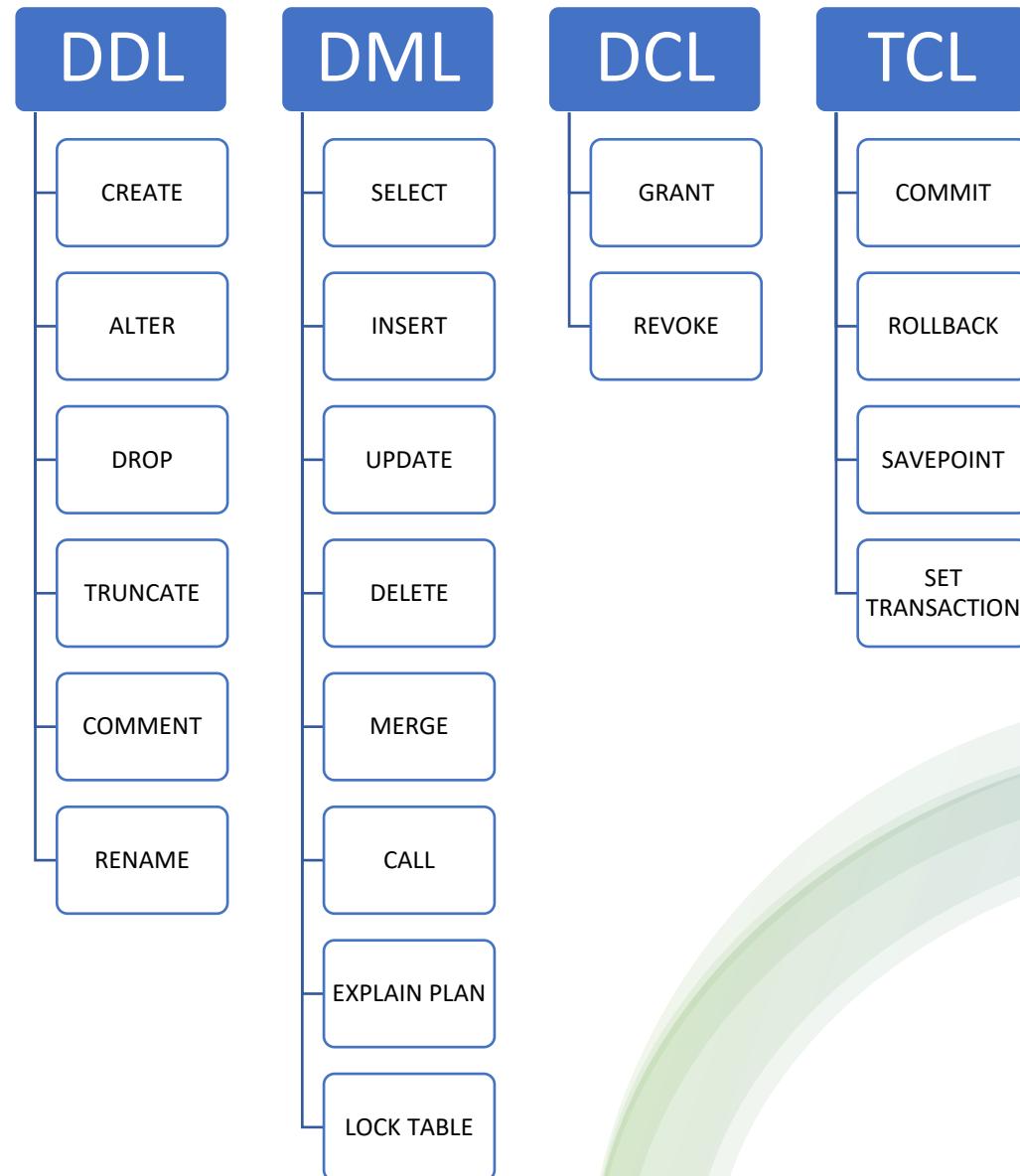
Lenguaje SQL

Data \* Language

# Tipos de SQL

En SQL podemos encontrar 4 categorías importantes:

- **DDL:**Corresponde a los comandos que nos permiten definirla estructura de nuestro MR.
- **DML:** Estos comandos nos permiten manipular nuestro MR



# Tipos de SQL

En SQL podemos encontrar 4 categorías importantes:

- **DCL:** Estos comandos rigen la parte de control y gobierno de nuestros datos
- **TCL:** Estos comandos rigen el control sobre las operaciones de DML.



Nosotros nos vamos a concentrar sobre todo en **DML** y un poco de **DDL**

# DDL

## Data Definition Language

# Creación de Elementos

- En PostgreSQL, tenemos que la sentencia **CREATE** nos permite crear distintos elementos en nuestra base de datos. Estos pueden ser:
  - **DATABASE**
  - **TABLE**
  - **INDEX**
  - **ROLE**
  - **USER**
  - ...
- `CREATE DATABASE testDB;`
- `CREATE TABLE Persons(`  
    `PersonID int,`  
    `LastName varchar(255),`  
    `FirstName varchar(255),`  
    `Address varchar(255),`  
    `City varchar(255)`  
`);`
- `CREATE TABLE TestTable AS`  
    `SELECT`  
        `customername,`  
        `contactname`  
    `FROM`  
        `customers;`
- `CREATE USER name [ [ WITH ] option[ ... ] ];`

Name	Aliases	Description
bigint	int8	signed eight-byte integer
bigserial	serial8	autoincrementing eight-byte integer
bit [ (n) ]		fixed-length bit string
bit varying [ (n) ]	varbit [ (n) ]	variable-length bit string
boolean	bool	logical Boolean (true/false)
box		rectangular box on a plane
bytea		binary data ("byte array")
character [ (n) ]	char [ (n) ]	fixed-length character string
character varying [ (n) ]	varchar [ (n) ]	variable-length character string
cidr		IPv4 or IPv6 network address
circle		circle on a plane
date		calendar date (year, month, day)
double precision	float8	double precision floating-point number (8 bytes)
inet		IPv4 or IPv6 host address
integer	int, int4	signed four-byte integer
interval [ fields ] [ (p) ]		time span
json		textual JSON data
jsonb		binary JSON data, decomposed
line		infinite line on a plane
lseg		line segment on a plane
macaddr		MAC (Media Access Control) address
macaddr8		MAC (Media Access Control) address (EUI-64 format)
money		currency amount
numeric [ (p, s) ]	decimal [ (p, s) ]	exact numeric of selectable precision
path		geometric path on a plane
pg_lsn		PostgreSQL Log Sequence Number
pg_snapshot		user-level transaction ID snapshot
point		geometric point on a plane
polygon		closed geometric path on a plane
real	float4	single precision floating-point number (4 bytes)
smallint	int2	signed two-byte integer
smallserial	serial2	autoincrementing two-byte integer
serial	serial4	autoincrementing four-byte integer
text		variable-length character string
time [ (p) ] [ without time zone ]		time of day (no time zone)
time [ (p) ] with time zone	timetz	time of day, including time zone
timestamp [ (p) ] [ without time zone ]		date and time (no time zone)
timestamp [ (p) ] with time zone	timestampz	date and time, including time zone
tsquery		text search query
tsvector		text search document
txid_snapshot		user-level transaction ID snapshot (deprecated; see pg_snapshot)
uuid		universally unique identifier
xml		XML data

# Creación de Elementos

- Usualmente, en nuestro rol de DS, MLE, etc. Vamos a estar utilizando creación sobre todo de tablas.
- Una parte importante de las tablas es el tipo de datos que contienen en sus columnas. Esto varia ligeramente entre motor y motor, en el caso de postgresSQL, los mas importantes son:
  - Numéricos (Int, Float, etc.)
  - Caracteres (char, varchar, text, ...)
  - Fecha y tiempo (timestamp, date, ....)
  - Objetos (XML,json,...)
  - Secuencias autogeneradas (Serial, ...)

# Modificación de tablas

- `ALTER TABLE tesTable ADD ( column datatype [DEFAULT expr]);`
  - `ALTER TABLE tesTable`
  - `ALTER COLUMN columnName datatype;`
  - `ALTER TABLE tesTable`
  - `ALTER COLUMN columnName SET NOT NULL;`
  - `ALTER TABLE tesTable`
  - `ALTER CHECK ( col::expression )`
  - `ALTER TABLE tesTable`
  - `ALTER CONSTRAINT [constraintName];`
  - `CHECK ( col::expression )`
- En PostgreSQL, tenemos que la sentencia ALTER esta nos permite cambiar atributos de nuestro objeto, en particular ALTER TABLE nos permite operar sobre nuestras tablas:
    - Agregar columnas
    - Cambiar la definición de las mismas
    - Agregar o borrar *constraints* (relaciones)

```
ALTER TABLE tesTable  
ALTER CONSTRAINT [relation_name];  
[FOREIGN|PRIMARY] KEY (col.O)  
[[REFERENCES] otherTestTable(col.R)]
```

```
CREATE SEQUENCE "theme_id_seq"
    INCREMENT 1
    MINVALUE 1
    MAXVALUE 2147483647
    START 1
    CACHE 1;
SELECT setval('"public"."theme_id_seq"', 1, TRUE);
```

## Ejemplo

```
CREATE TABLE theme(
    theme_id int DEFAULT nextval('theme_id_seq'::regclass) NOT NULL,
    namevarchar(256),
    parent_id int,
    CONSTRAINT pk_themes PRIMARY KEY (theme_id)
);

ALTER TABLE themes ADD CONSTRAINT (fk_themes_id)
FOREIGN KEY (parent_id) REFERENCES themes (theme_id)
```

## Ejemplo opción 2

```
CREATE TABLE theme(  
    theme_id serial NOT NULL,  
    name varchar(256),  
    parent_id serial  
    CONSTRAINT pk_themes  
    PRIMARY KEY (theme_id)  
);  
  
ALTER TABLE themes ADD CONSTRAINT (fk_themes_id)  
FOREIGN KEY (parent_id) REFERENCES themes (theme_id)
```

# DML

## Data Manipulation Language

# Insertando valores

- INSERT nos permite agregar filas en una tabla, es la única manera que nos provee SQL directamente para ingresar datos.
- ```
INSERT INTO tableName [(col1[,  
col2,...])]  
VALUES (val1[, val2, ...]);
```
- ```
INSERT INTO tableName  
VALUES (val1, val2, ... , val3);
```
- ```
INSERT INTO themes(name,parent_id)  
VALUES ('starwarsdeathstar', 128);
```
- ```
INSERT INTO sets  
VALUES (1,'dome',1989,128,129);
```

# ESTRUCTURA DE QUERIES

# ESTRUCTURA GENERAL DE UNA QUERY

**SELECT**

Se seleccionan todos los campos que se desean consultar

**FROM**

Se seleccionan las tablas de las cuales se extraen esos campos

**WHERE**

Se filtran los resultados según las condiciones deseadas

**GROUP BY**

Se agrupan los resultados según todos los campos no calculados

**HAVING**

Se filtran los resultados según las condiciones deseadas para los campos calculados

**ORDER BY**

Se ordenan los resultados según las columnas que se elijan con el orden deseado

SELECT AND DEFINE TABLES

CONDITIONALS AND OPERATORS

AGGREGATE FUNCTIONS

JOINS

SELECT AND DEFINE TABLES

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# SELECT

- Select partial table contents by placing restrictions on rows to be included in output.
- Add conditional restrictions to **SELECT** statement, using **WHERE** clause.
- Syntax:

```
SELECT *  
FROM table_name;
```

```
SELECT Col1,Col2,...,Coln  
FROM table_name  
[ WHERE conditionlist ] ;
```

# CREATE, DROP AND DELETE TABLES

## CREATE TABLE

- Used to create a new table
- Syntax:

```
CREATE TABLE  
scheme.table_name (  
column1 datatype primary key,  
column2 datatype,  
column3 datatype,  
.... );
```

```
CREATE TABLE scheme  
.table_name AS (  
SELECT columnlist  
FROM table_name);
```

## DELETE TABLE

- Used to drop data in a table
- Syntax:

```
DELETE FROM table_name  
[WHERE conditionlist];
```

## DROP TABLE

- Used to drop an entire table
- Syntax:

```
DROP TABLE table_name;
```

# ADD, UPDATE AND ALTER TABLE ROWS

## ADDING TABLE ROWS

- To enter data into table
- Syntax:

```
INSERT INTO table_name  
[(column1, column2, ...)]  
VALUES  
(value1,value2,...);
```

## UPDATE

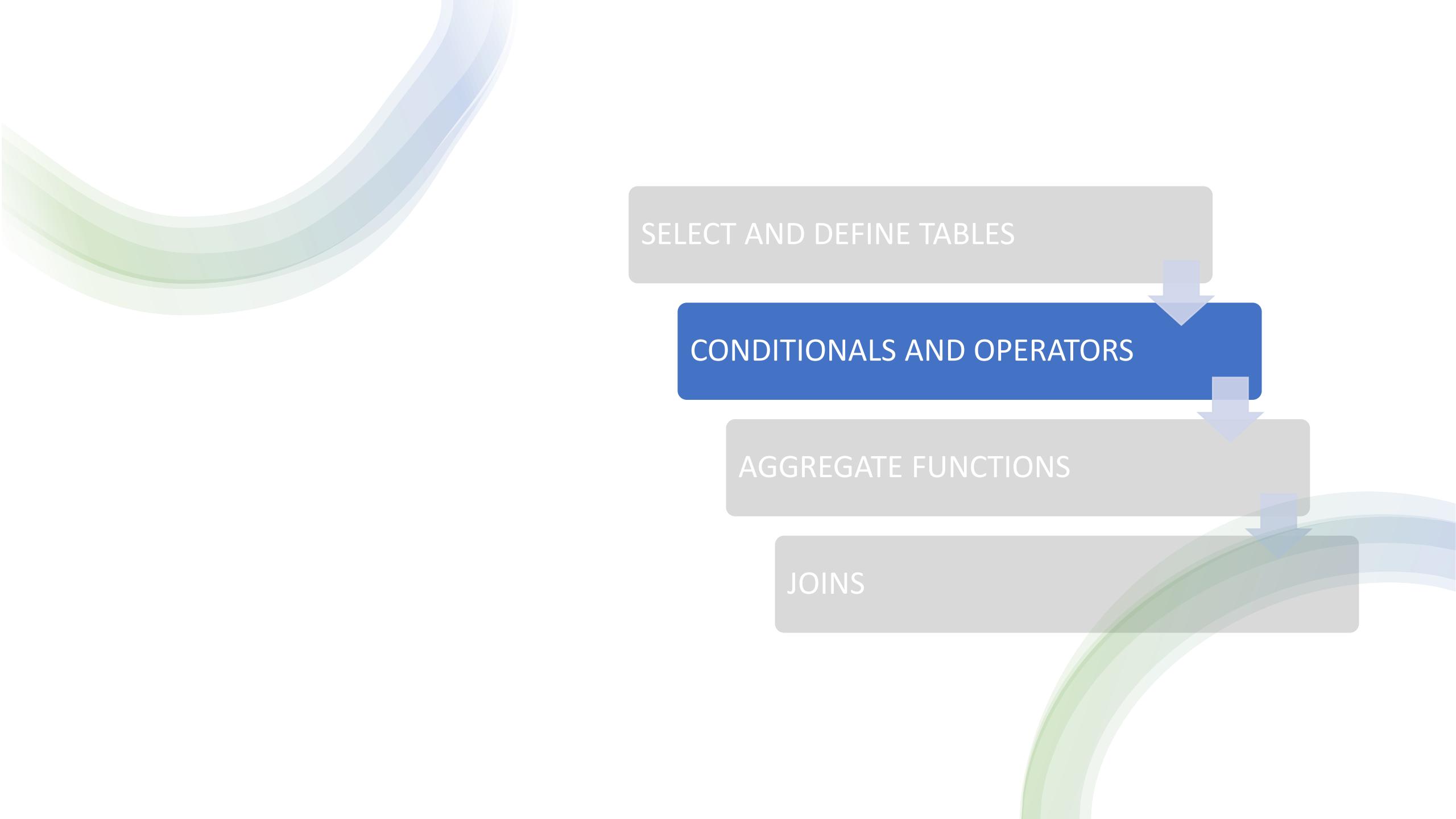
- Modify data in a table
- Syntax:

```
UPDATE tablename  
SET columnname = expression  
WHERE conditionlist];  
• If more than one attribute  
is to be updated in row,  
separate corrections with  
commas
```

## ALTER

- Alter conditions from a table
- Syntax:

- 1)**ALTER TABLE** table\_name  
**ADD COLUMN** new\_c TYPE;
- 2)**ALTER TABLE** table\_name  
**RENAME COLUMN** col\_1  
**TO** new\_name;



SELECT AND DEFINE TABLES

CONDITIONALS AND OPERATORS

AGGREGATE FUNCTIONS

JOINS

# CONDITIONALS: COMPARISON OPERATORS

Used in conditional expressions

- Syntax:

`SELECT columnlist`

`FROM tablelist`

`WHERE <expression>[comparison operator]<expression>;`

Operator	Description
=	Equal to
>	Greater than
<	Less than
>=	Greater than or equal to
<=	Less than or equal to
<>	Not equal to

# CONDITIONALS: LOGICAL OPERATORS

- Combine conditional expressions to return true or false values:

- Syntax:

```
SELECT columnlist
```

```
FROM tablelist
```

```
WHERE condition1 AND (condition2 OR condition3) ...;
```

```
SELECT columnlist
```

```
FROM tablelist
```

```
WHERE NOT condition1 ...;
```

# CONDITIONALS: SPECIAL OPERATORS

BETWEEN -> BETWEEN DATE '2020-08-01' AND DATE '2020-08-31'

- Used to check whether attribute value is within a range

IS NULL or IS NOT NULL -> SURENAME IS NULL

- Used to check whether attribute value is null

LIKE -> TRACKING\_CODE LIKE '%DELIVERED%'

- Used to check whether attribute value matches given string pattern

IN or NOT IN -> ID IN (SELECT \* FROM table\_one)

- Used to check whether attribute value matches any value within a value list

# CONDITIONALS: SPECIAL OPERATORS

DISTINCT -> SELECT DISTINCT NAMES FROM CLIENTES;

- Limits values to unique values

AS

- Use to rename columns
- Syntax:

**SELECT** column1 **AS** Name, column2 **AS** Surname  
**FROM** table1;

ORDER BY -> SELECT NAME, QUANTITY FROM  
CLIENTES ORDER BY 2 DESC;

- Use to sort data in descending or ascending order.

## TIPS

- Mantener estructura al escribir
- ; -> al final de cada query
- Distinct -> muestra únicos, usar siempre
- Limit / Top -> limita los resultados = más rápido
- '%Alvarez' -> el % == cualquier caracter



SELECT AND DEFINE TABLES

CONDITIONALS AND OPERATORS

AGGREGATE FUNCTIONS

JOINS

# AGGREGATE FUNCTIONS

Common Aggregate functions :

- Avg (expression)
- Count (expression) or Count (\*)
- Sum (expression)
- Min/Max (expression)

Statistics Aggregate functions:

- Corr ( Y, X )
- Sttdev (expression)
- Variance (expression)

# AGGREGATE FUNCTIONS

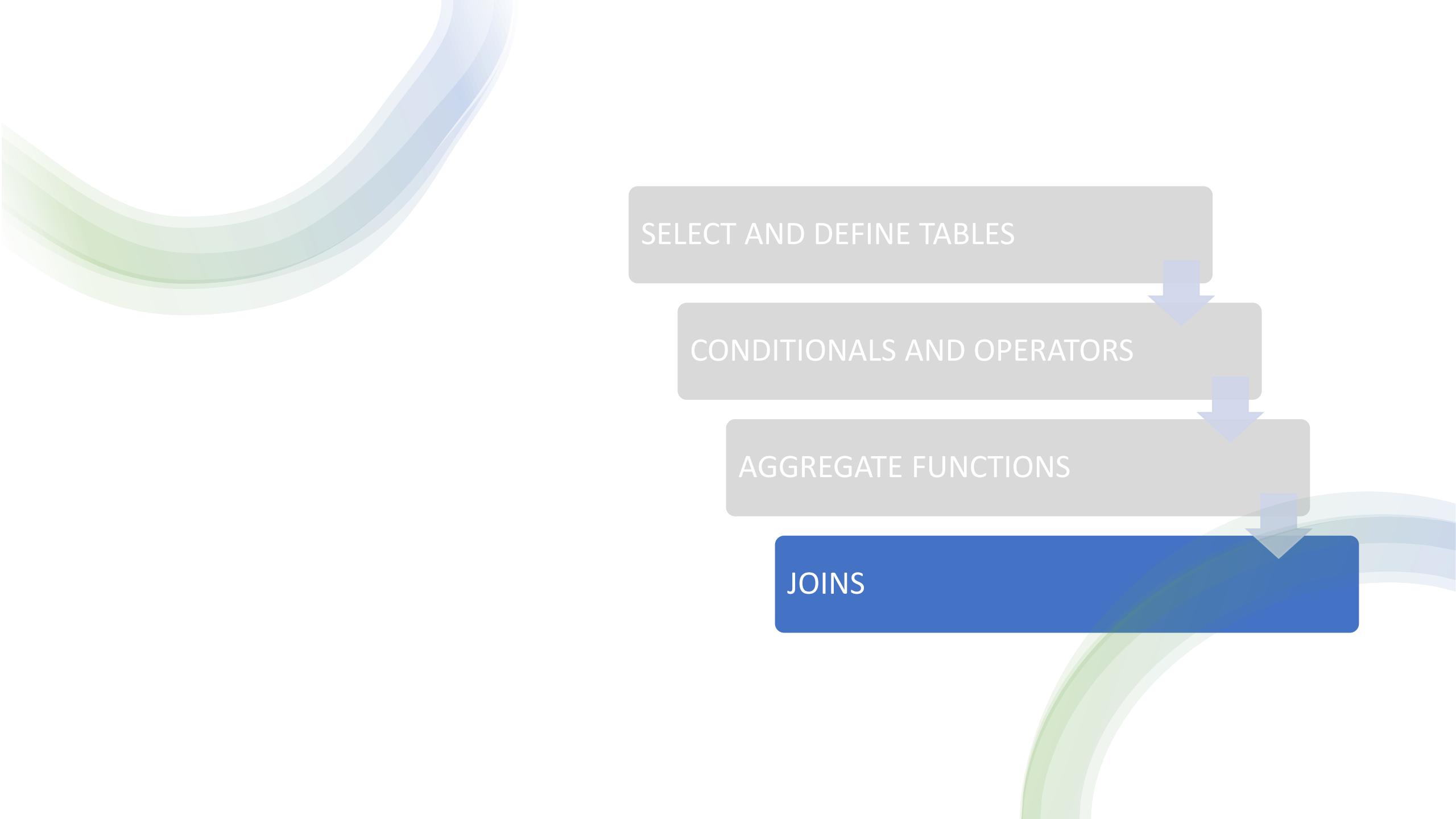
- Aggregate functions compute a single result from a set of input values.

- Syntax:

```
SELECT column_name(s), AGGREGATE_FUNCTION() AS  
column_name  
FROM table_name  
WHERE condition  
GROUP BY column_name(s)  
HAVING condition  
ORDER BY column_name(s);
```

\* **AGGREGATE FUNCTIONS** need a **GROUP BY** clause always !!!!!!!!

\* **HAVING** clause is use to conditionate aggregate functions.



SELECT AND DEFINE TABLES

CONDITIONALS AND OPERATORS

AGGREGATE FUNCTIONS

JOINS

# JOINS: UNION CLAUSE AND CARTESIAN JOIN

## UNION

- Syntax:

```
SELECT exp1,exp2,exp_n  
FROM table_name  
[WHERE condition]  
  
UNION ALL  
  
SELECT exp1,exp2,exp_n  
FROM table_name  
[WHERE condition];
```

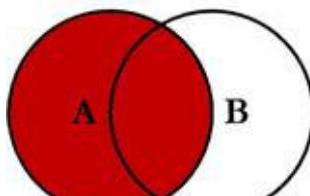
## CARTESIAN

- Syntax:

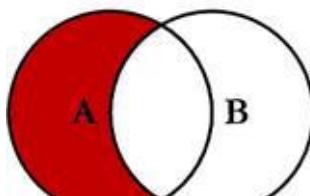
```
SELECT t1.a, t1.b, t2.aa, t2.bb  
FROM table_name AS t1  
[LEFT/INNER/etc ] JOIN table_name AS t2  
ON t1.columnY=t2.columnX;
```

# JOINS

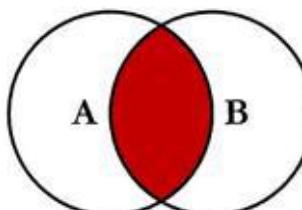
## SQL JOINS



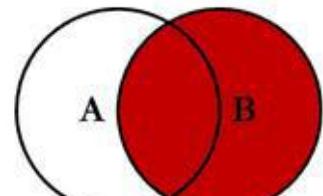
```
SELECT <select_list>
FROM TableA A
LEFT JOIN TableB B
ON A.Key = B.Key
```



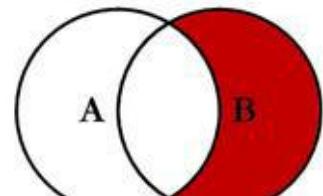
```
SELECT <select_list>
FROM TableA A
LEFT JOIN TableB B
ON A.Key = B.Key
WHERE B.Key IS NULL
```



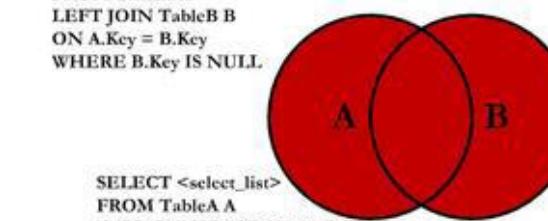
```
SELECT <select_list>
FROM TableA A
INNER JOIN TableB B
ON A.Key = B.Key
```



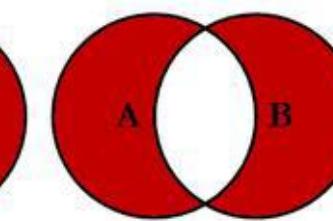
```
SELECT <select_list>
FROM TableA A
RIGHT JOIN TableB B
ON A.Key = B.Key
```



```
SELECT <select_list>
FROM TableA A
RIGHT JOIN TableB B
ON A.Key = B.Key
WHERE A.Key IS NULL
```



```
SELECT <select_list>
FROM TableA A
FULL OUTER JOIN TableB B
ON A.Key = B.Key
```



```
SELECT <select_list>
FROM TableA A
FULL OUTER JOIN TableB B
ON A.Key = B.Key
WHERE A.Key IS NULL
OR B.Key IS NULL
```

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# CARTESIAN JOIN EXAMPLE

Customers

ID	NAME	AGE	ADDRESS	SALARY
1	Ramesh	32	Ahmedabad	2000.00
2	Khilan	25	Delhi	1500.00
3	kaushik	23	Kota	2000.00
4	Chaitali	25	Mumbai	6500.00
5	Hardik	27	Bhopal	8500.00
6	Komal	22	MP	4500.00
7	Muffy	24	Indore	10000.00

Orders

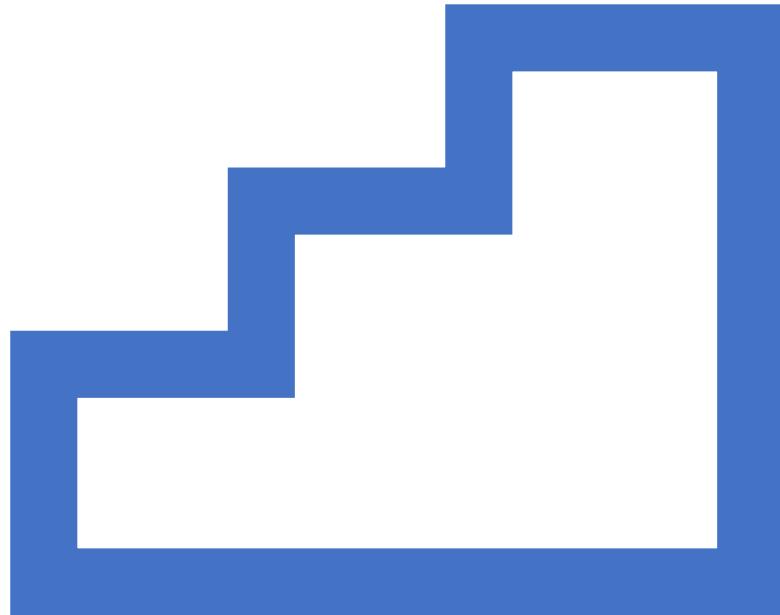
OID	DATE	CUSTOMER_ID	AMOUNT
102	2009-10-08 00:00:00	3	3000
100	2009-10-08 00:00:00	3	1500
101	2009-11-20 00:00:00	2	1560
103	2008-05-20 00:00:00	4	2060

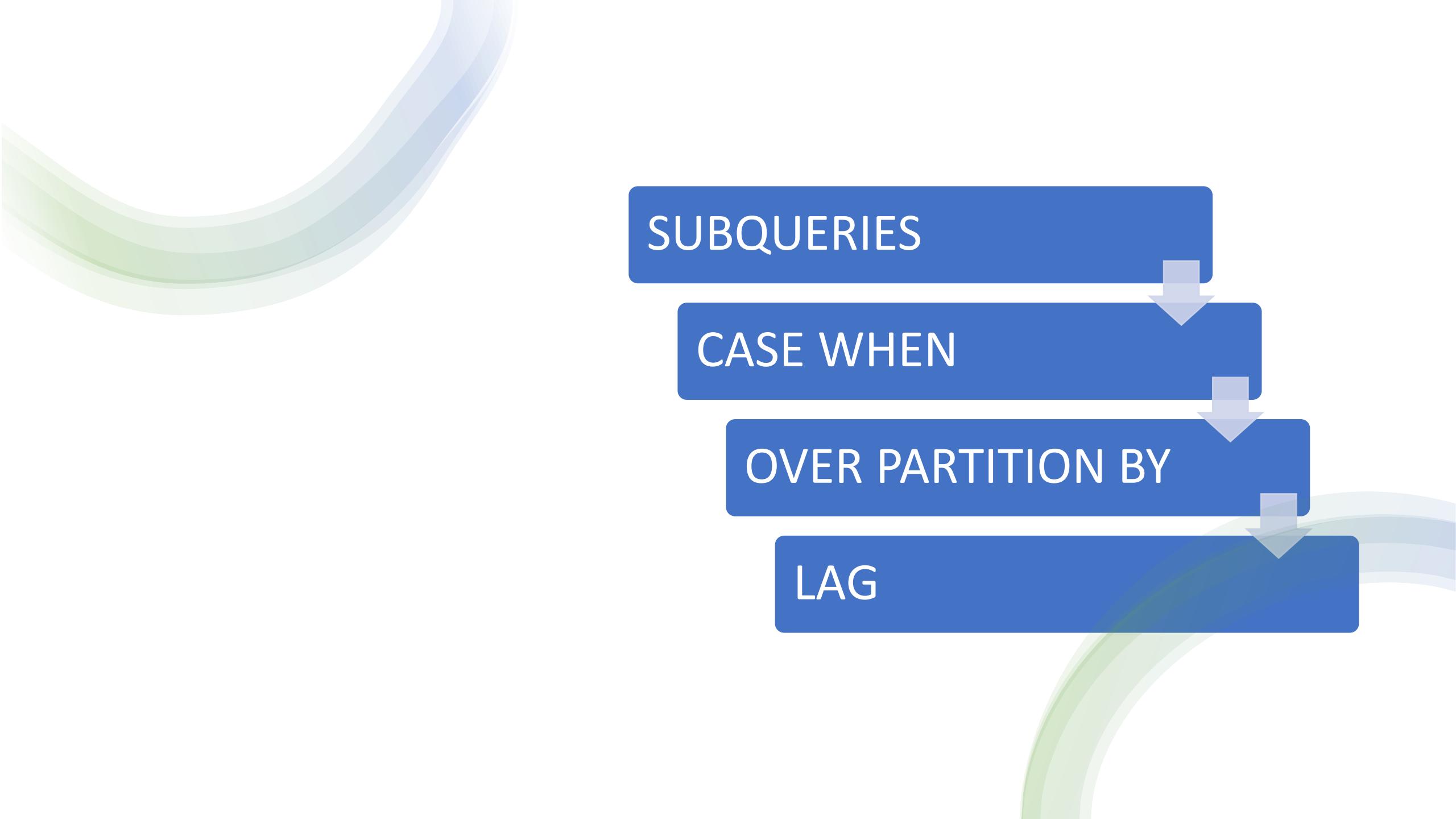
ID	NAME	AMOUNT	DATE
1	Ramesh	3000	2009-10-08 00:00:00
1	Ramesh	1500	2009-10-08 00:00:00
1	Ramesh	1560	2009-11-20 00:00:00
1	Ramesh	2060	2008-05-20 00:00:00
2	Khilan	3000	2009-10-08 00:00:00
2	Khilan	1500	2009-10-08 00:00:00
2	Khilan	1560	2009-11-20 00:00:00
2	Khilan	2060	2008-05-20 00:00:00
3	kaushik	3000	2009-10-08 00:00:00
3	kaushik	1500	2009-10-08 00:00:00
3	kaushik	1560	2009-11-20 00:00:00
3	kaushik	2060	2008-05-20 00:00:00
4	Chaitali	3000	2009-10-08 00:00:00
4	Chaitali	1500	2009-10-08 00:00:00
4	Chaitali	1560	2009-11-20 00:00:00
4	Chaitali	2060	2008-05-20 00:00:00
5	Hardik	3000	2009-10-08 00:00:00
5	Hardik	1500	2009-10-08 00:00:00
5	Hardik	1560	2009-11-20 00:00:00
5	Hardik	2060	2008-05-20 00:00:00
6	Komal	3000	2009-10-08 00:00:00
6	Komal	1500	2009-10-08 00:00:00
6	Komal	1560	2009-11-20 00:00:00
6	Komal	2060	2008-05-20 00:00:00
7	Muffy	3000	2009-10-08 00:00:00
7	Muffy	1500	2009-10-08 00:00:00
7	Muffy	1560	2009-11-20 00:00:00
7	Muffy	2060	2008-05-20 00:00:00

# DUDAS?



# SQL PRIMEROS PASOS



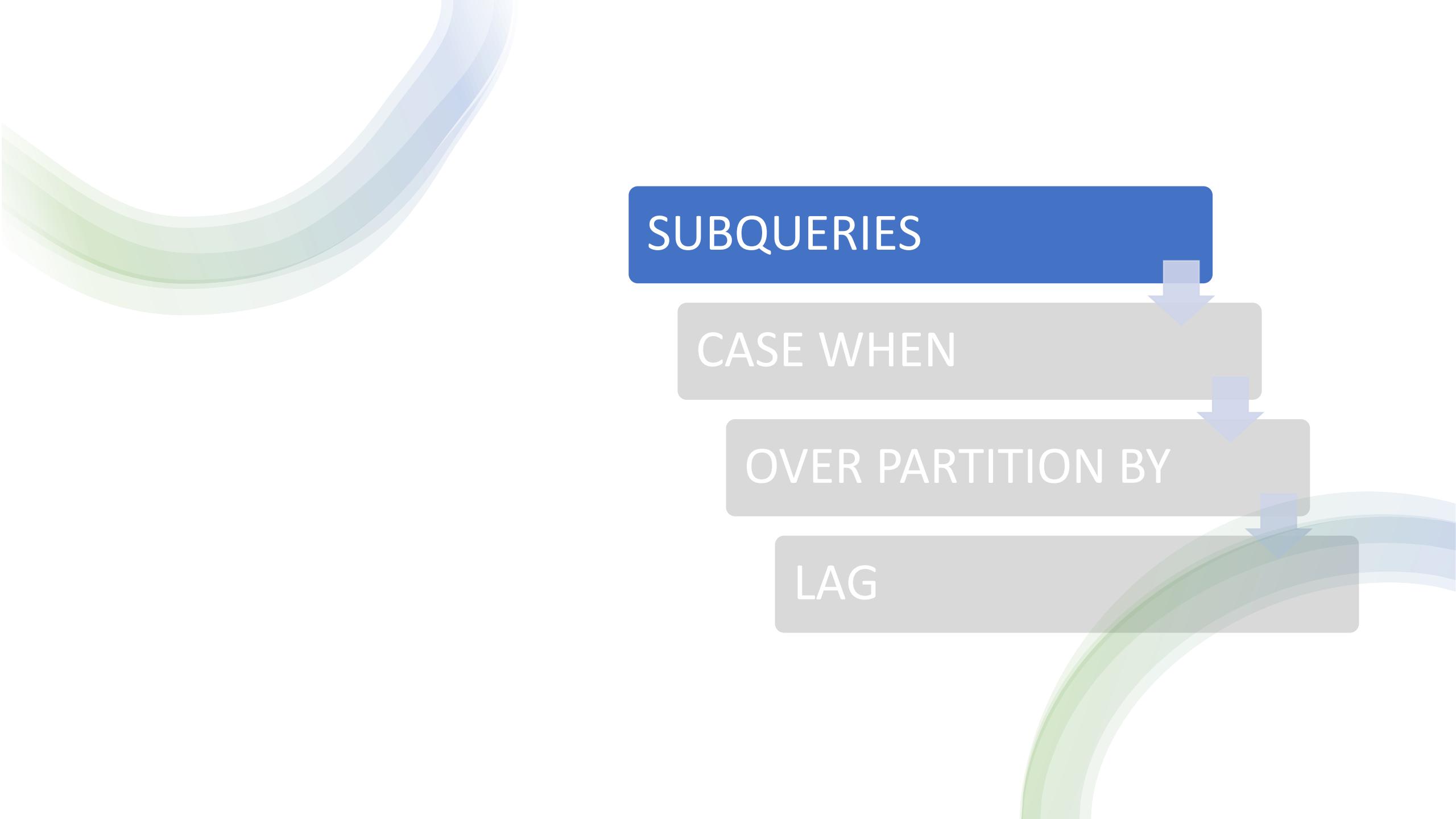


SUBQUERIES

CASE WHEN

OVER PARTITION BY

LAG



# SUBQUERIES

CASE WHEN

OVER PARTITION BY

LAG

# NESTED

- Syntax:

```
SELECT columnlist  
FROM (SELECT columnlist FROM tablelist);
```

```
SELECT columnlist  
FROM tablelist  
WHERE columnlist in ( SELECT columnlist FROM tablelist);
```

```
SELECT product, price, ( SELECT AVG (price) FROM tablelist ) avg_price  
FROM tablelist
```

# WITH

Permite hacer consultas intermedias (de la misma forma que una subquery ) pero de forma

ordenada y más simple cuando tenemos que hacer muchas. La idea es evitar anidar una subquery adentro de la otra y adentro de la otra y adentro de la otra, etc.

- Syntax

**WITH**

tabla1 **AS** (SELECT columnlist **FROM** tablelist),

tabla2 **AS** (SELECT columnlist **FROM** tablelist)

**SELECT \* FROM tabla1 INNER JOIN tabla2 ON tabla1.campo1 = tabla2.campo2;**



SUBQUERIES

CASE WHEN

OVER PARTITION BY

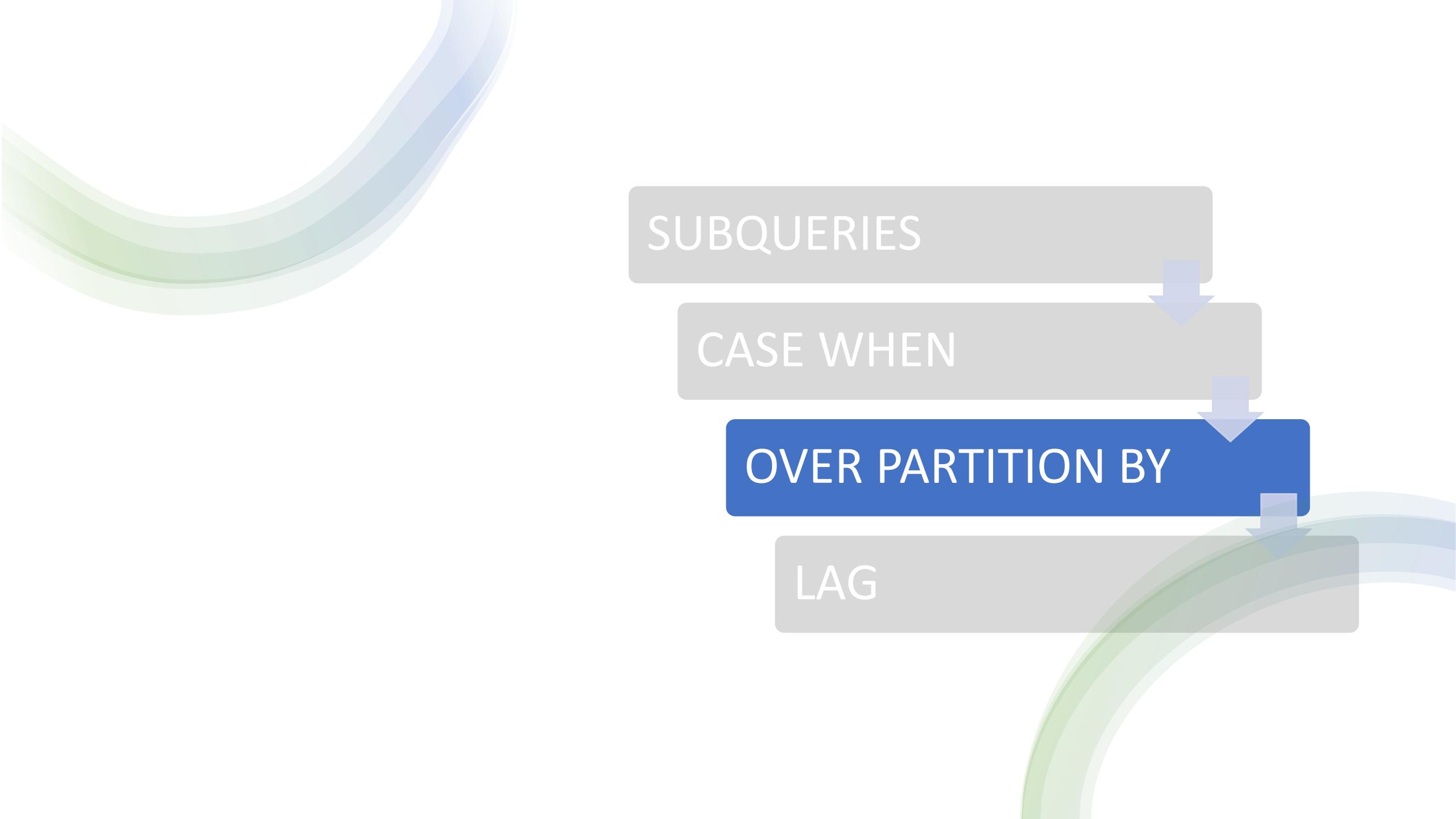
LAG

# CASE

The SQL CASE expression is a generic conditional expression, similar to if/else statements in other languages:

- Syntax:

```
SELECT name,  
CASE WHEN condition THEN result [WHEN ...] [ ELSE result ] END  
column_name  
FROM tablelist
```



SUBQUERIES

CASE WHEN

OVER PARTITION BY

LAG

# OVER PARTITION BY ORDER BY

Es una función agregada aplicada a una partición o subconjunto del resultado de una consulta. Se la llama WINDOW FUNCTION

Diferencia con GROUP BY:

- GROUP BY se usa con las funciones de agregación (suma, promedio, etc.) para indicarle a la función todos los campos que debe tener en cuenta para el cálculo.
- OVER clause define una ventana sobre la que hacer el calculo que NO NECESARIAMENTE son todas los campos de la tabla.

# OVER PARTITION BY

PARTITION BY: indica qué campos de la tabla mirar para hacer el cálculo solamente sobre los registros que estén dentro de esa Ventana.

- Syntax

```
SELECT depname , empno , salary ,  
AVG(salary) OVER ( PARTITION BY depname )  
FROM empsalary ;
```

+ info → diferencia entre aggregate functions y Windows functions

<https://learnsql.com/blog/window-functions-vs-aggregate-functions/>

depname	empno	salary	avg
develop	11	5200	5020.0000000000000000
develop	7	4200	5020.0000000000000000
develop	9	4500	5020.0000000000000000
develop	8	6000	5020.0000000000000000
develop	10	5200	5020.0000000000000000
personnel	5	3500	3700.0000000000000000
personnel	2	3900	3700.0000000000000000
sales	3	4800	4866.6666666666666667
sales	1	5000	4866.6666666666666667
sales	4	4800	4866.6666666666666667
(10 rows)			

# ORDER BY

ORDER BY: se usa si estamos haciendo una función que necesita la información de campos anteriores o posteriores. Hay que especificar el orden de los campos para que la Ventana esté correctamente seleccionada.

- Syntax

**SELECT**

```
    depname , empno , salary ,  
    rank () OVER PARTITION BY depname ( ORDER BY salary DESC )
```

**FROM** empsalary ;

depname	empno	salary	rank
develop	8	6000	1
develop	10	5200	2
develop	11	5200	2
develop	9	4500	4
develop	7	4200	5
personnel	2	3900	1
personnel	5	3500	2
sales	1	5000	1
sales	4	4800	2
sales	3	4800	2

(10 rows)

# ROWS: PRECEDING

ROW or RANGE: Permite que dentro de la ventana establecida por el PARTITION BY se tomen solamente ciertas filas o un rango en particular .

Por ejemplo ROWS BETWEEN 3 PRECEDED AND CURRENT ROW toma solamente los 3 anteriores, y la fila del cálculo .

- Syntax

**SELECT**

Year , DepartmentID , Revenue

**SUM(Revenue) OVER PARTITION BY DepartmentID ORDER BY [YEAR] ROWS BETWEEN 3 PRECEDING AND CURRENT ROW  
AS CurrentAndPrev3**

**FROM** revenue

**ORDER BY** DepartmentID , Year

# ROWS: FOLLOWING

ROW or RANGE: Permite que dentro de la ventana establecida por el PARTITION BY se tomen solamente ciertas filas o un rango en particular. Por ejemplo ROWS BETWEEN CURRENT ROW AND 3 FOLLOWING toma la fila del cálculo y las 3 posteriores.

- Syntax

```
SELECT Year , DepartmentID , Revenue  
      SUM(Revenue ) OVER (  
          PARTITION BY DepartmentID ORDER BY [Year]  
          ROWS BETWEEN CURRENT ROW AND 3 FOLLOWING  
      ) AS CurrentAndNext3  
FROM revenue ORDER BY DepartmentID , Year
```

# ROWS: PRECEDING AND FOLLOWING

ROW or RANGE: Permite que dentro de la ventana establecida por el PARTITION BY se tomen solamente ciertas filas o un rango en particular . Por ejemplo ROWS BETWEEN 1 PRECEEDING AND 1 FOLLOWING toma 1 fila anterior, la fila del cálculo y la posterior.

- Syntax

```
SELECT Year , DepartmentID , Revenue
```

```
SUM(Revenue ) OVER (
```

```
PARTITION BY DepartmentID
```

```
ORDER BY [Year]
```

```
ROWS BETWEEN 1 PRECEDING AND 1 FOLLOWING)
```

```
AS BeforeAndAfter
```

```
FROM revenue
```

```
ORDER BY DepartmentID , Year
```

Year	DepartmentID	Revenue	CurrentAndPrev3
1	1998	1	10030
2	1999	1	30030
3	2000	1	70030
4	2001	1	100030
5	2002	1	180000
6	2003	1	170300
7	2004	1	140300
8	2005	1	130300
9	2006	1	80300
10	2007	1	140000
11	2008	1	180000
12	2009	1	180000
13	2010	1	170000

Year	DepartmentID	Revenue	CurrentAndNext3
1	1998	1	10030
2	1999	1	180000
3	2000	1	170300
4	2001	1	140300
5	2002	1	130300
6	2003	1	80300
7	2004	1	140000
8	2005	1	180000
9	2006	1	180000
10	2007	1	170000
11	2008	1	180000
12	2009	1	140000

Year	DepartmentID	Revenue	BeforeAndAfter
1	1998	1	30030
2	1999	1	70030
3	2000	1	90000
4	2001	1	160000
5	2002	1	130300
6	2003	1	110300
7	2004	1	40300
8	2005	1	70000
9	2006	1	130000
10	2007	1	160000
11	2008	1	140000
12	2009	1	100000
13	2010	1	130000
14	2011	1	120000



SUBQUERIES

CASE WHEN

OVER PARTITION BY

LAG AND LEAD

# LAG AND LEAD FUNCTION

Lag da acceso a un registro previo específico , y Lead al siguiente registro

- Syntax:

**SELECT**

```
LAG(expression [,offset default_value ]]) OVER (
    PARTITION BY partition_expression , ...
    ORDER BY sort_expression ASC | DESC );
```

- Ejemplo

```
SELECT year, amount,
LAG (amount,1) OVER ( ORDER BY year ) prevs_year_sales
FROM table1;
```

	year smallint	amount numeric	previous_year_sales numeric
1	2018	5021.00	[null]
2	2019	4944.00	5021.00
3	2020	5137.00	4944.00

# ¡TIPS otras funciones

CAST(campo as tipo ) -> convierte el formato del dato

campo::FORMATO -> convierte el formato del dato ej : sku ::INT

DATE\_TRUNC('datepart ', fecha ) -> truncar fechas

To\_date -> transforma a fecha

Date(dd,mm,yyyy ) -> crea fecha

TRIM() -> quita espacios

EXTRACT('datepart ' from fecha ) ¶ Extraer una parte dato de la fecha

Group by 1,2,5.... Hacer referencia a los campos segun orden de ocurrencia

FLOOR()

CEILING() -> permite redondear un numero para abajo o para arriba respectivamente