Curso SQL

Nelson López Centeno

Curso SQL

- Consultas - SELECT
  - Combinar - JOIN
  - Anexar - UNION
  - Subconsultas y CTE
  - Funciones de ventana
- Modificar Datos - INSERT, UPDATE, DELETE
- Modificar Estructura - CREATE, ALTER, DROP
  - Vistas
  - Procedimientos Almacenados
  - Triggers
- Rendimiento

Configuración del entorno de trabajo

MySQL
https://dev.mysql.com/downloads/mysql/

DBeaver
https://dbeaver.io/download/

SELECT

SELECT DISTINCT
FROM
WHERE
GROUP BY
HAVING
ORDER BY
LIMIT

Orden de ejecución

FROM
WHERE
GROUP BY
HAVING
SELECT
DISTINCT
ORDER BY
LIMIT

TIPOS DATOS

Numéricos

INT, SMALLINT, TINYINT, BIGINT
DECIMAL, NUMERIC
FLOAT, REAL

Cadenas Caracteres

CHAR
VARCHAR
TEXT

Fecha y Hora

DATE
TIME
DATETIME

Binario

BINARY
VARBINARY
BLOB

FUNCIONES DE TEXTO

UPPER, LOWER
LEFT, RIGHT
LENGTH
TRIM, LTRIM, RTRIM, BTRIM
SUBSTRING
CONCAT

FUNCIONES DE FECHA Y HORA

CURRENT_DATE
CURRENT_TIME
CURRENT_TIMESTAMP

DATEADD
DATEDIFF
DATEPART

FILTRADO - **WHERE**

=, <>, <, >, <=, >=
AND, OR, NOT
BETWEEN … AND
IN (…)
LIKE

CASE

```
CASE exp
  WHEN valor1 THEN res1
  WHEN valor2 THEN res2
  WHEN valor3 THEN res3
  ELSE res4
END
```

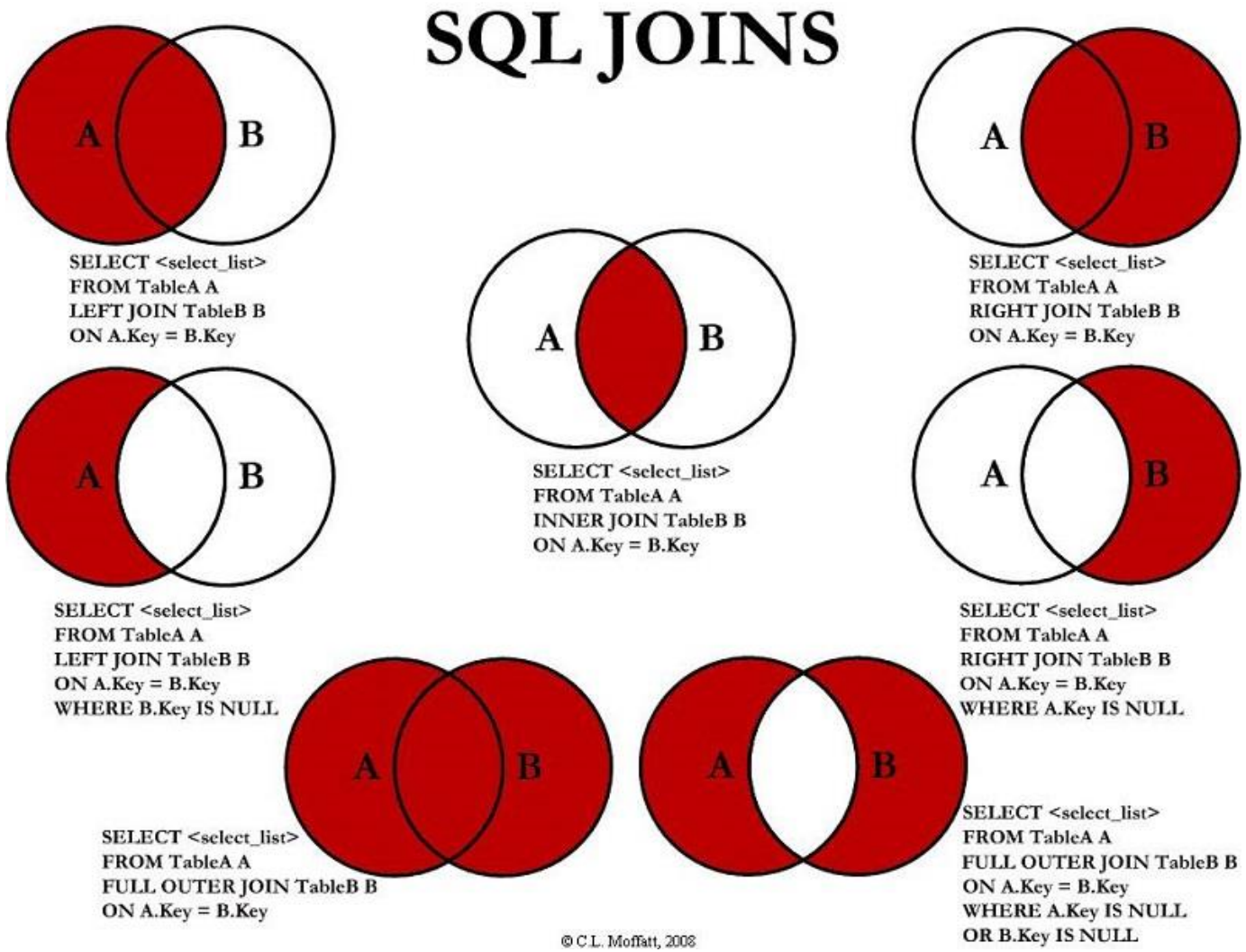
```
CASE
  WHEN cond1 THEN res1
  WHEN cond2 THEN res2
  WHEN cond3 THEN res3
  ELSE res4
END
```

FUNCIONES DE AGREGACIÓN

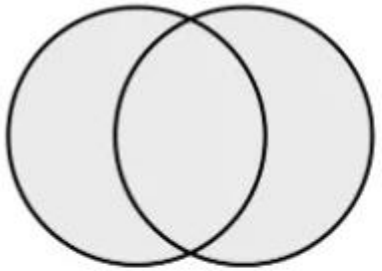
COUNT
SUM
MIN, MAX
AVG

Estas funciones se utilizan frecuentemente en combinación con GROUP BY y con HAVING

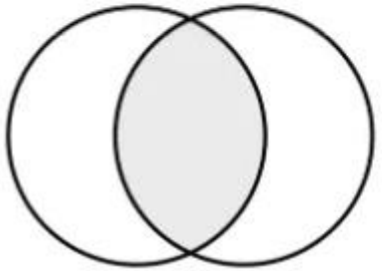
JOIN



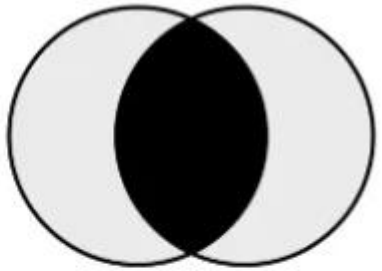
UNION



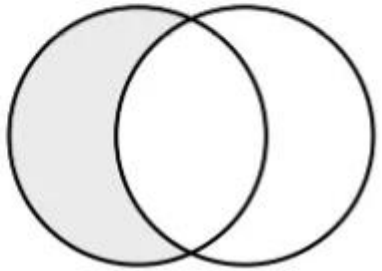
UNION



INTERSECT



UNION ALL



EXCEPT

SUBCONSULTA

Utilizarla como origen de otra consulta

```
SELECT
        SC1.c1,
        SC1.pc3
FROM (
        SELECT
                c1,
                AVG(c3) AS pc3
        FROM t2
    ) AS SC1
WHERE  SC1.pc3 > 70
```

También se puede usar con **JOIN**

SUBCONSULTA

Filtrar una consulta basándose en otra

```
SELECT c1
FROM t1
  WHERE
    c2 > (
      SELECT AVG(c3)
      FROM t2
    )
```

```
SELECT c1
FROM t1
  WHERE
    c2 IN (
      SELECT c3
      FROM t2
      WHERE c4 > 200
    )
```

SUBCONSULTA

Crear nuevas columnas a partir de agregaciones

```
SELECT
    c1,
    (
        SELECT AVG(c3)
        FROM t2
    )  AS c2
FROM t1
```

SUBCONSULTA

Consultas correlacionadas

```
SELECT
      c1,
      c2
FROM t1
WHERE  c2 = (
    SELECT MAX(c3)
    FROM t2
    WHERE t1.id = t2.c4
)
```

CTE: Common Table Expression

Organizar consultas complejas

```
WITH cte1 AS (
    SELECT
      c1,
      SUM(c2)
    FROM t1
    GROUP BY c1
)
```

```
SELECT
   ...
FROM cte1
```

CTE: Common Table Expression

Consulta recursiva

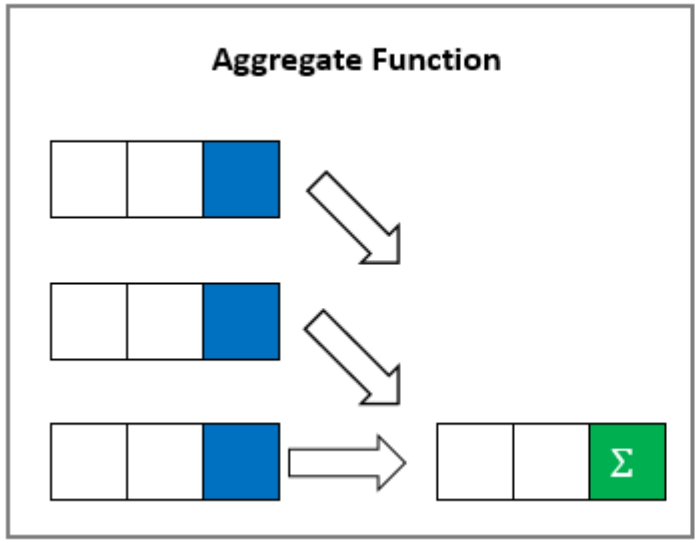
```
WITH cte_recursiva AS (
   SELECT
     c1
   FROM t1
   INNER JOIN cte_recursiva
…
)
```

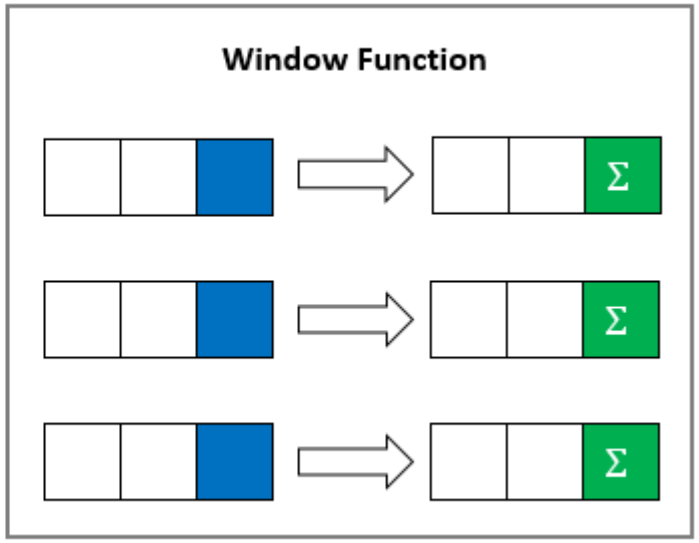
```
SELECT
   …
FROM cte_recursiva
…
```

Funciones Ventana

```
SELECT
  c1,
  c2,
  SUM(c3)
FROM T1
GROUP BY c1,c2
```

```
SELECT
  c1,
  c2,
  SUM(c3) OVER ()
FROM T1
```





Funciones Ventana

```
SELECT
  spend,
  SUM(spend) OVER (PARTITION BY product ORDER BY transaction_date) AS running_total
FROM product_spend;
```

Output

ORDER BY transaction_date	PARTITION BY product	SUM(spend) spend	running_total
10/07/2022 16:00:00	3.5mm headphone jack	7.99	7.99
07/01/2022 11:00:00	computer mouse	45.00	45.00
08/28/2022 16:00:00	microwave	49.99	49.99
03/01/2023 17:00:00	microwave	34.49	84.48
07/08/2023 16:00:00	microwave	64.95	149.43
12/26/2021 12:00:00	refrigerator	246.00	246.00
03/02/2022 11:00:00	refrigerator	299.99	545.99

Funciones Ventana

OVER se usa con las funciones de agregación:
COUNT(), SUM(), AVG(), MIN(), MAX()
y además con:

FIRST_VALUE()
LAST_VALUE()

ROW_NUMBER()
RANK()
DENSE_RANK()

LEAD()
LAG()

Modificar Datos

Al modificar los datos se tienen que **cumplir** las **restricciones** definidas en la base de datos.

- Claves primarias
- Claves foráneas
- Columnas identidad
- Columnas con valores únicos
- Columnas que no admiten NULL
- …

Modificar Datos - **INSERT**

```
INSERT INTO T1 (c1, c2)
VALUES
        (v1, v2),
        (v3, v4),
        …
```

```
INSERT INTO T1 (c1, c2)
SELECT
        c3, c4
FROM T2
WHERE
        c5 > 10
```

Modificar Datos - **UPDATE**

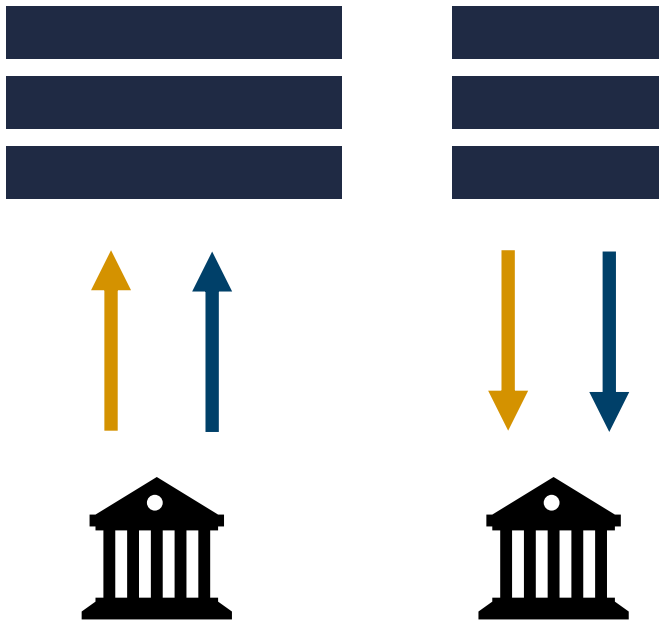
```
UPDATE T1
SET
        c1 = v1,
        c2 = v2
WHERE
        c3 > 10
```

```
UPDATE T1
JOIN T2 ON T1.id  = T2.t1_id
SET
        T1.c1 = T2.c1,
        T1.c2 = T2.c2
```

Modificar Datos - **DELETE**

```
DELETE FROM T1
WHERE
        c3 > 10
```

Transacciones - **ACID**



Atomicidad

Consistencia

Aislamiento

Durabilidad

Transacciones - **ACID**

Atomicidad: Garantiza que cada transacción sea tratada como una sola unidad que tiene éxito por completo, o bien fracasa por completo.

Consistencia: (Integridad) Garantiza que una transacción solo pueda llevar los datos de la base de datos de un estado válido a otro.

Aislamiento: Asegura que la ejecución simultánea de transacciones deja la base de datos en el mismo estado que se habría obtenido si las transacciones se hubieran ejecutado secuencialmente.

Durabilidad: Garantiza que una vez que una transacción se confirma, seguirá confirmada incluso si hay un error del sistema, como puede ser un corte de energía o un bloqueo.

Transacciones explícitas

START TRANSACTION;

COMMIT;

ROLLBACK;

Modificar Estructura

CREATE DATABASE BD1

ALTER DATABASE BD1 MODIFY NAME BD1

DROP DATABASE BD2

Modificar Estructura

```
CREATE TABLE T1 (
        ID int NOT NULL PRIMARY KEY AUTO_INCREMENT,
        ID2 int NOT NULL,
        C1 varchar(50) NOT NULL,
        C2 varchar(50) NULL,
        C3 int UNIQUE,
        FOREIGN KEY (ID2) REFERENCES T2(ID),
        INDEX C1C2 (C1,C2)
);

ALTER TABLE T1 ADD C4 int

DROP TABLE T1
```

VISTAS

Definición de la vista

```
CREATE VIEW V1 AS
SELECT
        c1 AS 'Columna Uno',
        c2 AS 'Columna Dos'
FROM T1
JOIN T2 ON T1.id = T2.id_t1
```

Uso de la vista

```
SELECT * FROM V1
WHERE
        c1 > 150
```

También se pueden usar con INSERT o UPDATE pero con algunas restricciones.

En algunos gestores de BD se pueden crear **vistas materializadas.**

VARIABLES

```
SET @v1 = 1;
SET @v2 = 'Hola';
SET @v3 = (SELECT MIN(first_name) FROM customer);
SELECT MAX(first_name) INTO @v4 FROM customer;


SELECT @v1, @v2, @v3, @v4;
```

PROCEDIMIENTOS ALMACENADOS

Definición del procedimiento almacenado

```
CREATE PROCEDURE citycount (IN country CHAR(3), OUT cities INT)
    BEGIN
      SELECT COUNT(*) INTO cities FROM world.city
      WHERE CountryCode = country;
    END
```

Uso del procedimiento almacenado

```
CALL citycount('ESP', @cities);
SELECT @cities;
```

FUNCIONES

Definición de la función

```
CREATE FUNCTION citycount (IN country CHAR(3)) RETURNS INT
    BEGIN
      SELECT COUNT(*) INTO @cities FROM world.city
      WHERE CountryCode = country;
      RETURN @cities;
    END
```

Uso de la función

```
SELECT citycount('ESP');
```

TRIGGERS

Definición del trigger

```
CREATE TRIGGER ins_sum BEFORE INSERT ON T1
        FOR EACH ROW SET @sum = @sum + NEW.amount
```

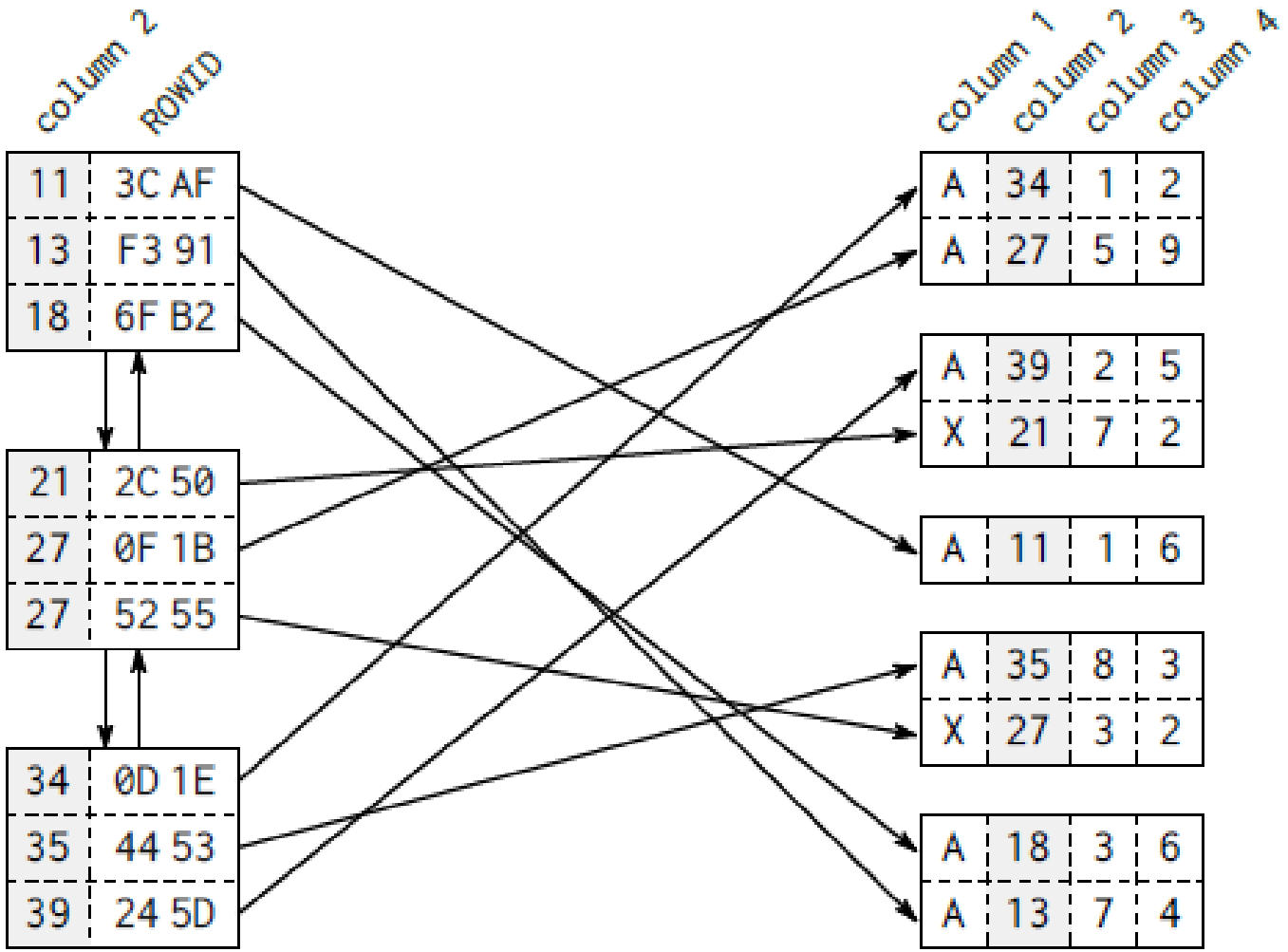
Uso del trigger

```
SET @sum = 0;
INSERT INTO T1
        VALUES(137,14.98),(141,1937.50),(97,-100.00);
SELECT @sum;
```

TRIGGERS

```
CREATE TRIGGER upd_check BEFORE UPDATE ON T1
        FOR EACH ROW
        BEGIN
                IF NEW.amount < 0 THEN
                        SET NEW.amount = 0;
                ELSEIF NEW.amount > 100 THEN
                        SET NEW.amount = 100;
                END IF;
        END;
```

RENDIMIENTO - ÍNDICES



RENDIMIENTO - ÍNDICES