What is SQL

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- SQL stands for **Structured Query Language**.
- designed for managing data in a relational database management system (RDBMS)
- It is pronounced as S-Q-L or sometime **See-Qwell**
- SQL is a database language, it is used for database creation, deletion, fetching rows, and modifying rows, etc.
- SQL is based on relational algebra and tuple relational calculus.

Why SQL is required

SQL Syntax

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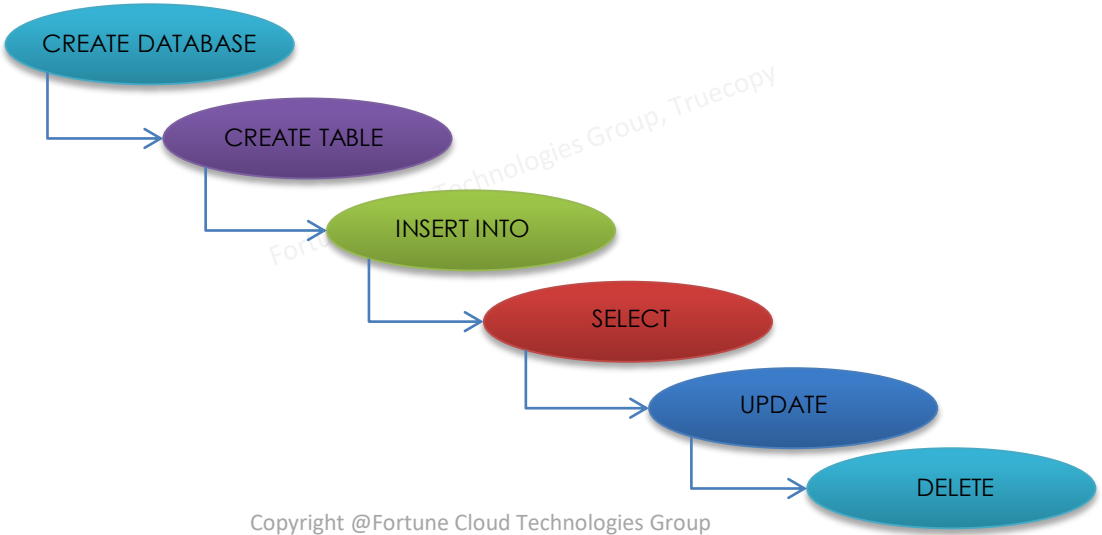
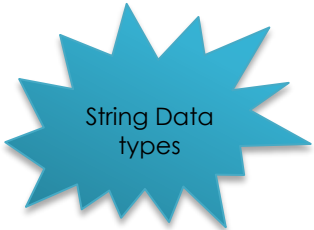
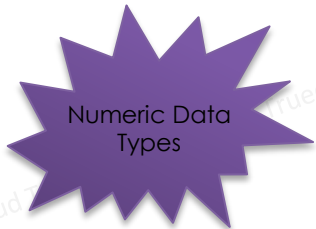
- **SQL** is not case sensitive.
- SQL keywords are written in uppercase.
- We can place a single SQL statement on one or multiple text lines.
- SQL statements are started with any of the SQL commands/keywords like SELECT, INSERT, UPDATE, DELETE, ALTER, DROP etc. and the statement ends with a semicolon(;).

Important SQL Commands



Installation

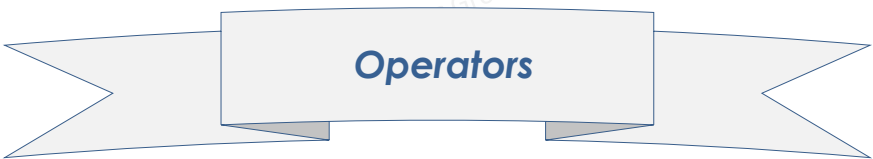




CHAR – 0 to 255
VARCHAR – 0 to 65535
TEXT -0 to 255
ENUM - 65535
BLOB - 65535

INT – 255
INTEGER
FLOAT
DOUBLE
BOOL

DATE
DATETIME
TIMESTAMP
TIME
YEAR



Comparison Operators

=	a=b
!=	a!=b
>	a>b
<	a<b
>=	a>=b
<=	a<=b
!<	a!<b
!>	a!>b

Arithmetic Operators

+	a+b
-	a-b
*	a*b
/	a/b
%	a%b

Logical Operators

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ALL	compare a value to all values
AND	allows the existence of multiple conditions
ANY	compare the value in list according to the condition
BETWEEN	search for values, that are within a set of values
IN	compare a value to that specified list value
NOT	reverse the meaning of any logical operator
OR	combine multiple conditions
EXISTS	search for the presence of a row in a specified table
LIKE	compare a value to similar values using wildcard operator

CREATE DATABASE

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- The SQL **CREATE DATABASE** statement is used to create a new SQL database.

Syntax

CREATE DATABASE database_name;

Eg. **CREATE DATABASE** mydb;

Database name

DROP DATABASE

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- The SQL **DROP DATABASE** statement is used to drop an existing database in SQL schema.

Syntax

DROP DATABASE DatabaseName;

Eg. **DROP DATABASE** mydb;

RENAME DATABASE

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- SQL **RENAME DATABASE** is used when you need to change the name of your database.

Syntax

RENAME DATABASE OldDatabaseName **TO** NewDatabaseName ;

Eg. **RENAME DATABASE** mydb **TO** mydb1;

Note: RENAME DATABASE Syntax was added in MySQL 5.1.7 but was found to be dangerous and was removed in MySQL 5.1.23.

SELECT DATABASE

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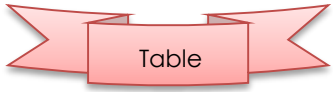
- When you have multiple databases in your SQL Schema, then before starting your operation, you would need to select a database

Syntax

USE Databasename;

Eg. **USE** mydb;



- Table is a collection of data, organized in terms of rows and columns.
- In DBMS term, table is known as relation and row as tuple.
- A table has a specified number of columns, but can have any number of rows.
- A table is also considered as a convenient representation of relations.

CREATE TABLE

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- SQL **CREATE TABLE** statement is used to create table in a database.
- If you want to create a table, you should name the table and define its column and each column's data type.

Syntax

CREATE TABLE table_name(column_name1 datatype,
Column_name2 datatype,....);

Eg. **CREATE TABLE** student(id int(10), name varchar(20));

DROP TABLE

- A SQL **DROP TABLE** statement is used to delete a table definition and all data from a table.

Syntax

DROP TABLE table_name;

Eg. **DROP TABLE** student;

DELETE TABLE

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- The **DELETE** statement is used to delete rows from a table. If you want to remove a specific row from a table you should use **WHERE** condition.

Syntax

DELETE FROM table_name;

Eg. **DELETE FROM** student;

Syntax

DELETE FROM table_name [**WHERE** condition];

Eg. **DELETE FROM** student **WHERE** id=1;

RENAME TABLE

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- SQL **RENAME TABLE** is used to change the name of a table.

Syntax

alter table old_table_name **rename to** new_table_name;

Eg. **alter table** student **rename to** student_new;

TRUNCATE TABLE

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- A truncate SQL statement is used to remove all rows (complete data) from a table.

Syntax

TRUNCATE TABLE table_name;

Eg. **TRUNCATE TABLE** student;

COPY TABLE

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- Copy a SQL table into another table in the same SQL server database

Syntax

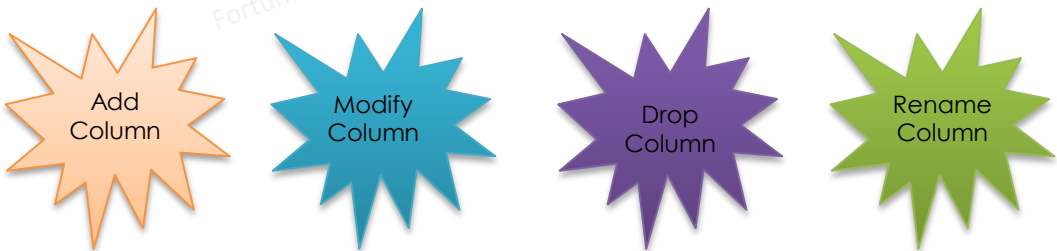
insert into destination_table **select * from** source_table**;**

Eg. **Insert into** student1 **select** * **from** student;

Note: SELECT INTO is totally different from INSERT INTO statement.

ALTER TABLE

- ALTER TABLE statement is used to add, modify or delete columns in an existing table.
- It is also used to rename a table.



ALTER – Add Column

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- Add columns in SQL table

Syntax

ALTER TABLE table_name **ADD** column_name column-definition;

Eg. **alter table** student **add** name **varchar**(20);

ALTER – Modify Column

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- Modify an existing column in SQL table

Syntax

ALTER TABLE table_name **MODIFY** column_name column_type;

Eg. **alter table** login **MODIFY** name int(10);

ALTER – Drop Column

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- Drop an existing column in SQL table

Syntax

ALTER TABLE table_name **DROP COLUMN** column_name;

Eg. **alter table** login1 **drop column** name;

ALTER – Rename Column

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- Rename an existing column in SQL table

Syntax

ALTER TABLE table_name RENAME **COLUMN** old_name **to** new_name;

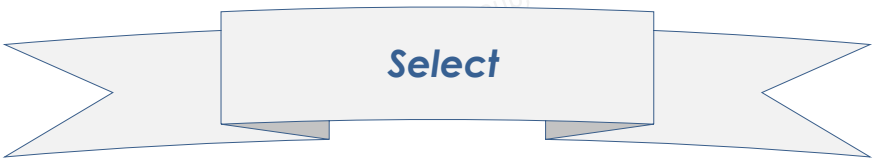
OR

ALTER TABLE login1 **CHANGE** column_name datatype;

Eg. **alter table** login1 **RENAME COLUMN** pass **to** pass1;

OR

alter table login1 **change** roll_no id int(20);



Select

- It is used to query the database and retrieve selected data that follow the conditions we want.
- The SQL **SELECT** statement is used to fetch the data from a database table which returns this data in the form of a result table.

Clauses in SELECT Statement

WHERE → GROUP BY → HAVING → ORDER BY

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Syntax

SELECT * **FROM** table_name;

Eg. **SELECT** * **FROM** student;

Syntax

SELECT column_name **FROM** table_name;

Eg. **SELECT** name **FROM** student;

SELECT UNIQUE OR SELECT DISTINCT

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- **SELECT UNIQUE** is an old syntax which was used in oracle description but later ANSI standard defines **DISTINCT** as the official keyword.

Syntax

SELECT UNIQUE column_name **FROM** table_name;

Eg. **SELECT UNIQUE** name **FROM** student;

OR

Syntax

SELECT DISTINCT column_name **FROM** table_name;

Eg. **SELECT DISTINCT** name **FROM** student;

SELECT COUNT

- The **SQL COUNT()** function is used to return the number of rows in a query.
- it is very useful to count the number of rows in a table having enormous data.

SELECT COUNT(column_name)

SELECT COUNT(*)

SELECT COUNT(DISTINCT column_name)

SELECT COUNT(column_name)

- It will return the total number of names of student_table.
- null fields will not be counted.

Syntax

SELECT COUNT (column_name) **FROM** table_name;

Eg. **SELECT COUNT** (name) **FROM** student;

SELECT COUNT(*)

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- It is used to return the number of records in table.

Syntax

SELECT COUNT (*) **FROM** table_name;

Eg. **SELECT COUNT** (*) **FROM** student;

SELECT COUNT(DISTINCT column_name)

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- It will return the total distinct names of student_table.

Syntax

SELECT COUNT (DISTINCT column_name**) FROM** table_name;

Eg. **SELECT COUNT (DISTINCT** name**) FROM** student;

SELECT TOP

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- It is used to select top data from a table.
- The top clause specifies that how many rows are returned.

Syntax

SELECT COUNT (expression)

Eg. **SELECT TOP** 2 * **FROM** student;

OR

Syntax

SELECT * **FROM** table_name **LIMIT** count;

Eg. **select** * **from** student **limit** 2;

SELECT AS

- **SQL AS** is used to assign temporarily a new name to a table column.
- Allows the developer to label results more accurately without permanently renaming table columns.

Syntax

SELECT column_name **AS** column_name **FROM** table_name;

Eg. **select** uername **as** 'name' **from** student;

SELECT IN

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- SQL IN is an operator used in a SQL query to help reduce the need to use multiple SQL "OR" conditions.
- It minimizes the use of SQL OR operator.

Syntax

SELECT * **FROM** table_name **WHERE** column_name **IN** (val1,val2,….);

Eg. **select** * **from** student **where** name **in**('abc','lmn');

SELECT SUM

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- It is also known as SQL SUM() function.
- It is used in a SQL query to return summed value of an expression.

Syntax

SELECT SUM (column_name) **AS** "expression_name" **FROM** table_name;

Eg. **select sum**(salary) **as** "total salary" **from** employee;

SELECT NULL

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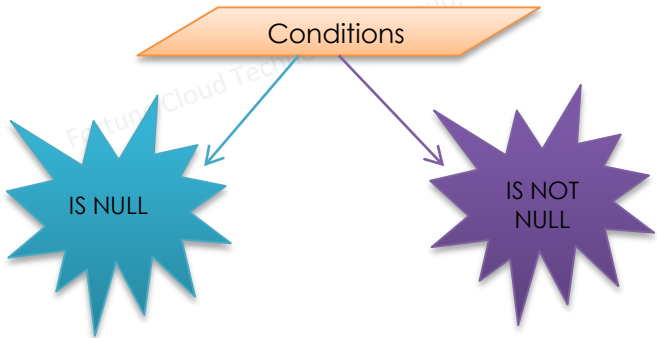
- Null values are used to represent missing unknown data.



IS NULL

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- Select records with null values.

Syntax

SELECT column_name **FROM** table_name **WHERE** column_name **IS NULL**;

Eg. **select** name **from** student **where** marks **is null**;

IS NOT NULL

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- Select records with no null values.

Syntax

SELECT column_name **FROM** table_name **WHERE** column_name **IS NOT NULL**;

Eg. **select** name **from** student **where** marks **is not null**;

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Clauses

WHERE CLAUSE

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- The SQL **WHERE** clause is used to specify a condition while fetching the data from a single table or by joining with multiple tables.
- You should use the WHERE clause to filter the records and fetching only the necessary records.

Syntax

SELECT * **FROM** table_name **WHERE** condition;

Eg. **select** * **from** student **where** id=1;

AND CLAUSE

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- The SQL **AND** condition is used in SQL query to create two or more conditions to be met.

Syntax

SELECT * **FROM** table_name **WHERE** condition1 **AND** condition2;

Eg. **select** * **from** student **where** id=1 **AND** name='abc';

OR CLAUSE

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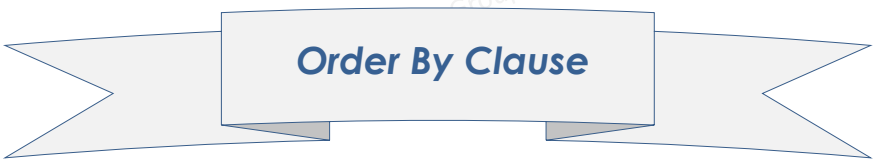
- The **OR** operator is used to combine multiple conditions in an SQL statement's WHERE clause.

Syntax

SELECT * **FROM** table_name **WHERE** condition1 **OR** condition2;

Eg. **select** * **from** student **where** id=1 **OR** id=5;



- The SQL ORDER BY clause is used for sorting data in ascending and descending order based on one or more columns.
- Databases sort query results in ascending order by default.

ASC

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- It is used to sort data in ascending order.
- SQL ORDER BY query takes ascending order by default.

Syntax

SELECT * **FROM** table_name **ORDER BY** column_name **ASC**;

Eg. **select** * **from** student **ORDER BY** id **ASC**;

DESC

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- It is used to sort data in descending order.

Syntax

SELECT * **FROM** table_name **ORDER BY** column_name **DESC**;

Eg. **select** * **from** student **ORDER BY** id **DESC**;

RANDOM

LIMIT

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- If you want to fetch random rows from any of the databases you have to use **RANDOM()**
- **SQL LIMIT -** We can retrieve limited rows from the database.

Syntax

SELECT * **FROM** table_name **ORDER BY RAND() LIMIT** 1;

Eg. **select** * **from** student **order by RAND() LIMIT 1;**

- It is used to insert a single or a multiple records in a table.

Without specifying column names

Syntax

INSERT INTO table_name **VALUES** (value1, value2, value3....);

Eg. **INSERT INTO** student **VALUES** (101,'abcd');

By specifying column names

Syntax

INSERT INTO table_name (column_name1, column_name2)
VALUES (val1,val2,…);

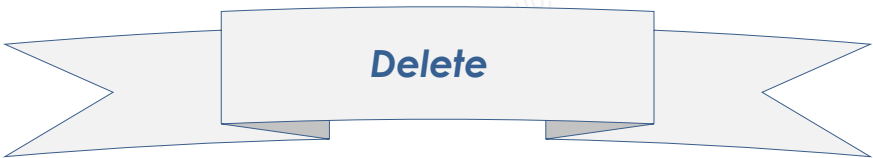
Eg. **INSERT INTO** student (id, name) **VALUES** (101,'abcd');

- **SQL UPDATE** statement is used to change the data of the records held by tables.
- Which rows is to be update, it is decided by a condition.

Syntax

UPDATE table_name **SET** [column_name1= value1,... column_nam eN = valueN] [**WHERE** condition]

Eg. **UPDATE** student **SET** name='Abc', address='Pune' **WHERE** id=1



Remove All Rows

Syntax

DELETE FROM table_name;

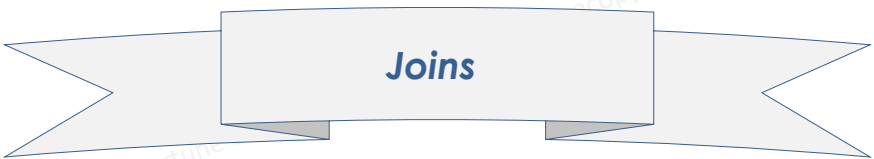
Eg. **DELETE FROM** student;

Remove All Rows With Condition

Syntax

DELETE FROM table_name **WHERE** condition;

Eg. **DELETE FROM** student **WHERE** id=101;



- JOIN means **"to combine two or more tables"**.
- The SQL JOIN clause takes records from two or more tables in a database and combines it together.

Types of **JOIN**

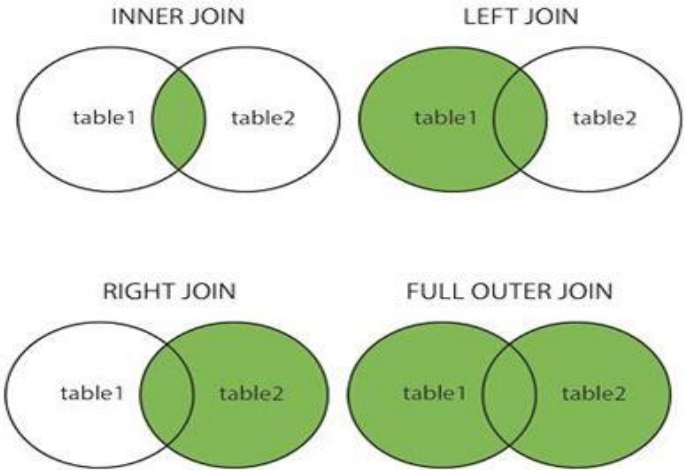
Inner Join

Left Outer Join

Right Outer Join

Full Outer Join

Cross Join



Id	Name	Address
1	Abc	Pune
2	Xyz	Mumbai

Id	Contact	Pincode
1	9874563210	132456
3	9874563210	789456

Id	Name	Address	Contact	Pincode
1	Abc	Pune	9874563210	132456

Inner Join

The **INNER JOIN** keyword selects records that have matching values in both tables.

Syntax

```
SELECT column_name(s)
FROM table1
INNER JOIN table2
ON table1.column_name = table2.column_name;
```

Eg. **SELECT** * **FROM** student1 **INNER JOIN** student2 **ON** student1.id=student2.id;

Left Outer Join

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- The SQL left join returns all the values from the left table and it also includes matching values from right table
- if there are no matching join value it returns NULL.

Syntax

```
SELECT column_name(s)
FROM table1
LEFT JOIN table2
ON table1.column_name = table2.column_name;
```

Eg. **SELECT** * **FROM** student1 **LEFT JOIN** student2 **ON** student1.id=student2.id;

Right Outer Join

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- The SQL right join returns all the values from the rows of right table.
- It also includes the matched values from left table
- if there is no matching in both tables, it returns NULL.

Syntax

```
SELECT column_name(s)
FROM table1
RIGHT JOIN table2
ON table1.column_name = table2.column_name;
```

Eg. **SELECT** * **FROM** student1 **RIGHT JOIN** student2 **ON** student1.id=student2.id;

Full Outer Join

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- The SQL full join is the result of combination of both left and right outer join
- It puts NULL on the place of matches not found.
- it is known as SQL FULL JOIN.

Syntax

```
SELECT column_name(s) FROM table1 LEFT JOIN table2
ON table1.column_name = table2.column_name
UNION
SELECT column_name(s) FROM table1 RIGHT JOIN table2
ON table1.column_name = table2.column_name;
```

Eg.

```
SELECT * FROM student1 LEFT JOIN student2 ON student1.id=student2.id
UNION
SELECT * FROM student1 RIGHT JOIN student2 ON student1.id=student2.id;
```

Cross Join

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- Each row of first table is combined with each row from the second table, known as Cartesian join or cross join.

1st Syntax

SELECT * **FROM** table1 **CROSS JOIN** table2;

Eg. **SELECT** * **FROM** student1 **CROSS JOIN** student2;

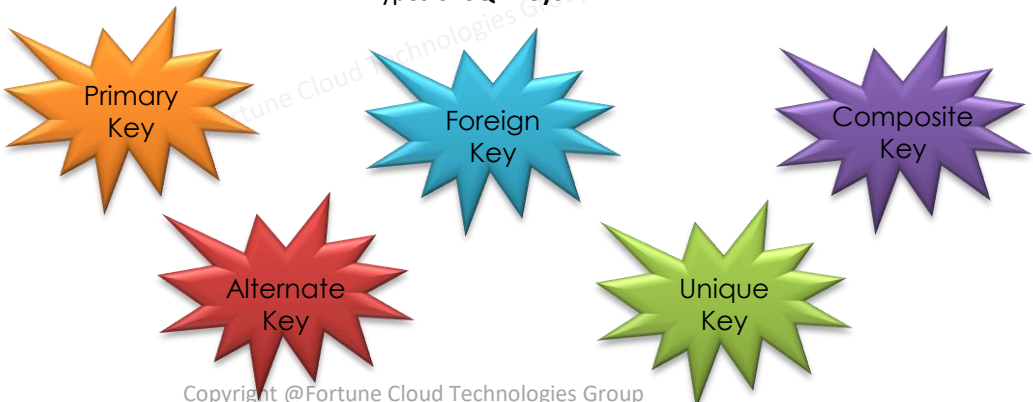
2nd Syntax

SELECT * **FROM** table1, table2;

Eg. **SELECT** * **FROM** student1, student2;

- A key is a single or combination of multiple fields in a table.
- Keys are also used to create a relationship among different database tables.

Types of **SQL Keys**



Primary Key

- **pk-** that uniquely identifies each row in the table.
- Primary key always has unique data.
- A primary key cannot have null value.

Syntax

create table table_name(column_name **datatype(size)**, **PRIMARY KEY**(column_name));

Eg. **create table** student**(**id **int**, name **varchar(20)**, **PRIMARY KEY(**id**));**

Foreign Key

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- Establish a link between two tables.
- Foreign key in one table used to point primary key in another table.

Syntax

create table second_table_name(column_name **datatype(size),**
PRIMARY KEY(column_name**),FOREIGN KEY**(column_name)
REFERENCES first_table_name(first_table_column_name));

Eg. **create table** student2**(**s_id **int, primary key(**s_id**), foreign key(**s_id**) references** student1 **(**id**));**

Composite Key

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- A primary key that is made by the combination of more than one attribute is known as a composite key.

Syntax

create table table_name(column_name1 **datatype**(size), column_name2 **datatype**(size), **PRIMARY KEY**(column_name1, column_name2));

Eg. **create table** student(id **int**, name **varchar**(20), **PRIMARY KEY**(id,name));

Alternate Key

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- Eg. Id, Roll_no, Email are qualified to become a primary key. But since Id is the primary key, Roll No, Email becomes the alternative key.

Id	Roll_no	Email
101	1	abc@gmail.com

Unique Key

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- set of one or more than one fields/columns of a table that uniquely identify a record in a database table.
- it is little like primary key but it can accept only one null value.
- it cannot have duplicate values.
- There may be many unique key constraints for one table, but only one PRIMARY KEY constraint for one table.

Syntax

create table table_name(column_name1 **datatype**(size), column_name2 **datatype**(size), **UNIQUE**(column_name1));

Eg. **create table** student(id **int NOT NULL**, name **varchar**(20), **UNIQUE**(id));

Difference between Primary & Foreign Key

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- primary key cannot be null
- Primary key is always unique
- Primary key uniquely identify a record in the table.
- There is only one primary key in the table

- Foreign key can be null
- Foreign key can be duplicate
- Foreign key is a field in a table that is primary key in another table.
- We can have more than one foreign key in the table.

- Pl/SQL stands for **"Procedural Language extension of SQL"** that is used in Oracle.
- pl/sql is a block structured language that can have multiple blocks in it.
- A line of PL/SQL text contains groups of characters known as lexical units. It can be classified as follows:

```
DELIMITER //

BEGIN
        ……….
END //

DELIMITER ;
```

Control Statements

If then else

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```
DELIMITER //
CREATE FUNCTION check_if_else(val INT )
RETURNS varchar(20)

BEGIN

  DECLARE income_level varchar(20);
  IF val = 10 THEN
    SET income_level = 'value is 10';
  ELSEIF val =20 THEN
    SET income_level = 'value is 20';
  ELSE
    SET income_level = 'Incorrect value';
  END IF;
  RETURN income_level;

END; //
DELIMITER ;
```

```
select check_if_else(10);
```

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```
DELIMITER //
CREATE FUNCTION check_case(val INT )
RETURNS varchar(20)

BEGIN

  DECLARE income_level varchar(20);
  CASE val
    WHEN 1000 THEN
      SET income_level = 'Low Income';
    WHEN 5000 THEN
      SET income_level = 'Avg Income';
    ELSE
      SET income_level = 'High Income';
  END CASE;
  RETURN income_level;

END; //
DELIMITER ;
```

```
select check_case(1000);
```

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- the LEAVE statement is used when you want to exit a block of code identified by a *label_name*

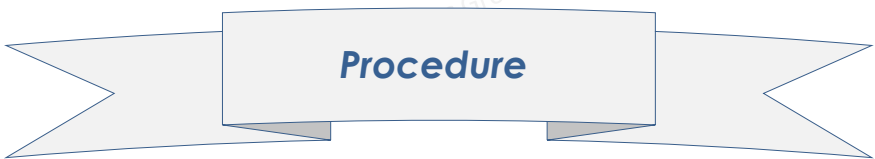
```
DELIMITER //
CREATE FUNCTION cal_income (val INT )
RETURNS INT
BEGIN
  DECLARE income INT;
  SET income = 0;
  label1: LOOP
    SET income = income + val;
    IF income < 3000 THEN
      ITERATE label1;
    END IF;
    LEAVE label1;
  END LOOP label1;
  RETURN income;
END; //
DELIMITER ;
```

```
select cal_income(100);
```

```
DELIMITER //
CREATE FUNCTION CalcIncome (
starting_value INT )
RETURNS INT
BEGIN
  DECLARE income INT;
  SET income = 0;
  label1: WHILE income <= 3000 DO
    SET income = income +
starting_value;
  END WHILE label1;
  RETURN income;
END; //
DELIMITER ;
```



```
select CalcIncome(100);
```



- It is just like procedures in other programming languages.
- **Header:** The header contains the name of the procedure and the parameters or variables passed to the procedure.
- **Body:** The body contains a declaration section, execution section and exception section similar to a general PL/SQL block.

Syntax

```
DELIMITER //

CREATE PROCEDURE procedure_name
(parameters…)

BEGIN
    ……statements
END //

DELIMITER ;
```

Example

```
DELIMITER //

CREATE PROCEDURE insert_user
(IN p_id int(10),IN p_name varchar(100))

BEGIN
    insert into user(id,name)values(p_id,p_name);
END //

DELIMITER ;
```

```
call insert_user(101,'abc');
```

- A function is same as a procedure except that it returns a value.
- a function must always return a value, and on the other hand a procedure may or may not return a value.

Syntax

```
DELIMITER //

CREATE FUNCTION function_name
(parameters…)
RETURNS datatype
BEGIN
      ……statements
    return value;
END //

DELIMITER ;
```

Example

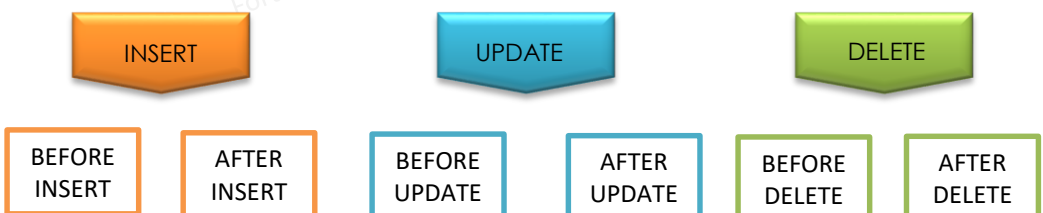
```
DELIMITER //

CREATE FUNCTION my_square(val int)
RETURNS int
BEGIN
        DECLARE result int;
        set result=0;
        set result=val * val;
        return result;
END //

DELIMITER ;
```

```
select my_square (5);
```

- Triggers are stored programs, which are automatically executed or fired when some event occurs.
- Trigger generates some derived column values automatically
- Event logging and storing information on table access
- Imposing security authorizations



Syntax

```
DELIMITER //

CREATE TRIGGER trigger_name BEFORE INSERT ON table_name

BEGIN

    ......statements

END //

DELIMITER ;
```

Example

```
DELIMITER //

CREATE TRIGGER before_insert_money BEFORE INSERT ON money
FOR EACH
ROW
BEGIN
   UPDATE employee SET salary='Credited';
END //

DELIMITER ;
```

```
insert into money values('100');
```

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