TRƯỜNG ĐẠI HỌC BÁCH KHOA HÀ NỘI
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SQL Language

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Reference: https://www.tutorialspoint.com/sql/index.htm

PART 1. SQL LANGUAGE - BASIC

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Data Types

- **char(n).** Fixed length character string, with user-specified length *n.*
- **varchar(n).** Variable length character strings, with maximum length *n.*
- **int.** Integer (a finite subset of the integers that is machine-dependent).
- **smallint.** Small integer (a machine-dependent subset of the integer domain type).
- **numeric(p,d).** Fixed point number, with user-specified precision of *p* digits, with *d* digits to the right of decimal point. (ex., **numeric**(3,1), allows 44.5 to be stores exactly, but not 444.5 or 0.32)
- **real, double precision.** Floating point and double-precision floating point numbers, with machine-dependent precision.
- **float(n).** Floating point number, with user-specified precision of at least *n* digits.
- **date:** A calendar date, containing four digit year, month, and day of the month.
- **time:** The time of the day in hours, minutes, and seconds.

Data Types

Data Type	From	To
int	-2,147,483,648	2,147,483,647
smallint	-32,768	32,767
numeric	-10^38 +1	10^38 -1
real	-3.40E + 38	3.40E + 38
float	-1.79E + 308	1.79E + 308
date	Stores a date like June 30, 1991	
time	Stores a time of day like 12:30 P.M	

CHAR and VARCHAR Data types

- **char(n).**
  - Fixed length character string, with user-specified length *n.*
  - Values are right-padded with spaces to the specific length
- **varchar(n).**
  - Variable length character strings, with maximum length *n.*
  - 1-byte or 2-byte length prefix is used to indicates the number of bytes in the value

Value	CHAR(4)	Storage Required	VARCHAR(4)	Storage Required
''	' '	4 bytes	''	1 byte
'ab'	'ab '	4 bytes	'ab'	3 bytes
'abcd'	'abcd'	4 bytes	'abcd'	5 bytes
'abcdefgh'	'abcd'	4 bytes	'abcd'	5 bytes

Create Database

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

```
CREATE DATABASE DatabaseName;
```

- Note: database name should be unique within the RDBMS.
- Example:

```
SQL> CREATE DATABASE testDB;
SQL> SHOW DATABASES;
```

Drop Database

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

```
DROP DATABASE DatabaseName;
```

Note: database name should be unique within the RDBMS.

- Example:

```
SQL> DROP DATABASE testDB;
SQL> SHOW DATABASES;
```

Select Database

- **USE** statement is used to select any existing database in the SQL schema.
- Syntax

```
USE DatabaseName;
```

Note: database name should be unique within the RDBMS.

- Example:

```
SQL> SHOW DATABASES;
SQL> USE mysql;
```

Create Table

- SQL **CREATE TABLE** statement is used to create a new table.
- Syntax

```
CREATE TABLE table_name(
   column1 datatype,
   column2 datatype,
    .....
   columnN datatype,
   PRIMARY KEY( one or more columns )
);
```

- Example:

```
SQL> CREATE TABLE CUSTOMERS(
   ID   INT              NOT NULL,
   NAME VARCHAR (20)     NOT NULL,
   AGE  INT              NOT NULL,
   ADDRESS  CHAR (25) ,
   SALARY   DECIMAL (18, 2),
   PRIMARY KEY (ID)
);
```

Desc Table

```
SQL> DESC CUSTOMERS;
+---------+---------------+------+-----+---------+-------+
| Field   | Type          | Null | Key | Default | Extra |
+---------+---------------+------+-----+---------+-------+
| ID      | int(11)       | NO   | PRI |         |       |
| NAME    | varchar(20)   | NO   |     |         |       |
| AGE     | int(11)       | NO   |     |         |       |
| ADDRESS | char(25)      | YES  |     | NULL    |       |
| SALARY  | decimal(18,2) | YES  |     | NULL    |       |
+---------+---------------+------+-----+---------+-------+
5 rows in set (0.00 sec)
```

Drop Table

- DROP TABLE statement is used to remove a table definition and all the data, indexes, triggers, constraints and permission specifications for that table.
- Syntax

```
DROP TABLE table_name;
```

- Example:

```
SQL> DROP TABLE CUSTOMERS;
Query OK, 0 rows affected (0.01 sec)

SQL> DESC CUSTOMERS;
ERROR 1146 (42S02): Table 'TEST.CUSTOMERS' doesn't exist
```

Insert Query

- **INSERT INTO** Statement is used to add new rows of data to a table in the database.
- Syntax

```
INSERT INTO TABLE_NAME (column1, column2, column3,...columnN)
VALUES (value1, value2, value3,...valueN);
```

- Example:

```
INSERT INTO CUSTOMERS (ID,NAME,AGE,ADDRESS,SALARY)
VALUES (1, 'Ramesh', 32, 'Ahmedabad', 2000.00 );

INSERT INTO CUSTOMERS (ID,NAME,AGE,ADDRESS,SALARY)
VALUES
        (2, 'Peb', 25, 'Delhi', 1500.00),
        (3, 'kaushik', 23, 'Kota', 2000.00);
```

Sample data

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

Select Query

- **SELECT** statement is used to fetch the data from a database table which returns this data in the form of a result table
- Syntax

```
SELECT column1, column2, columnN FROM table_name;
```

```
SELECT ID, NAME, SALARY FROM CUSTOMERS;
```

ID	NAME	SALARY
1	Ramesh	2000.00
2	Khilan	1500.00
3	kaushik	2000.00
4	Chaitali	6500.00
5	Hardik	8500.00
6	Komal	4500.00
7	Muffy	10000.00

```
SELECT * FROM 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

Where Clause

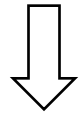
- **WHERE** clause is used to specify a condition while fetching the data from a single table or by joining with multiple tables
- Syntax

```
SELECT column1,.., columnN
FROM table_name
WHERE [condition]
```

- Operators: >, <, =, LIKE, NOT, etc.
- Example

```
SQL> SELECT ID, NAME, SALARY
FROM CUSTOMERS
WHERE SALARY > 2000;
```

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



ID	NAME	SALARY
4	Chaitali	6500.00
5	Hardik	8500.00
6	Komal	4500.00
7	Muffy	10000.00

AND and OR Conjunctive Operators

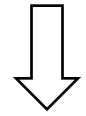
- **AND** & **OR** operators are used to combine multiple conditions to narrow data in an SQL statement.
- Syntax

```
SELECT column1, ,columnN
FROM table_name
WHERE [condition1] AND...AND
  [conditionN];
```

- Example

```
SELECT ID, NAME, SALARY
FROM CUSTOMERS
WHERE SALARY > 2000 AND age < 25;
```

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



ID	NAME	SALARY
6	Komal	4500.00
7	Muffy	10000.00

Update Query

- **UPDATE** Query is used to modify the existing records in a table.
- Syntax

```
UPDATE table_name
SET column1 = value1, column2 = value2...., columnN = valueN
WHERE [condition];
```

- Example:

```
UPDATE CUSTOMERS
SET ADDRESS = 'Pune'
WHERE ID = 6;
```

Delete Query

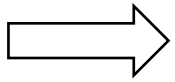
- **DELETE Query** is used to delete the existing records from a table.
- Syntax

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

- Example

```
DELETE FROM CUSTOMERS
WHERE ID = 6;
```

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



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
7	Muffy	24	Indore	10000.00

Like Clause

- **LIKE** clause is used to compare a value to similar values using wildcard operators.
  - %: zero, one or multiple characters
  - _: single number or character
- Example syntax

```
SELECT column FROM table_name
WHERE column LIKE '_XXXX%'
```

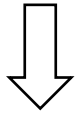
- Example

```
SELECT * FROM CUSTOMERS
WHERE SALARY LIKE '200%'
```

- Other conditions

```
WHERE SALARY LIKE '%200%'
WHERE SALARY LIKE '%2'
WHERE SALARY LIKE '_00%'
WHERE SALARY LIKE '2_%_%'
```

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



ID	NAME	AGE	ADDRESS	SALARY
1	Ramesh	32	Ahmedabad	2000.00
3	kaushik	23	Kota	2000.00

Top Clause

- **TOP** clause is used to fetch a TOP N number or X percent records from a table.
- Syntax

```
SELECT TOP number|percent
column_name(s)
FROM table_name
WHERE [condition]
```

- Example

```
SELECT TOP 3 * FROM CUSTOMERS;
```

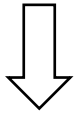
- MySQL

```
SELECT * FROM CUSTOMERS LIMIT 3;
```

- Oracle

```
SELECT * FROM CUSTOMERS
WHERE ROWNUM <= 3;
```

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



ID	NAME	AGE	ADDRESS	SALARY
1	Ramesh	32	Ahmedabad	2000.00
2	Khilan	25	Delhi	1500.00
3	kaushik	23	Kota	2000.00

Order By

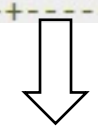
- **ORDER BY** clause is used to sort the data in ascending or descending order, based on one or more columns. Some databases sort the results in an *ascending order* by default.
- Syntax

```
SELECT column-list
FROM table_name
[WHERE condition]
[ORDER BY column1, column2, .. columnN] [ASC | DESC];
```

- Example:

```
SELECT * FROM CUSTOMERS
ORDER BY NAME DESC;
```

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



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

Group By

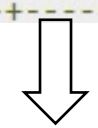
- **GROUP BY** clause is used in collaboration with the SELECT statement to arrange identical data into groups.
- Syntax

```
SELECT column1, column2
FROM table_name
WHERE [ conditions ]
GROUP BY column1, column2
```

- Example:

```
SELECT NAME, SUM(SALARY) FROM
CUSTOMERS
GROUP BY NAME;
```

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



NAME	SUM(SALARY)
Chaitali	6500.00
Hardik	8500.00
kaushik	2000.00
Khilan	1500.00
Komal	4500.00
Muffy	10000.00
Ramesh	2000.00

Distinct

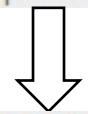
- **DISTINCT** keyword is used in conjunction with the SELECT statement to eliminate all the duplicate records and fetching only unique records.
- Syntax

```
SELECT DISTINCT column1,...columnN
FROM table_name
WHERE [condition]
```

- Example:

```
SELECT DISTINCT SALARY
FROM CUSTOMERS
ORDER BY SALARY;
```

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



SALARY
1500.00
2000.00
4500.00
6500.00
8500.00
10000.00

Excercises 1

- Give a relational database containing 4 tables:
  - customers(customerid, firstname, lastname, address, city, country, email, phone, gender)
  - orders(orderid, customerid, netamount, tax, totalamount, orderdate)
  - orderlines(orderlineid, orderid, productid, quantity)
  - products(productid, color, title, price)
- Write SQL queries to perform following requirements:

1. Define the database and tables above.
2. Insert data into tables. Each table should contain at least 10 rows

Part 2. SQL LANGUAGE - ADVANCED

- NULL
- ALTER TABLE
- CONSTRAINTS
- JOIN
- UNION, MINUS, INTERSECT
- ALIAS
- Sub Queries
- Functions

NULL

- **NULL** is the term used to represent a missing value. A NULL value in a table is a value in a field that appears to be blank.
- Syntax

```
CREATE TABLE CUSTOMERS(
   ID          INT              NOT NULL,
   NAME        VARCHAR (20)     NOT NULL,
   AGE         INT              NOT NULL,
   ADDRESS     CHAR (25) ,
   SALARY      DECIMAL (18, 2),
   PRIMARY KEY (ID)
);
```

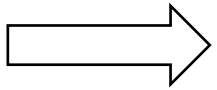
NULL - Example

- Example

```
SELECT  ID, NAME, AGE, ADDRESS, SALARY
FROM CUSTOMERS
WHERE SALARY IS NOT NULL;
```

- Try with: `WHERE SALARY IS NULL;`

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	
7	Muffy	24	Indore	



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

Alter Table

- **ALTER TABLE** command is used to add, delete or modify columns in an existing table. You should also use the ALTER TABLE command to add and drop various constraints on an existing table.
- Syntax

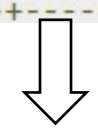
```
ALTER TABLE table_name
ADD column_name datatype;
```

- Examples:

```
ALTER TABLE CUSTOMERS
ADD SEX char(1);

ALTER TABLE CUSTOMERS
DROP SEX;
```

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



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

Constraint

- Constraints are the rules enforced on the data columns of a table. These are used to limit the type of data that can go into a table
  1. *NOT NULL Constraint – Ensures that a column cannot have NULL value.*
  2. *DEFAULT Constraint – Provides a default value for a column*
  3. *UNIQUE Constraint – Ensures that all values in a column are different.*
  4. *PRIMARY Key – Uniquely identifies each row/record in a table.*
  5. *FOREIGN Key – Uniquely identifies a row/record in any of the given database table.*
  6. *CHECK Constraint – The CHECK constraint ensures that all the values in a column satisfies certain conditions.*
  7. *INDEX – Used to create and retrieve data from the database very quickly.*
- Examples:

```
ALTER TABLE CUSTOMERS DROP PRIMARY KEY ;
ALTER TABLE CUSTOMERS ADD PRIMARY KEY (ID);
```

Foreign Key

- A foreign key is a key used to link two tables together.
- Example:

```
CREATE TABLE CUSTOMERS(
   ID   INT              NOT NULL,
   NAME VARCHAR (20)     NOT NULL,
   AGE  INT              NOT NULL,
   ADDRESS  CHAR (25) ,
   SALARY   DECIMAL (18, 2),
   PRIMARY KEY (ID)
);
```

```
CREATE TABLE ORDERS (
   ID           INT      NOT NULL,
   DATE         DATETIME,
   CUSTOMER_ID  INT,
   AMOUNT       double,
   PRIMARY KEY (ID)
);
```

Create a Foreign key

- Create a Foreign key in a new table

```
CREATE TABLE Orders (
  OrderID int NOT NULL,
  CustomerID int,
  PRIMARY KEY (OrderID),
  CONSTRAINT FK_CustomerID FOREIGN KEY (CustomerID) REFERENCES
                                                  Customers(ID)
);
```

- Create a Foreign key in an existing table

```
ALTER TABLE Orders
ADD CONSTRAINT FK_CustomerID FOREIGN KEY (CustomerID)
REFERENCES Customers(ID)
;
```

Join

- **Joins** clause is used to combine records from two or more tables in a database. A JOIN is a means for combining fields from two tables by using values common to each.
- Example:

```
SELECT ID, NAME, AGE, AMOUNT
FROM CUSTOMERS, ORDERS
WHERE  CUSTOMERS.ID =
ORDERS.CUSTOMER_ID;
```

ID	NAME	AGE	AMOUNT
3	kaushik	23	3000
3	kaushik	23	1500
2	Khilan	25	1560
4	Chaitali	25	2060

Table 1 – CUSTOMERS Table

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

Table 2 – ORDERS Table

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

Union

- **UNION** clause/operator is used to combine the results of two or more SELECT statements without returning any duplicate rows. To use this UNION clause, each SELECT statement must have:
  - The same number of columns selected
  - The same number of column expressions
  - The same data type and
  - Have them in the same order
- UNION ALL: allows duplicate rows in the result
- Syntax

```
SELECT column1 [, column2 ]
FROM table1 [, table2 ] [WHERE condition]
UNION
SELECT column1 [, column2 ]
FROM table1 [, table2 ] [WHERE condition]
```

Union

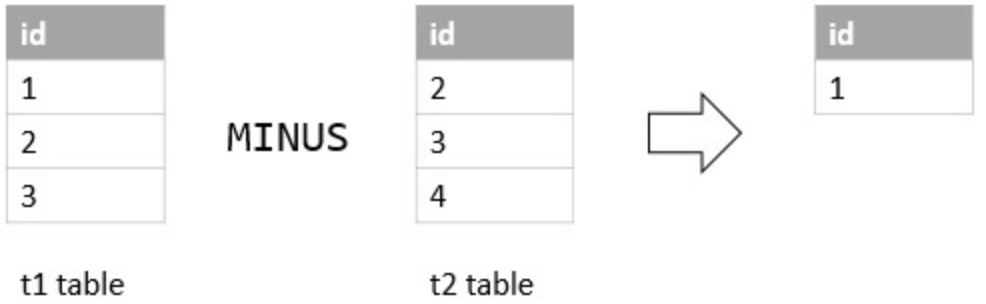
```
SELECT  ID, NAME  FROM CUSTOMERS
WHERE AGE>=25
UNION
SELECT  ID, NAME  FROM CUSTOMERS
WHERE SALARY >=5000
```

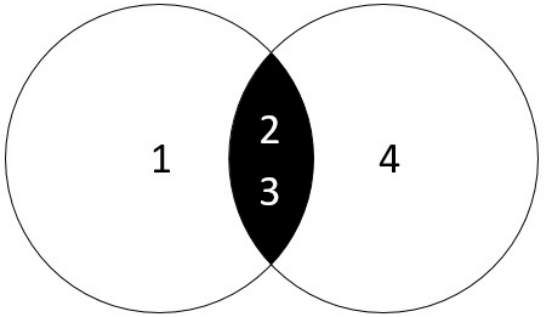
Table 1 – CUSTOMERS Table is as follows.

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

MINUS, INTERSECT

- **MINUS** returns all records/rows in the first SELECT statement that are not returned by the second SELECT statement
  - Oracle supports MINUS
  - SQL Server, PostgreSQL support EXCEPT
  - MySQL does not support MINUS
- **INTERSECT** returns all records/rows in both SELECT statements
  - Remove duplicate records/rows
  - MySQL does not support INTERSECT





ALIAS

- We can rename a table or a column temporarily by giving another name known as **Alias.** The actual table name does not change in the database.
- Syntax

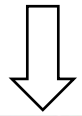
```
SELECT column_name AS alias_name
FROM table_name
WHERE [condition];
```

- Example

```
SELECT  ID AS CUSTOMER_ID, NAME AS
CUSTOMER_NAME
FROM CUSTOMERS
WHERE SALARY IS NOT NULL;
```

Table 1 – CUSTOMERS Table is as follows.

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



ID	NAME	AGE	AMOUNT
3	kaushik	23	3000
3	kaushik	23	1500
2	Khilan	25	1560
4	Chaitali	25	2060

Sub Queries

- A Subquery or Inner query or a Nested query is a query within another SQL query and embedded within the WHERE clause.
  - An ORDER BY command cannot be used in a subquery
  - A Subquery typically returns only one column
- Syntax

```
SELECT column_name…
FROM   table…
WHERE  column_name OPERATOR
     (SELECT column_name [, column_name ]
     FROM table [WHERE])
```

Operators

- IN: is used to check whether a specific value matches any value in a list
- Syntax:

```
SELECT column1, column2,…
FROM table1, table2,…
WHERE column1 IN ('value1', 'value2',…);
```

- NOT IN: is opposite IN
- EXISTS: is used to check whether the subquery returns any record/row

```
WHERE EXISTS (subquery)
```

- NOT EXISTS: is opposite EXISTS

Functions

- Some aggregrate functions
  - MAX/MIN
  - SUM
  - AVG
  - COUNT
- Customers have the highest salary

```
SELECT sname  FROM  CUSTOMERS
WHERE Salary ≥ ALL(SELECT Salary FROM CUSTOMERS)
```

- Count the number of Customers

```
SELECT COUNT(ID)  FROM CUSTOMERS
```

- Highest salary

```
SELECT MAX(Salary) FROM  CUSTOMERS
```

Table 1 – CUSTOMERS Table is as follows.

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

DATE functions

- `CURTIME()`: the current time as a value in ‘HH:MM:SS’
  - Example: `SELECT CURTIME();`
  - Result: `23:50:26`

- `CURDATE()`: the current date as a value in ‘YYYY-MM-DD’
  - Example: `SELECT CURDATE();`
  - Result: `2019-09-30`

- `DATEDIFF(expr1,expr2)`: the difference between expr1 and expr2.
  - Example: `SELECT DATEDIFF('2020-10-30', '2020-10-01') AS 'Result’;`
  - Result

```
+--------+
| Result |
+--------+
|     29 |
+--------+
```

Sub Queries - Example

```
SELECT *
    FROM CUSTOMERS
    WHERE ID IN (SELECT ID
          FROM CUSTOMERS
          WHERE SALARY > 4500) ;
```

```
SELECT *
    FROM CUSTOMERS
    WHERE ID IN (SELECT CUSTOMER_ID
          FROM ORDERS) ;
```

Table 1 – CUSTOMERS Table

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

Table 2 – ORDERS Table

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

Structure of a query

SELECT [DISTINCT] <column 1>, <column 2>, …
FROM <table 1>,<table 2>, …
[**WHERE** <condition>]
[**GROUP BY** <column 1>, <column 2>, …
[**HAVING** <condition>]]
[**ORDER BY** <column 1> [**ASC**|**DESC**]]

Excercises 2

- Give a database containing 4 tables as follows:
  - customers(**customerid**, firstname, lastname, address, city, country, email, phone, gender)
  - orders(**orderid**, *customerid*, netamount, tax, totalamount, orderdate)
  - orderlines(**orderlineid, *orderid***, *productid*, quantity)
  - products(**productid**, color, title, price)
- **Primary key is written in bold and underscore**, *foreign key is written in italic*.
- Write SQL queries to perform following requirements:

1. Define the database and tables above
2. Insert data into tables. Each table should contain at least 5 rows

Q1

Có bao nhiêu cách nào để định nghĩa khóa chính? Dùng câu lệnh nào?

Q2

Có bao nhiêu cách nào để định nghĩa khóa ngoài? Dùng câu lệnh nào?

Q3

Khóa chính và Khóa ngoài có khác nhau không?

Q4

Vai trò của khóa ngoài dùng để làm gì? Ví dụ?

- Trong liên kết khóa ngoài, có yêu cầu 2 thuộc tính của 2 bảng có cùng tên không?

Q5

- Cú pháp câu lệnh tạo bảng là gì?

Q6

- Câu lệnh tạo, xóa CSDL là gì?
- Câu lệnh tạo, xóa bảng là gì?

Q7

- Câu lệnh ALTER có những vai trò gì?