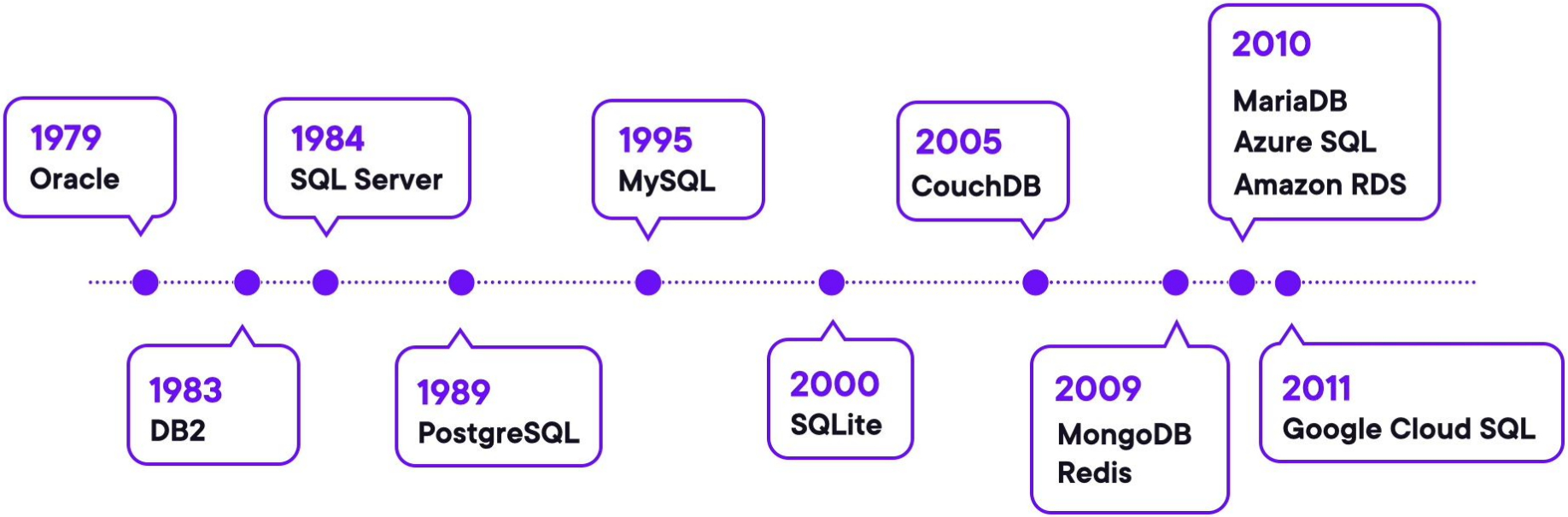
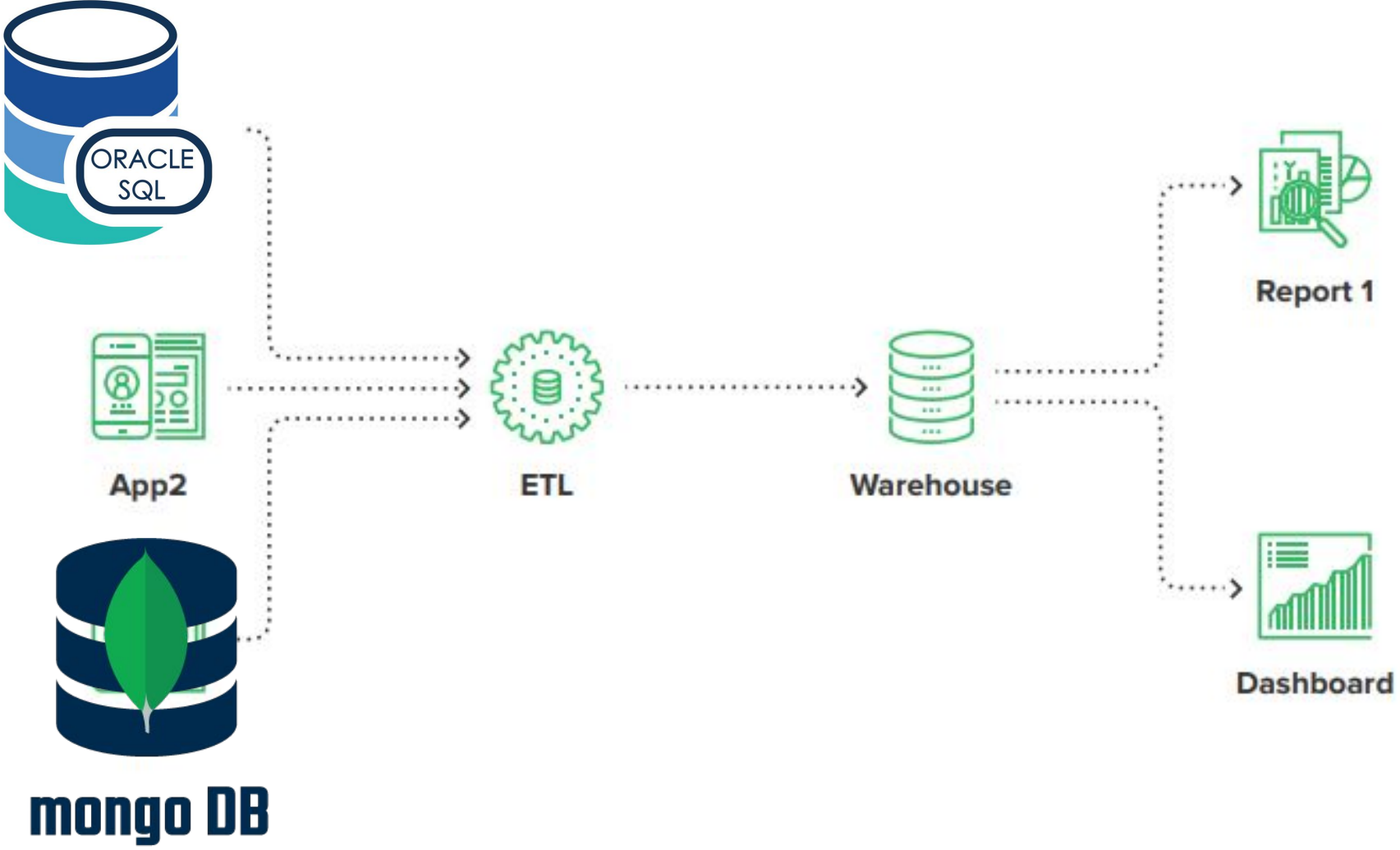
SQL -DDL,DML,DQL,TCL

DAY: 3-7

Feel free to ask any questions after the session. If a topic requires a more detailed explanation, we'll cover it during the dedicated Q&A session

Timeline of DBMS Products



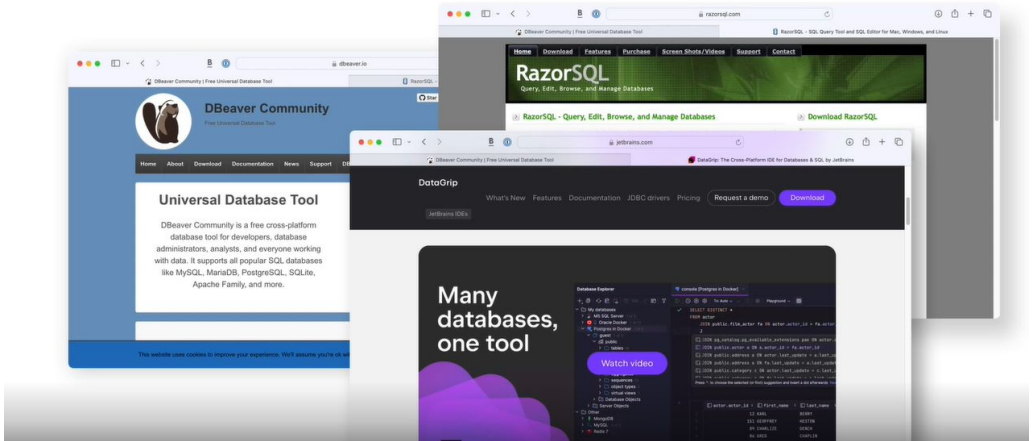

ORACLE
SQL
App2
mongo DB
ETL
Warehouse
Report 1
Dashboard

Installing Oracle Database

- To install Oracle database on your computer, you need to download the installer from the Oracle website.
- To interact with Oracle Database we can use below tools
- TOAD
- **SQL Developer**
- **PL/SQL Developer**

Webtool:
https://livesql.oracle.com/apex/f?p=590:1000

General-purpose database applications
(Examples: DBeaver, RazorSQL, DataGrip)



What is a Database?

- A *database* is a set of data stored in a computer. This data is usually structured in a way that makes the data easily accessible.
- A Database is a collection of information that is well organized so that it can be easily accessed ,managed and updated.
- Database Management system should provide systematics method of

  1.Creating Database

  2.Updating the database

  3.Storing the database

  4.Retrieving of data from Database.

CREATE DATABASE my_database;

What is Data

- **Data** is a collection of facts, such as numbers, words, measurements, observations or just descriptions of things.
- Data is any sort of information which is stored in computer memory. This information can later be used for a website, an application or can be used in future.
- Data can be structured OR unstructured.
- Structured-Student Name, Address
- Unstructured-Student Photo,AddrMap
- If you create a notepad file, then the content of that document is data.
- It can simply be a piece of information, a list of grocery items, or observations, a story or a description of a certain scenario.

Metadata

- Metadata is a data about data. Metadata shows basic information about data, which can make finding and working with specific instances of data easier.
- Metadata describes relevant information about the data.
- It is stored in data dictionary.
- Metadata refers to name of attributes, their types, user constraints, integrity information and storage information.
- if you create a notepad file the name of the file, storage description, type of file, size of file all becomes metadata of your file.
- Metadata properties: Data Name,Definitions,Length or Size,Values allowed,Source of data,Ownership.

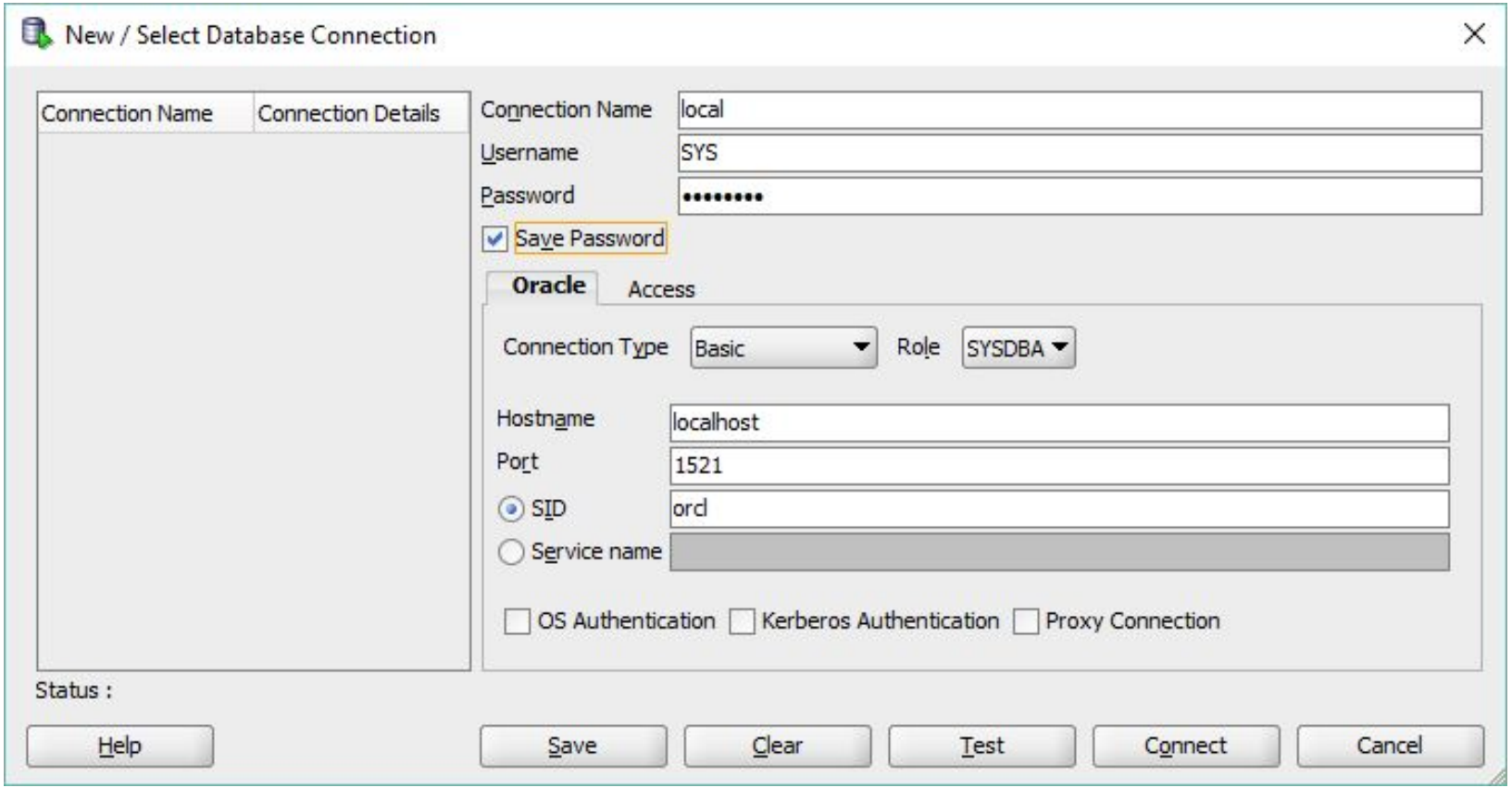
NAME	AGE	GENDER	HEIGHT (CM)
A	20	MALE	172
B	21	MALE	168
C	19	FEMALE	160
D	20	MALE	163

METADATA

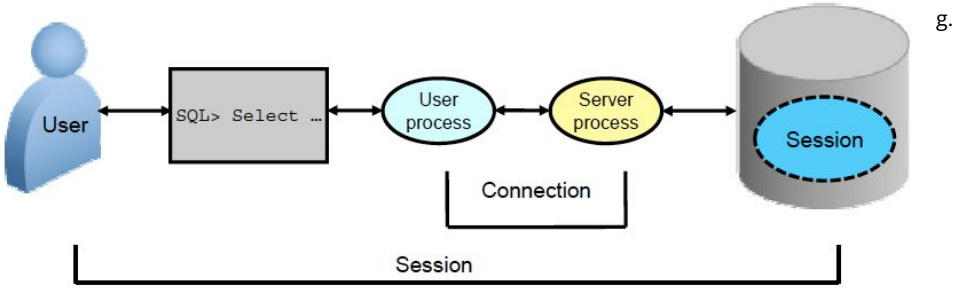
DATA

In sql rows is called as tuples

Credentials for Sql Developer



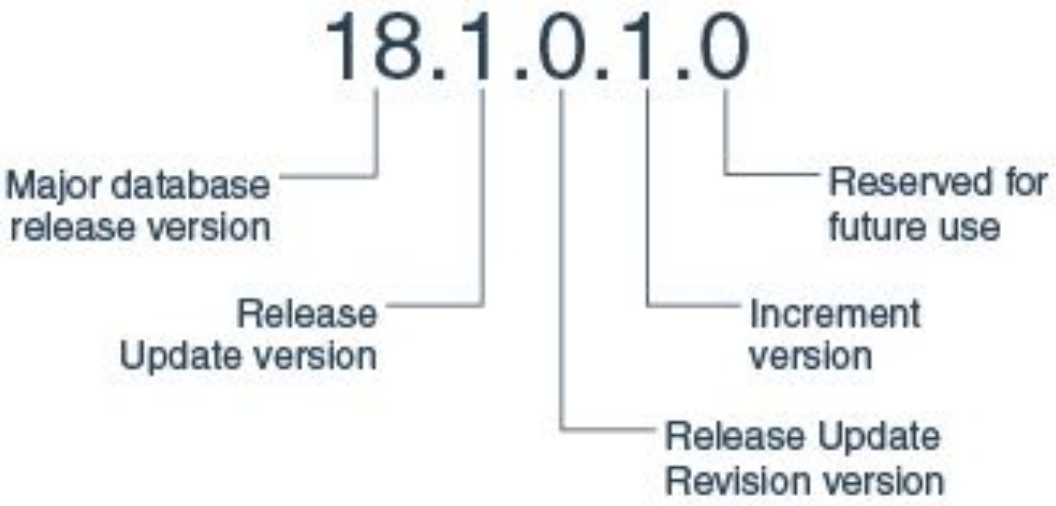
Connecting to the Database Instance



g.

- A **connection** is a communication pathway between a user process and an Oracle Database instance.
- A **session** represents the state of a current user login to the database instance. For example, when a user starts SQL*Plus, the user must provide a valid username and password, and then a session is established for that user.

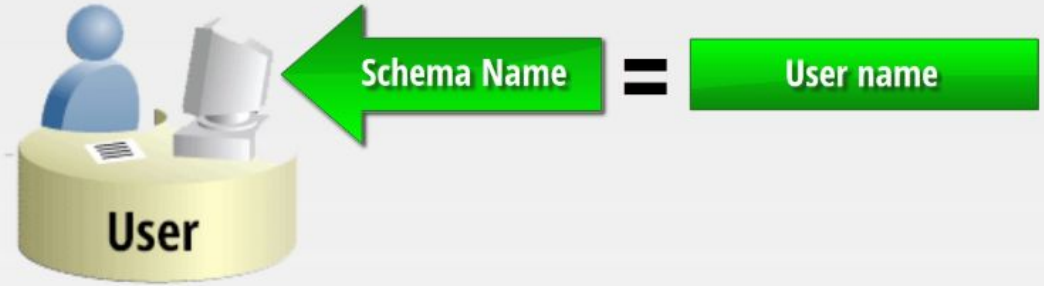
Example of database Release Number



Database Objects

Introducing Database Objects

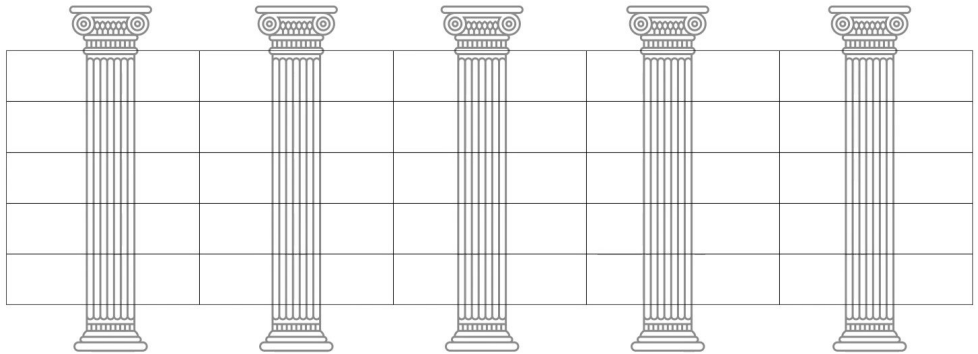
- Oracle Database has many database objects categorized under two subjects which are **Schema objects** and **Nonschema objects**.
- **Schema Objects:** A schema is a collection of logical structures of data or objects. There are many schema objects. But, we will mention the objects that we will cover in this course or some important objects that we need to know.



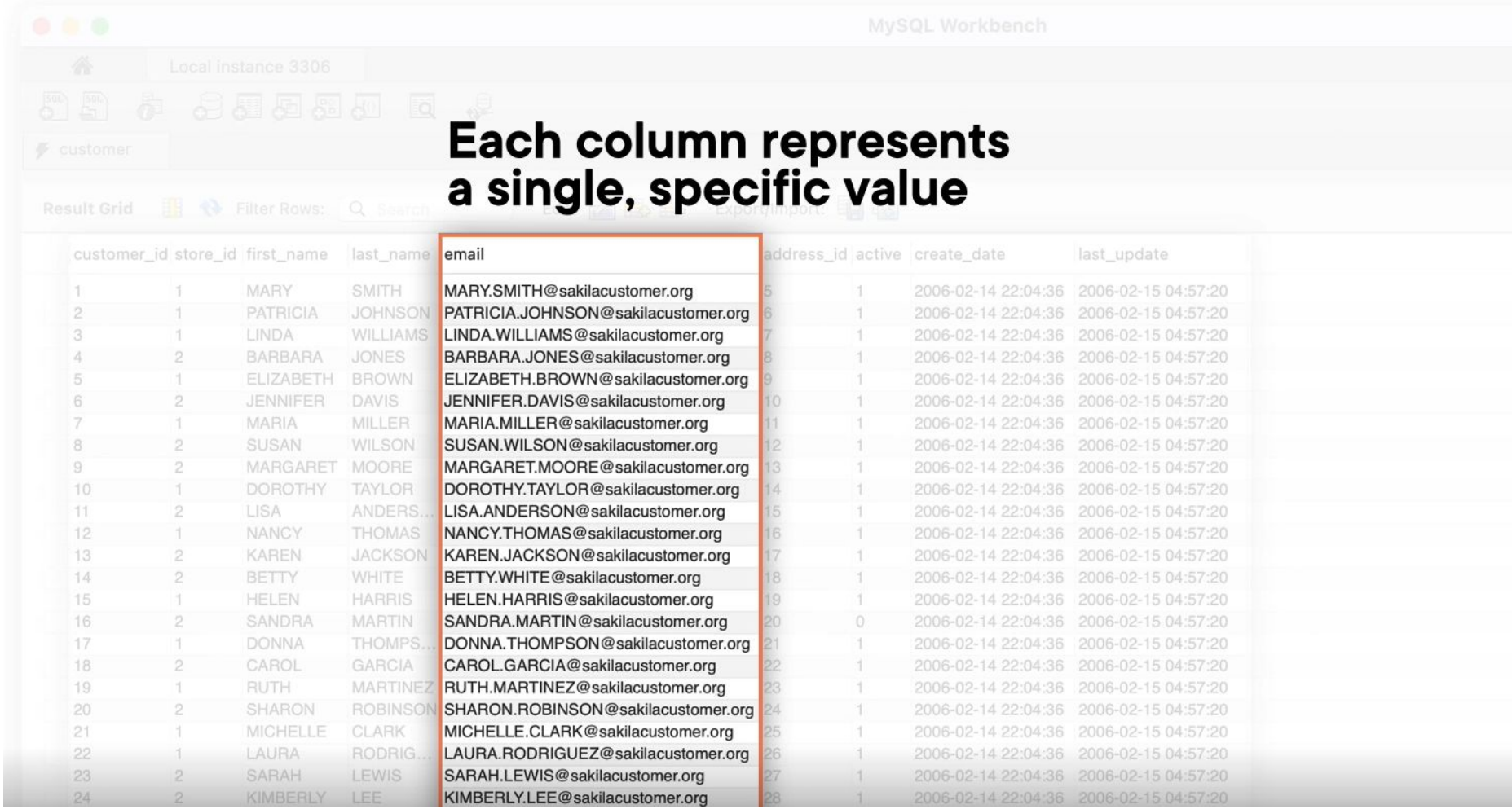
Tables: Rows and Columns

- The RDBMS database uses tables to store data. A table is a collection of related data entries and contains rows and columns to store data.
- A table is the simplest example of data storage in RDBMS.

ID	Name	AGE	COURSE
1	Ajeet	24	B.Tech
2	aryan	20	C.A
3	Mahesh	21	BCA
4	Ratan	22	MCA
5	Vimal	26	BSC



Each column represents a single, specific value



Each row represents one “item” of related data, and every row in the table has the same structure.

customer

Result Grid Filter Rows: Edit: Export/Import:

customer_id	store_id	first_name	last_name	email	address_id	active	create_date	last_update
1	1	MARY	SMITH	MARY.SMITH@sakilacustomer.org	5	1	2006-02-14 22:04:36	2006-02-15 04:57:20
2	1	PATRICIA	JOHNSON	PATRICIA.JOHNSON@sakilacustomer.org	6	1	2006-02-14 22:04:36	2006-02-15 04:57:20
3	1	LINDA	WILLIAMS	LINDA.WILLIAMS@sakilacustomer.org	7	1	2006-02-14 22:04:36	2006-02-15 04:57:20
4	2	BARBARA	JONES	BARBARA.JONES@sakilacustomer.org	8	1	2006-02-14 22:04:36	2006-02-15 04:57:20
5	1	ELIZABETH	BROWN	ELIZABETH.BROWN@sakilacustomer.org	9	1	2006-02-14 22:04:36	2006-02-15 04:57:20
6	2	JENNIFER	DAVIS	JENNIFER.DAVIS@sakilacustomer.org	10	1	2006-02-14 22:04:36	2006-02-15 04:57:20
7	1	MARIA	MILLER	MARIA.MILLER@sakilacustomer.org	11	1	2006-02-14 22:04:36	2006-02-15 04:57:20
8	2	SUSAN	WILSON	SUSAN.WILSON@sakilacustomer.org	12	1	2006-02-14 22:04:36	2006-02-15 04:57:20
9	2	MARGARET	MOORE	MARGARET.MOORE@sakilacustomer.org	13	1	2006-02-14 22:04:36	2006-02-15 04:57:20
10	1	DOROTHY	TAYLOR	DOROTHY.TAYLOR@sakilacustomer.org	14	1	2006-02-14 22:04:36	2006-02-15 04:57:20
11	2	LISA	ANDERS…	LISA.ANDERSON@sakilacustomer.org	15	1	2006-02-14 22:04:36	2006-02-15 04:57:20
12	1	NANCY	THOMAS	NANCY.THOMAS@sakilacustomer.org	16	1	2006-02-14 22:04:36	2006-02-15 04:57:20
13	2	KAREN	JACKSON	KAREN.JACKSON@sakilacustomer.org	17	1	2006-02-14 22:04:36	2006-02-15 04:57:20
14	2	BETTY	WHITE	BETTY.WHITE@sakilacustomer.org	18	1	2006-02-14 22:04:36	2006-02-15 04:57:20
15	1	HELEN	HARRIS	HELEN.HARRIS@sakilacustomer.org	19	1	2006-02-14 22:04:36	2006-02-15 04:57:20
16	2	SANDRA	MARTIN	SANDRA.MARTIN@sakilacustomer.org	20	0	2006-02-14 22:04:36	2006-02-15 04:57:20
17	1	DONNA	THOMPS…	DONNA.THOMPSON@sakilacustomer.org	21	1	2006-02-14 22:04:36	2006-02-15 04:57:20
18	2	CAROL	GARCIA	CAROL.GARCIA@sakilacustomer.org	22	1	2006-02-14 22:04:36	2006-02-15 04:57:20
19	1	RUTH	MARTINEZ	RUTH.MARTINEZ@sakilacustomer.org	23	1	2006-02-14 22:04:36	2006-02-15 04:57:20
20	2	SHARON	ROBINSON	SHARON.ROBINSON@sakilacustomer.org	24	1	2006-02-14 22:04:36	2006-02-15 04:57:20

Columns have a specific data type

Employee
table

FirstName	LastName	Email	DateHired	BonusPercentage	IsFulltime
Brynn	Juarez	b.juarez@globomantics.com	01-06-2015	10	TRUE
Amena	Albert	a.amena@globomantics.com	08-09-2009	5	TRUE
Shelby	Blair	s.blair@globomantics.com	10-10-2018	0	FALSE
...	...	...	...	...	...

text | text | text (valid email format) | date | numeric | boolean (true/false)

Database Objects

- Tables
- Views or object views
- Other synonyms
- Remote objects via a database link
- PL/SQL packages, procedures, and functions
- Materialized views
- Sequences
- Java class schema object
- User-defined object types

What is SQL?

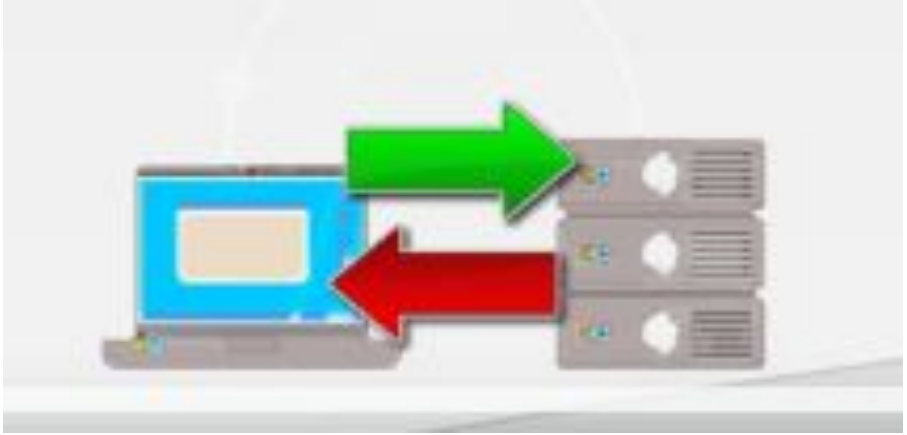
- SQL (**S**tructured **Q**uery **L**anguage) is a programming language used to communicate with data stored in a relational database management system. SQL syntax is similar to the English language, which makes it relatively easy to write, read, and interpret.
- It’s used to perform data interacting tasks such as:

  Creating a table and inserting data into it.

  Querying and filtering data.

  Modifying and updating data.

  Delete data or table.



DATA TYPES

String / Text (character data)	Numeric	Date & Time	Boolean (true / false)	Binary Data	Others
fixed length	integer	date		image	xml
variable length	decimal	time		attachment	json
long text	floating point	timestamp		blob (binary large object)	
	currency / money				

TABLE:
Product

COLUMN NAME	DATA TYPE
ProductID	INT
Name	VARCHAR(100)
Category	VARCHAR(50)
Description	TEXT
StockQuantity	INT
Price	DECIMAL(10, 2)
DateAdded	DATE
IsActive	BOOLEAN

Desc, Information, Info +

- Describe table_name;
- Desc table_name;

Database Naming Conventions

Snake case: all lowercase, separate multiple words with underscores:

`email_address` / `list_price` / `quantity` / `product_id`

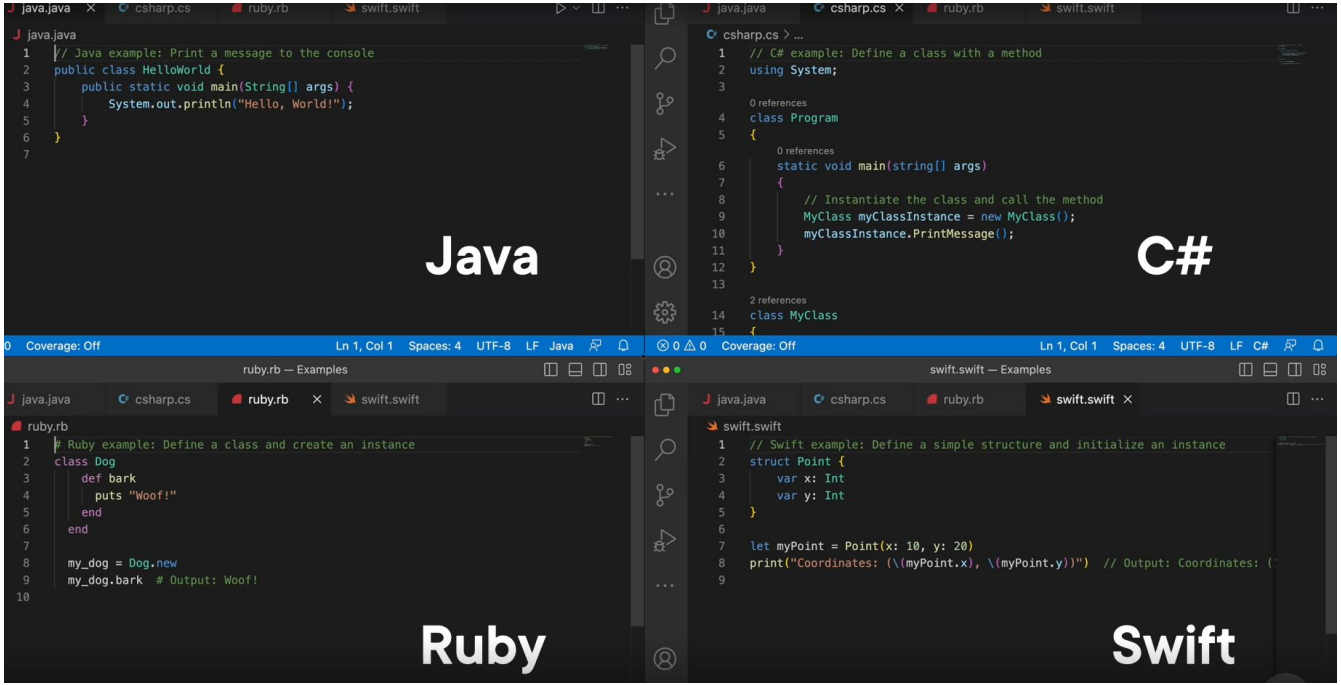
Camel case: lowercase first word, capitalize subsequent words

`emailAddress` / `listPrice` / `quantity` / `productID`

Pascal case / Upper camel case: capitalize each word

`EmailAddress` / `ListPrice` / `Quantity` / `ProductID`

SQL Case Sensitve



select * from employees;
SELECT * FROM EMPLOYEES;
Select * From Employees
SelecT * fROm eMpLoyees;

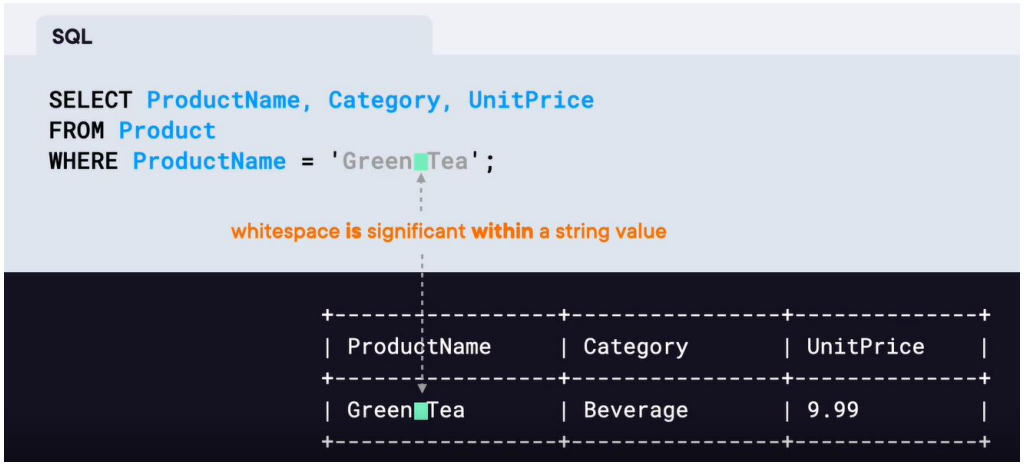
SQL whitespace , Semi Column, Slash:

You can write SQL query in multiple lines.
Multiple space

Keywords cannot be abbreviated or split

sql can be terminated by a semi colon ';' or a forward slash "/" sign .

"Need at least one space between keywords."



Error Msg :

When cause and action will come is mention in below example

1. SELECT * employees;
2. SELECT 1 + 'abc' FROM dual;
3. SELECT 1 + 2 FROM dual;
4. CREATE OR REPLACE PUBLIC SYNONYM jobs FOR hr.jobs;

Oracle Data Types

Data Type	Description
VARCHAR2(size)	Variable-length character data
CHAR(size)	Fixed-length character data
NUMBER(p, s)	Variable-length numeric data
DATE	Date and time values
LONG	Variable-length character data (up to 2 GB)
RAW and LONG RAW	Raw binary data.
BLOB	Maximum size is (4 gigabytes - 1) * (DB_BLOCK_SIZE initialization parameter (8 TB to 128 TB)
CLOB	Maximum size is (4 gigabytes - 1) * (DB_BLOCK_SIZE).
BFILE	Binary data stored in an external file (up to 4 GB)
ROWID	A base 64 number system representing the unique address of a row in its table.

NUMERIC TYPES

INT
SMALLINT
TINYINT
MEDIUMINT
BIGINT
DECIMAL
NUMERIC
FLOAT
DOUBLE
BIT

STRING TYPES

CHAR
VARCHAR
BINARY
VARBINARY
BLOB
TINYBLOB
MEDIUMBLOB
LONGBLOB
TEXT
TINYTEXT
MEDIUMTEXT
LONGTEXT
ENUM

DATE TYPES

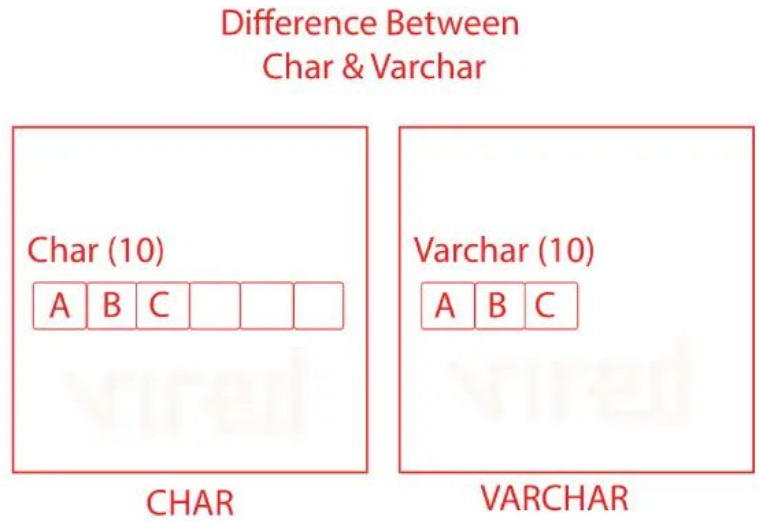
DATE
DATETIME
TIMESTAMP
TIME
YEAR

Character	Description	Unicode number	UTF-8 Encoding
A	*Latin Capital Letter A*	U+0041	`41`
Я	*Cyrillic Capital Letter Ya*	U+042F	`D0 AF`
な	*Hiragana Letter Na*	U+306A	`E3 81 AA`
ꪛ	*Tai Viet Letter High Bo*	U+AA9B	`EA AA 9B`
🧡	*Orange Heart Emoji*	U+1F9E1	`F0 9F A7 A1`
😃	*Smiling Face with Open Mouth Emoji*	U+1F603	`F0 9F 98 83`
✓	*Check Mark*	U+2713	`E2 9C 93`

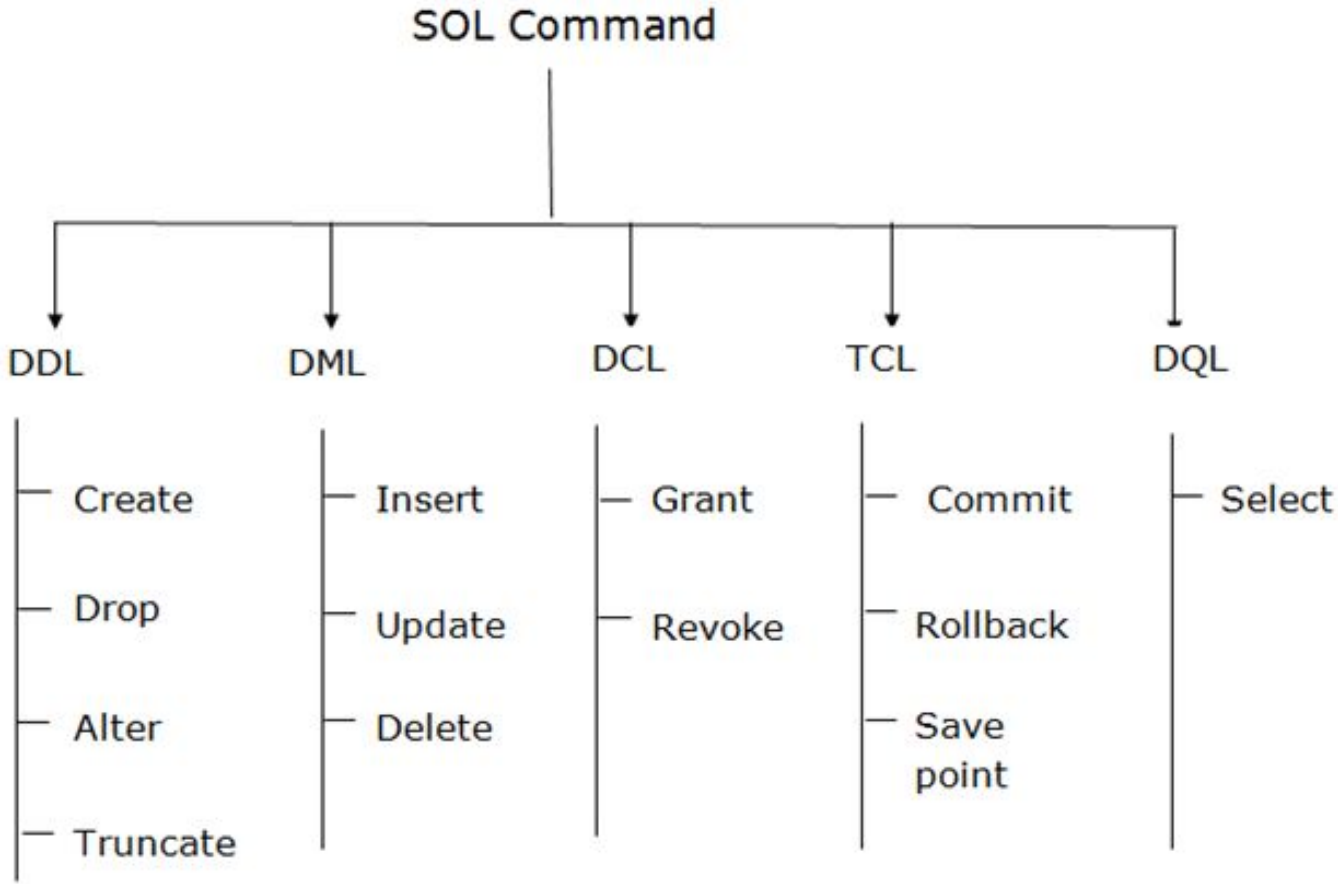
Integer type	Rang IF Signed	Rang IF Unsigned
TINYINT	–128 to 127	0 to 255
SMALLINT	–32,768 to 32,767	0 to 65,535
MEDIUMINT	–8,388,608 to 8,388,607	0 to 16,777,215
INT (or INTEGER)	–2,147,483,648 to 2,147,483,647	0 to 4,294,967,295
BIGINT	–9,223,372,036,854,775,808 to 9,223,372,036,854,775,807	0 to 18,446,744,073,709,551,615

Text Type	Maximum Characters
TINYTEXT	225
TEXT	64k
MEDIUMTEXT	16M
LONGTEXT	4G

BLOB Type	Maximum Bytes
TINYTBLOB	225
BLOB	64k
MEDIUMBLOB	16M
LONGBLOB	4G



Types of SQL Commands



DDL

- DDL is abbreviation of **Data Definition Language**. It is used to create and modify the structure of database objects in database.
- CREATE – Creates objects in the database
  ALTER – Alters objects of the database
  DROP – Deletes objects of the database
  TRUNCATE – Deletes all records from a table and resets table identity to initial value.

DML

- DML is abbreviation of **Data Manipulation Language**. It is used to retrieve, store, modify, delete, insert and update data in database.
- SELECT – Retrieves data from a table
  INSERT - Inserts data into a table
  UPDATE – Updates existing data into a table
  DELETE – Deletes all records from a table

DCL

- DCL is abbreviation of **Data Control Language**. It is used to create roles, permissions, and referential integrity as well it is used to control access to database by securing it.
- GRANT – Gives user's access privileges to database
  REVOKE – Withdraws user's access privileges to database given with the GRANT command

```
GRANT SELECT, INSERT, UPDATE, DELETE ON SCHEMA :: dbo to SqlUser
```

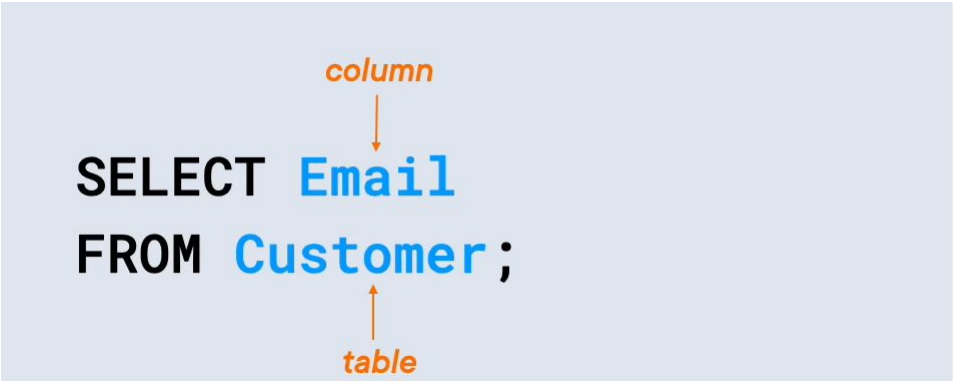
TCL

- TCL is abbreviation of **Transactional Control Language**. It is used to manage different transactions occurring within a database.
- COMMIT – Saves work done in transactions ROLLBACK – Restores database to original state since the last COMMIT command in transactions SAVE TRANSACTION – Sets a savepoint within a transaction

DQL

Data Query Language (DQL) is used to fetch the data from the database.

DQL



Results/ Result Set

Email
smiller@globomantics.com
leifeng42@example.com
rk@kumarcorp.net
f.alfarsi@wiredbrain.com
tommy2345@example.com

If 100 records we will get 100 records. If 1000 records we get 1000 records;

* Is used to retrieve all columns

Query

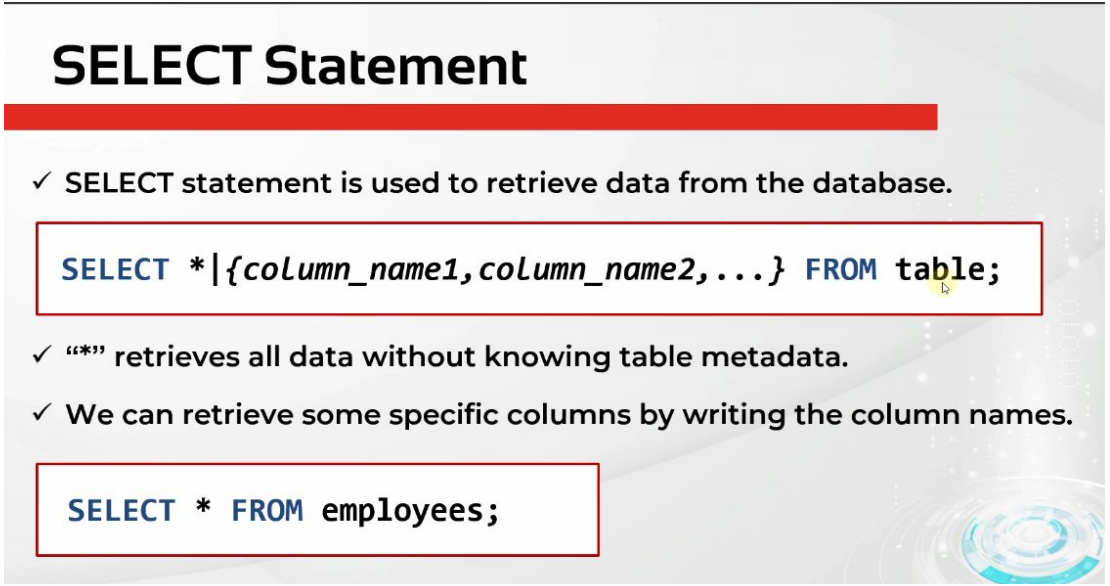
- It is an operation that retrieves data from one or more tables or views
- Select statement is used to Retrieves data from one or more tables/views/Mviews.

Synatax:

SELECT [COLUMNS] FROM [Table_Name]

WHERE [Condtions] GROUP BY ORDER BY

1. SELECT * FROM employees;
2. SELECT * FROM employees WHERE salary > 10000;
3. SELECT * FROM employees WHERE job_id = 'IT_ROG';



SQL Aliases

- SQL aliases are used to give a table, or a column in a table, a temporary name.
- Aliases are often used to make column names more readable.
- An alias only exists for the duration of that query.
- An alias is created with the AS keyword.

- SELECT *column_name* AS *alias_name* FROM *table_name;*
- SELECT *column_name* AS *”new name”* FROM *table_name;*

- select * from dual;
- select 'My Name is Adam' as "Output" from dual;
- select 'I''m using quote operator in SQL statements' as "Output" from dual;
- select q'[I'm using quote operator in SQL statements]' as "Quote Operator" from dual;
- select q'<I'm using quote operator in SQL >' as "Quote Operator" from dual;
- select q'dI'm using quote operator in statementsd' as "Quote Operator" from dual;

Where Condition

Introduction to `WHERE` Clause:

- The `WHERE` clause is used to filter records in an SQL query.
- It allows us to specify conditions, returning only the rows that meet those criteria.
- Often used with `SELECT`, `UPDATE`, `DELETE`, and `JOIN` statements.

```
SELECT column1, column2, ... FROM table_name WHERE condition;
```


SQL
Constraints

NOT NULL

- Prevents null values from being entered in a column, ensuring a column always has a value.
- Commonly used with primary keys and essential columns

UNIQUE

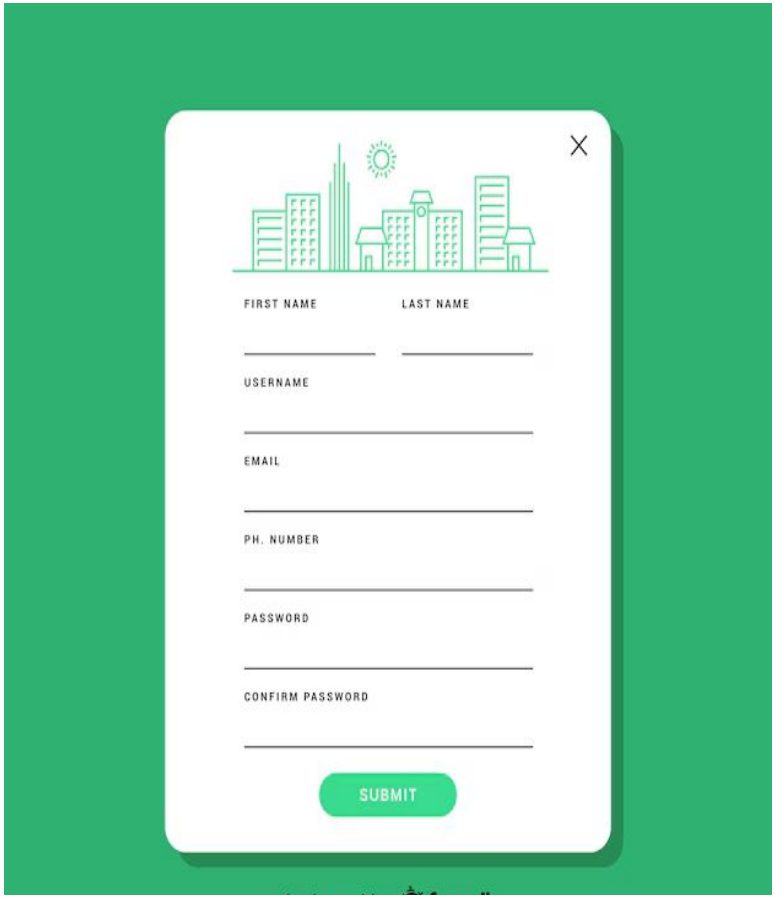
- Ensures all values in a column or set of columns are unique.
- Unlike the primary key, a table can have multiple unique constraints.

CHECK (MySQL 8.0+)

- Ensures all values in a column satisfy a specific condition.

DEFAULT

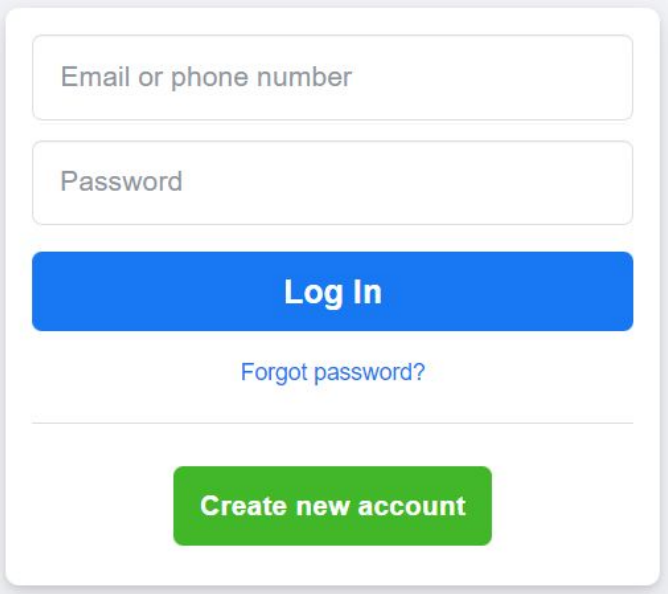
- Assigns a default value to a column when no specific value is provided.



What is a Primary Key?

- A primary key is a **unique identifier** for each record in a table.
- It ensures **uniqueness** and **non-nullability** of the data in a particular column (or a set of columns).
- No two rows in a table can have the same primary key value.

```
CREATE TABLE employees ( id
INT PRIMARY KEY, name
VARCHAR(50), age CREATE
TABLE employees ( id INT
PRIMARY KEY, name
VARCHAR(50), age INT );INT );
```

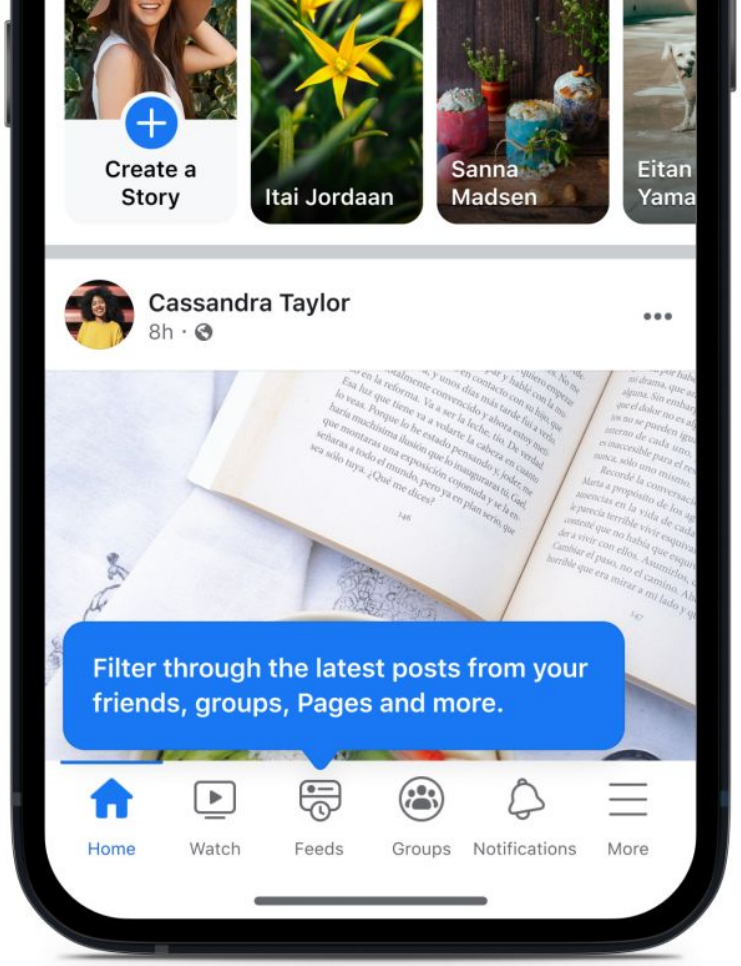


What is a Foreign Key?

- A **foreign key** is a column or a set of columns in one table that **references the primary key** of another table.
- It establishes a **relationship between two tables**, enforcing referential integrity by linking records across tables.

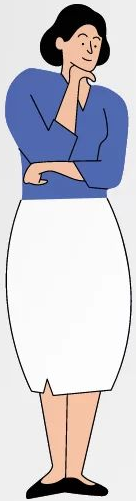
```
CREATE TABLE employees (
emp_id INT PRIMARY KEY,
emp_name VARCHAR(50), dept_id
INT,

FOREIGN KEY (dept_id)
REFERENCES
departments(dept_id) );
```

```
CREATE TABLE departments (
dept_id INT PRIMARY KEY,
dept_name VARCHAR(50) );
```


Create a Story
Itai Jordaan
Sanna Madsen
Eitan Yama
Cassandra Taylor
8h ·
Filter through the latest posts from your friends, groups, Pages and more.
Home
Watch
Feeds
Groups
Notifications
More

Data Manipulation Techniques

- Sorting
- Filtering
- Grouping
- Cleaning
- Transformation



Filtering : Operators in `WHERE` Clause:

- **Comparison Operators:** `=`, `!=`, `<`, `>`, `<=`, `>=`
- **Pattern Matching:** `LIKE`, `IN`
- **Range Check:** `BETWEEN`
- **Null Check:** `IS NULL`, `IS NOT NULL`
- **Logical Operators:** `AND`, `OR`, `NOT IN`
- **Arithmetic Operators:** `+, -, *, /, %`
- **Other Operators:** `distinct`

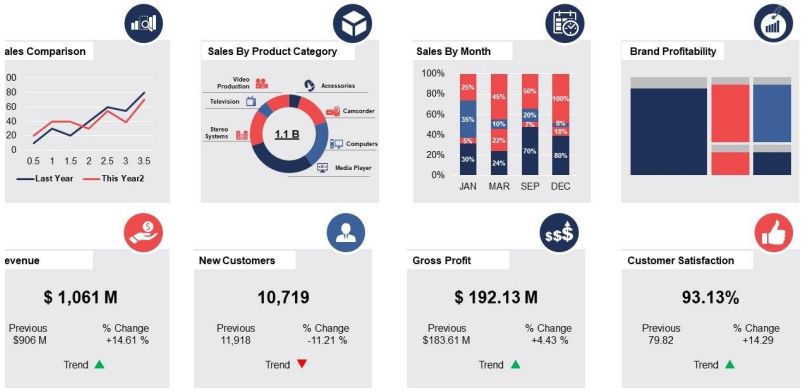


Table: `Products`

- Columns: `ProductID`, `ProductName`, `Category`, `Price`, `Stock`

Table: `Sales`

- Columns: `SaleID`, `ProductID`, `QuantitySold`, `SaleDate`, `CustomerRegion`

Table: `Customer`

- Columns: `CustomerID, CustomerName, Phone, Email, Address`

- Find all products priced exactly **₹200**.
- Identify sales with quantities not equal to 10:
- List all sales where the quantity sold is **less than 10**.
- Find products in stock and priced below $100
- Retrieve customers whose names contain the letter "a".
- Find products that belong to the **"Electronics"** category.
- List customers from regions starting with "N":
- Get products priced between **₹50 and ₹150**.
- Show sales made between **January 20 and January 22, 2024**.
- Find customers where the email address is missing (if any).
- Check for products with no stock
- Identify sales records where the `CustomerRegion` is provided.
- Retrieve all sales made between **January 15, 2024**, and **January 20, 2024**, but exclude sales where the `CustomerRegion` is **North**.

  Find products that are in the **"Furniture"** category, priced **between ₹100 and ₹400**, and have **stock greater than 20**.

-
- List all products that are in stock and priced below ₹100.
- Retrieve customers who live in either "North" or "South" region.
- Calculate the total stock value for products by multiplying `Price` by `Stock`.
- Find products where the stock is a multiple of 10.
- List sales from either "North", North East or "South" region:
- Get a distinct list of all product categories.
- Find distinct regions from the `Sales` table.
- Combine simple operations. Find all products in the "Electronics" category priced **between ₹100 and ₹500** and currently **in stock**.