

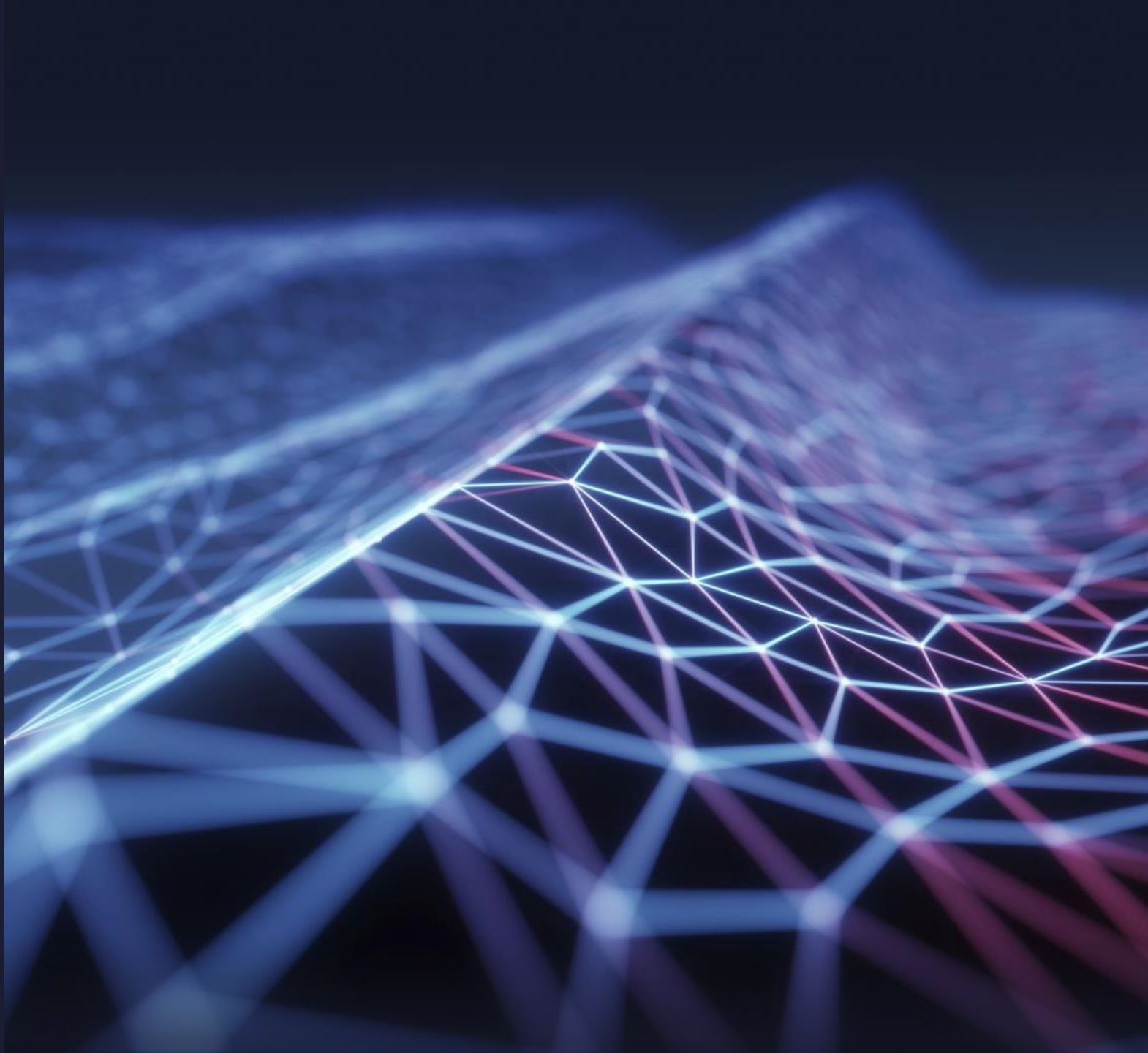


# Introduction to database.

What is an RDBMS?

What is its functionalities?

And what are the differences between the major 3 RDBMSs?



# Database

- A database is **information that is set up for easy access, management and updating**. Computer databases typically store aggregations of data records or files that contain information, such as sales transactions, customer data, financials and product information.
- DBMS performs several important functions that guarantee the integrity and consistency of the data in the database. The most important functions of Database Management System are :
  - Data Storage Management,
  - Data Transformation and Presentation,
  - Multi user Access Control....



# RDBMS or Relational database management system

- **The software used to store, manage, query, and retrieve data stored in a relational database** is called a relational database management system (RDBMS). The RDBMS provides an interface between users and applications and the database, as well as administrative functions for managing data storage, access, and performance.
- The three RDBMS we are going to talk about are : **MySQL, PostgreSQL and SQL SERVER**



# MySQL & its functionalities

- **MySQL** is a relational database management system (RDBMS) based on the SQL (Structured Query Language) queries. It is one of the most popular languages for accessing and managing the records in the table.
- Ease of Management – It is pretty easy to download and use the software.
- High performance – It provides you fast loading utilities with different memory cache.
- Scalable – With MySQL, you can scale anytime you like. It is really easy to create data warehouses including an enormous amount of data.
- Compatibility – MySQL is compatible with all modern platforms like Windows, Linux, Unix.
- Performance – MySQL gives you high-performance results without losing essential functionality.
- Complete Data Security – Only the authorized users can access the database. Complete security for the data.
- Memory Efficiency – MySQL has low memory leakage.

# POSTGRESQL & its functionalities

PostgreSQL is an advanced, enterprise-class, and open-source relational database system. PostgreSQL supports both SQL (relational) and JSON (non-relational) querying.

- Supports the locking mechanism.
- It has high availability.
- It is free and open-source software.
- It is ACID compliant.
- It has the capacity for fault tolerance.
- It also supports image, video, audio storage and supports graphical data.
- It requires deficient maintenance.
- It runs on all operating systems.
- It supports Multi-version concurrency control (MVCC).
- Recovery is high.
- It has user-defined data types.
- Table inheritance.
- It runs on all operating systems.

# SQL Server & its functionalities

- SQL Server is a relational database management system (RDBMS) developed and marketed by Microsoft. As a database server, the primary function of the SQL Server is to store and retrieve data used by other applications.
- Usage :
- To create & maintain databases.
- To analyze the data through SQL Server Analysis Services (SSAS).
- To generate reports through SQL Server Reporting Services (SSRS).
- To carry out ETL operations through SQL Server Integration Services (SSIS).



# Comparison

	MySQL	POSTGRESQL	SQL SERVER
<b>Maturity</b>	1995	1989	MSMS SQL Server for OS/2 in 1989. SQL Server 6.0 was released in 1995 .
<b>Cost</b>	Open source / Owned by Oracle and has several paid editions	Completely free / Open source	SQL Server Express is a free edition, but it is limited to using 1 processor, 1 GB memory and 10 GB database files.
<b>Supports JSON</b>	Yes	Yes	Yes
<b>Partial indexes (an index built over a subset of a table using filter)</b>	Does not support partial indexes	Supports partial indexes	Supports partial indexes

Row updates	Updates happen in place, changed data is copied to the rollback segment. This makes vacuuming and index compaction very efficient. MySQL is slower for reads, but writes are atomic and if columns in a secondary index change, this does not require changes to all indexes.	Updates are being implemented as inserts + mark as delete for vacuum. All indexes have a link to the physical id of the row. This has an update amplifying effect because when the column gets updated, new row with new physical id gets created and all indexes require updates, even those which are not referring to the changed column to get a pointer to the new row physical id.	Row-Store database engine:  In-Memory database engine: updates implemented as insert + mark for delete. Garbage collector is not non-blocking and parallel  Column store database engine: in-place updates
Server-side scripts	Yes	User defined functions	Transact-SQL .NET languages R & Python 2019 Version : Java
Data scheme	Yes	Yes	Yes



# Conculsion

- For large organizations, databases contain mission-critical record items that have complex logical relationships with a myriad of other datasets that grow with the amount of users. As a result, organizations need to actively monitor, tune, and improve their databases to ensure a high level of performance.
- **So how to Optimize database performance ?**
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