MySQL

It is an open source relational database management system. As based on the structure query language (SQL), it is used to add, remove and modify information in the database. Standard SQL commands like ADD, DROP, INSERT and UPDATE, all could be used with MySQL.

A software which:

- Allows us to implement database operations on tables, rows, columns, and indexes.
- Defines the database relationship in the form of tables (collection of rows and columns).
- Provides the Referential Integrity between rows or columns of various tables (id, customer number...).
- Allows us to updates the table indexes automatically.
- Uses many SQL queries and combines useful information from multiple tables for the end-users.

PostgreSQL

It is an open source relational database management system (DBMS) developed by a worldwide team of volunteers. It is not controlled by any corporation or other private entity and the source code is available free of charge.

It supports text, images, sounds, and video, and includes programming interfaces for C / C++, Java, Perl, Python, Ruby, Tcl and Open Database Connectivity (ODBC).

Below is an inexhaustive list of various features found in PostgreSQL:

- **Data Types**

- Primitives: Integer, Numeric, String, Boolean
- Structured: Date/Time, Array, Range, UUID
- Document: JSON/JSONB, XML, Key-value (Hstore)
- Geometry: Point, Line, Circle, Polygon
- Customizations: Composite, Custom Types

- **Data Integrity**
  - UNIQUE, NOT NULL
  - Primary Keys
  - Foreign Keys
  - Exclusion Constraints
  - Explicit Locks, Advisory Locks

- **Concurrency, Performance**
  - Indexing: B-tree, Multicolumn, Expressions, Partial
  - Advanced Indexing: GiST, SP-Gist, KNN Gist, GIN, BRIN, Covering indexes, Bloom filters
  - Sophisticated query planner / optimizer, index-only scans, multicolumn statistics
  - Transactions, Nested Transactions (via savepoints)
  - Multi-Version concurrency Control (MVCC)
  - Parallelization of read queries and building B-tree indexes

    - Table partitioning
    - All transaction isolation levels defined in the SQL standard, including Serializable
    - Just-in-time (JIT) compilation of expressions
- **Reliability, Disaster Recovery**
    - Write-ahead Logging (WAL)
    - Replication: Asynchronous, Synchronous, Logical
    - Point-in-time-recovery (PITR), active standbys
    - Tablespaces
- **Security**
    - Authentication: GSSAPI, SSPI, LDAP, SCRAM-SHA-256, Certificate, and more
    - Robust access-control system
    - Column and row-level security
    - Multi-factor authentication with certificates and an additional method
- **Extensibility**
    - Stored functions and procedures
    - Procedural Languages: PL/PGSQL, Perl, Python (and many more)
    - SQL/JSON path expressions
    - Foreign data wrappers: connect to other databases or streams with a standard SQL interface

- Customizable storage interface for tables
- Many extensions that provide additional functionality, including PostGIS

- **Internationalisation, Text Search**
  - Support for international character sets, e.g. through ICU collations
  - Case-insensitive and accent-insensitive collations
  - Full-text search

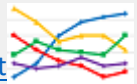
SQL Server

It is a relational database management system (RDBMS), developed and marketed by Microsoft.

SQL Server works exclusively on Windows environment for more than 20 years. In 2016, Microsoft made it available on Linux. SQL Server 2017 became generally available in October 2016 that ran on both Windows and Linux.

Compare the three RDBMS: MySQL vs PostgreSQL vs SQL Server

Ref: https://db-engines.com/en/system/Microsoft+SQL+Server%3BMySQL%3BPostgreSQL

Name	**Microsoft SQL Server X**	**MySQL X**	**PostgreSQL X**
Description	Microsofts relational DBMS	Widely used open source RDBMS	Widely used open source RDBMS
Primary database model	Relational DBMS	Relational DBMS	Relational DBMS
Secondary database models	Document store Graph DBMS	Document store	Document store
DB-Engines Ranking Trend Chart 	Score 1031.23 Rank #3 Overall #3 Relational DBMS	Score 1252.06 Rank #2 Overall #2 Relational DBMS	Score 552.23 Rank #4 Overall #4 Relational DBMS
Website	www.microsoft.com/-en-us/sql-server	www.mysql.com	www.postgresql.org
Technical documentation	docs.microsoft.com/-en-US/sql/sql-server	dev.mysql.com/-doc	www.postgresql.org/-docs

Developer	Microsoft	Oracle	PostgreSQL Global Development Group
Initial release	1989	1995	1989
Current release	SQL Server 2019, November 2019	5.7.32 , October 2020	13.1, November 2020
License	commercial	Open Source	Open Source
Cloud-based only	no	no	no
DBaaS offerings (sponsored links)		ScaleGrid for MySQL: Fully managed MySQL hosting on AWS, Azure and DigitalOcean with high availability and SSH access on the #1 multi-cloud DBaaS.	ScaleGrid for PostgreSQL: Fully managed PostgreSQL hosting on AWS, Azure and DigitalOcean with high availability and SSH access on the #1 multi-cloud DBaaS.
Implementation language	C++	C and C++	C

Server operating systems	Linux Windows	FreeBSD Linux OS X Solaris Windows	FreeBSD HP-UX Linux NetBSD OpenBSD OS X Solaris Unix Windows
Data scheme	yes	yes	yes
Typing	yes	yes	yes
XML support	yes	yes	yes
Secondary indexes	yes	yes	yes
SQL	yes	yes	yes
APIs and other access methods	ADO.NET JDBC ODBC OLE DB Tabular Data Stream (TDS)	ADO.NET JDBC ODBC Proprietary native API	ADO.NET JDBC native C library ODBC streaming API for large objects

Supported programming languages	C# C++ Delphi Go Java JavaScript (Node.js) PHP Python R Ruby Visual Basic	Ada C C# C++ D Delphi Eiffel Erlang Haskell Java JavaScript (Node.js) Objective-C OCaml Perl PHP Python Ruby Scheme Tcl	.Net C C++ Delphi Java JavaScript (Node.js) Perl PHP Python Tcl
Server-side scripts	Transact SQL, .NET languages, R, Python and (with SQL Server 2019) Java	yes	user defined functions
Triggers	yes	yes	yes

Partitioning methods	tables can be distributed across several files (horizontal partitioning); sharding through federation	horizontal partitioning, sharding with MySQL Cluster or MySQL Fabric	partitioning by range, list and (since PostgreSQL 11) by hash
Replication methods	yes, but depending on the SQL-Server Edition	Multi-source replication Source-replica replication	Source-replica replication
MapReduce	no	no	no
Consistency concepts	Immediate Consistency	Immediate Consistency	Immediate Consistency
Foreign keys	yes	yes	yes
Transaction concepts	ACID	ACID	ACID
Concurrency	yes	yes	yes
Durability	yes	yes	yes

In-memory capabilities	yes	yes	no
User concepts	fine grained access rights according to SQL-standard	Users with fine-grained authorization concept	fine grained access rights according to SQL-standard