Relational Database Management Systems (RDBMS)

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Introduction

- RDBMS stands for **Relational Database Management System**. It is a type of database management system (DBMS) that stores data in a structured format, using rows and columns.

Characteristics of RDMS

Tables: Data is organized into tables, which consist of rows and columns. Each table represents a different entity, such as customers, orders, or products.

Schema: The schema defines the structure of the database, including tables, columns, data types, and relationships between tables.

Primary Keys: Each table typically has a primary key, a unique identifier for each row in the table. This ensures that each record can be uniquely identified.

Foreign Keys: Foreign keys are used to create relationships between tables. A foreign key in one table points to a primary key in another table, establishing a link between the two tables.

SQL (Structured Query Language): RDBMSs use SQL for querying and managing data. SQL allows users to perform various operations such as selecting, inserting, updating, and deleting data.

PostgreSQL

- PostgreSQL, often simply referred to as Postgres, is an open-source relational database management system (RDBMS). It is known for its robustness, flexibility, and standards compliance. Postgres supports both SQL (relational) and JSON (non-relational) querying and is designed to handle a wide range of workloads, from single machines to data warehouses or web services with many concurrent users.

Pros of PostgreSQL

- Open-source and free
- Strong support for ACID compliance
- Advanced data types and indexing
- Extensible through plugins

Cons of PostgreSQL

- Can be slower with very large datasets
- Complexity in management for beginners

Microsoft SQL Server

- Microsoft SQL Server is a relational database management system (RDBMS) developed by Microsoft. It is designed to store and retrieve data as requested by other software applications, whether those applications run on the same computer or across a network.

Pros of Microsoft SQL

Integration with other Microsoft products

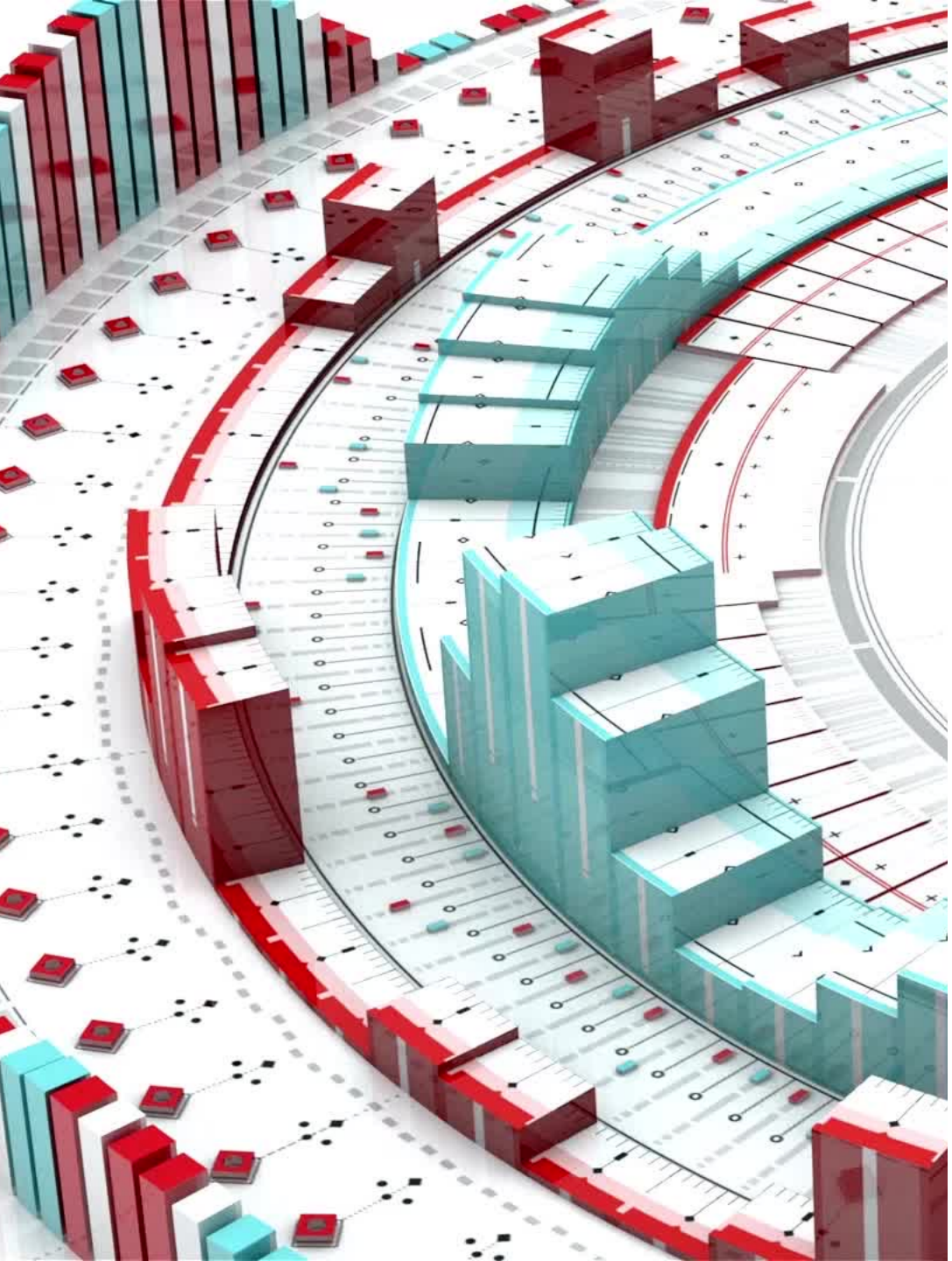
Comprehensive tools for management and development

High performance with large datasets

Cons of Microsoft SQL

EXPENSIVE LICENSING

WINDOWS-CENTRIC ENVIRONMENT



Oracle Database

- Oracle Database, often referred to simply as Oracle, is a multi-model database management system produced and marketed by Oracle Corporation.
- It is one of the most widely used databases in the world, particularly favored for its reliability, scalability, and extensive feature set.
- Oracle supports both on-premises and cloud deployments, making it versatile for a variety of use cases.

Pros of Oracle

Robust and reliable for large-scale applications

Advanced analytics and data warehousing capabilities

High availability and disaster recovery options

Cons of Oracle

High cost of ownership

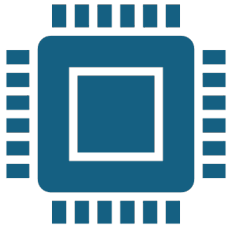
Complex licensing model

IBM DB2

- IBM DB2 is a family of data management products, including database servers, developed by IBM. DB2 is designed to store, analyze, and retrieve data efficiently. It supports both relational and non-relational data models and is known for its high performance, scalability, and reliability, making it suitable for enterprise-level applications.

Pros of IBM DB2

High performance and scalability



Excellent support for SQL and NoSQL

Integration with IBM's suite of enterprise tools

Cons of IBM DB2

Costly for small to medium-sized enterprises

Steep learning curve

Comparison table

Feature	PostgreSQL	Microsoft SQL Server	Oracle Database	IBM DB2
Scalability	High	High	Very High	Very High
Performance Optimization	Advanced (Indexing, Partitioning)	Advanced (Profiler, Tuning Advisor)	Very Advanced (RAC, Partitioning)	Advanced (BLU Acceleration)
Security	Strong (Encryption, Role based access control)	Advanced (Encryption, RBAC)	Very Advanced (Transparent Data Encryption - TDE, Database Vault)	Advanced (Encryption, Access Control)

Comparison table

Feature	PostgreSQL	Microsoft SQL Server	Oracle Database	IBM DB2
High Availability	Moderate	High	Very High	High
Support for Multiple Data Models	Yes (SQL, JSON)	Moderate (SQL, JSON)	Yes (Relational, JSON, XML, Spatial)	Yes (Relational, XML, JSON, Graph)
Integration with Ecosystem	Limited	Strong (Microsoft products)	Very Strong (Oracle products)	Strong (IBM products)

Comparison table

Feature	PostgreSQL	Microsoft SQL Server	Oracle Database	IBM DB2
Cost	Low (Open Source)	High (Licensing costs)	Very High (Licensing costs)	High (Licensing costs)
Resource Intensive	Moderate	High	Very High	High
Vendor Lock-in	Low	High	Very High	High

Q&A