



Hibernate & Spring Data JPA

Beginner to Guru

What is a Relational Database Management System?



RDBMS

- RDBMS - Relational Database Management System - Type of a DBMS specifically for Relational Databases
- REVIEW - DBMS's have 4 important characteristics:
 - Data Definition - define the data being tracked
 - Data Manipulation - add, update or remove data
 - Data Retrieval - extract and report on the data in the database
 - Administration - defining users on the system, security, monitoring, system administration





SQL & Langaue Support

- RDBMS - All support ANSI SQL
- Also support their own version of SQL
 - MySQL is different from Oracle which is different from MS SQL Server
- May support their own language for stored procedures and triggers
 - This will vary by platform





Data Definition

- DDL - Data Definition Language (ie CREATE TABLE...) is used to define the relational model
- Under the covers, the RDBMS will store data about your tables in catalog tables
- The software is used to enforce data being stored conforms to the rules you've defined for the data.
 - You can't store a text (string) in a number field
 - You must provide a value - NOT NULL





Data Manipulation

- DML - Data Manipulation Language
- Allows you to add (INSERT), change (UPDATE), or remove (DELETE) data.
- The RDBMS enforces data manipulation adheres to the rules of the Data Definition.
- The RDBMS allows set up 'rules' for multi-user systems.
- These rules manage what happens in competing conditions. (what happens when two users want to update the same data, at the same time)
- Enforces Data Integrity - What happens when things go wrong?





Data Retrieval

- Data Retrieval is the act of pulling data out of the database
- The RDBMS determines the optimal way to retrieve data out of the database.
- Multi-table joins can become very complex.
 - Consider tables with billions and billions of rows.
 - Reports can go from seconds, to hours when the retrieval strategy is wrong.
- The RDBMS also considers what happens when updates occur while your report is running.





Administration

- Users - RDBMS define user accounts
- User accounts have security roles which control what individual users can see, update, delete, etc
- RDBMS have tools to see performance metrics which can be used to identify costly operations
- System Administration Includes:
 - Defining users
 - Where the database stores its data on the computer system
 - Backups and Auditing





How Data is Stored?

- RDBMS - Control how data is stored to disk
- Can be a few files
- Can be very VERY complex spread across multiple drives or network devices
- This becomes more important on larger database systems





Administration Best Practices

- Use a schema for your application
- Do not use a 'super user' account for your application user
- Apply the principle of minimal authorities
- Account used by application often called a 'service account'
- Service account should only have CRUD access
- Service account should not be able to perform DDL operations
 - Prevents malicious acts via SQL Injection attacks



