Database Modeling and Database Systems

Course Description

Stored data form the basis of many value chains of an information and knowledge society. The methodical structuring of data through data schemas, therefore, forms an important basis for storing information in such a way that it can be retrieved and processed quickly and easily. In addition to the structured storage of data, structured access to large amounts of data must also be possible. This course teaches students how to store data in relational data models and how to access stored data with SQL. In addition to relational database systems, modern DB systems (NoSQL) for storing and accessing data will be presented.

Contents

1. Fundamentals of Relational Databases
   1. Basic Concepts of the Relational Data Model
   2. Find and Delete Records in the Database
   3. SQL and Relational Database Systems
2. Querying Data from a Single Table
   1. Query Data (SELECT)
   2. Query Data with Condition (WHERE)
   3. Sort Query Output (ORDER BY)
   4. Queries with Group Formation (GROUP BY)
   5. Subqueries with Nested SELECT Statements
3. Conception and Modeling of Relational Databases
   1. The Entity Relationship Model
   2. Relationships and Cardinalities in E/R Models
   3. Normal Forms of Databases
4. Creation of Relational Databases
   1. Logical Database Design Activities
   2. Mapping of the Conceptual Data Model into the Physical Data Model
   3. Generation of Tables in SQL Databases from E/R Diagrams
5. Complex Database Queries on Multiple Tables
   1. Composite Quantities (JOIN)
   2. Set Operations
   3. Data Views with CREATE VIEW
6. Manipulating Records in Databases
   1. Insert New Data Records (INSERT)
   2. Change Existing Records
   3. Transactions
7. NoSQL Database Systems
   1. Motivation and Basic Idea
   2. Selected Groups of NoSQL Systems