

# Fullstack Development

# Database Design

# Content

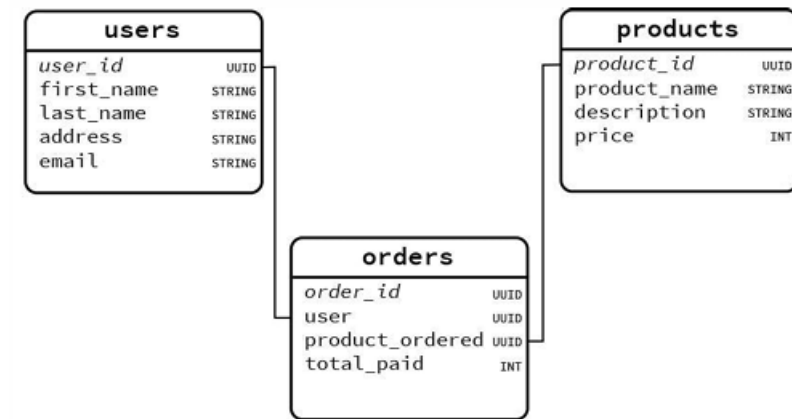
- Database ranking
- SQL database
- NoSQL database
- Schema patterns
- Some useful information

# Database Engine Ranking

- Database engine
  - DBMS (Database Management System)
- A brief history of databases
- DB-Engines Ranking

# SQL Database

- Relational database
- Organize data into **tables** of related information
- Utilize **Structured Query Language (SQL)** for managing/manipulating data



# Popular RDBMS

- Open source: MySQL , PostgreSQL
- Commercial: Oracle Database , Microsoft SQL Server , IBM DB2
- [RDBMS Ranking](#)

# SQL

The standard language used to interact with SQL databases

- Data Definition Language (DDL)
  - e.g., `CREATE TABLE` , `ALTER TABLE` , `DROP TABLE`
- Data Manipulation Language (DML)
  - e.g., `INSERT` , `UPDATE` , `DELETE` , `SELECT`
- Data Control Language (DCL)
  - e.g., `GRANT` , `REVOKE`

# ACID Properties

- An acronym that stands for ...
  - Atomicity
  - Consistency
  - Isolation
  - Durability
- Ensure reliable transaction processing and data integrity
- What does ACID Means?



# MySQL and MariadDB

# PostgreSQL

# NoSQL

- non SQL or not only SQL
- Stores data in a format other than relational tables

# Types of NoSQL Database

- Document-oriented
- Column-oriented
- Graph-based
- Key-Value pair
- Time series

# Document Database

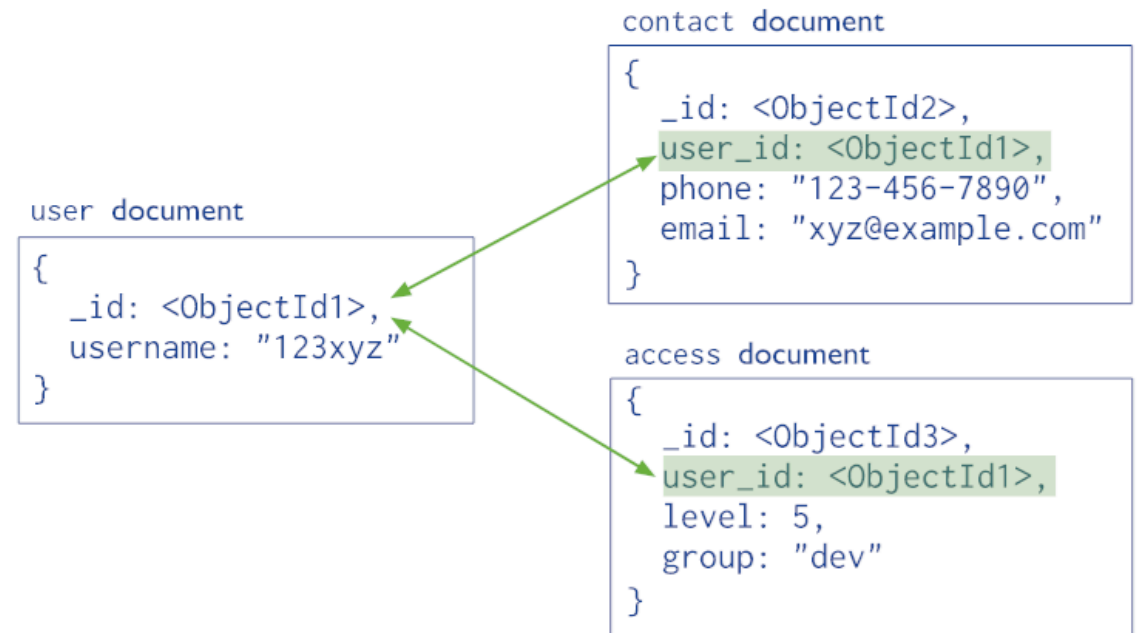
- The data is stored in document
- Each document is typically a nested structure of keys and values
- **Possible to retrieve only parts of a document**
- The most commonly used data format are JSON, BSON, and XML

# Document Database

(a) Embedded Data Model



(b) Normalized Data Model



# Key-value Data Store

- Stores data as a collection of key-value pairs
- Each data item is identified by a unique key
- The value can be anything (string, number, object, ...)

