

Special Topics

<https://chhay.page.link/m11>

CS5200 DBMS
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Special Topics

L1. MongoDB

NoSQL

- Volume, velocity, variety.
- Horizontal scale with commodity servers.
- High availability.

MongoDB Overview

- “MongoDB is a general purpose, document-based, distributed database built for modern application developers and for the cloud era.”
- JSON documents:
 - Arrays, nested objects.
 - Dynamic schemas.
- Full ACID transactions (mostly single documents, multi supported).
- Relationships: reference and embedded.
 - Normalized relational DBs: reference.
 - Denormalized (redundant data): embedded. Violates NF.

MongoDB vs. Relational DBs

- Document data model \Leftrightarrow relational data model.
- Documents \Leftrightarrow Rows.
- Collections \Leftrightarrow Tables.
- Declarative JSON queries \Leftrightarrow SQL.
 - Translations to SQL. [Example](#).
- JOINS can be done with [\\$lookup](#) (LEFT OUTER JOIN).
- Aggregation: multi-stage pipeline, map-reduce, single-collection functions (count/distinct). [Examples](#).
- Consistency can be compromised for availability and partition tolerance.

MongoDB

Client-Side Database



Mobile



Web



IoT / Embedded (coming)

Application Development



Rules



Serverless Functions



Code Deployment



Sync

Data Layer



MongoDB
Server

.....



MongoDB
Atlas



Full-Text Search



MongoDB Atlas
Data Lake

Special Topics

L2. Exercise

Exercise

- Install [Community Server](#) and [Compass GUI](#) (Community Edition).
- Translate relational DB schema to JSON.
 - One-to-many relationships.
 - Many-to-many relationships.

To start:

- `$ cd ~/Documents/mongodb/`
- `$ mkdir -p data/db`
- `$./bin/mongod --dbpath ./data/db`
- Start MongoDB Compass UI, connect to `mongodb://localhost:27017`

Exercise

- Insert sample data.
 - [bloguser1.json](#)
 - [bloguser2.json](#)
- Create collection: BlogUsers
- Add Data > Insert Document
- Documentation
 - [CRUD operations.](#)
 - [BSON data types.](#)
 - [1-to-many embedded.](#) Also notice “subset” pattern.

Exercise

- Query data
 - {"username":"username1"}
 - {"blogposts.content": "leaping dogs"}
- Documentation
 - [Query embedded documents.](#)

Exercise

- Project: in your application stack, replace your storage subsystem and data access layer with MongoDB. What do we need to change?
- Documentation:
 - [Java driver](#).
 - [Quick start with POJO](#).
 - CodecRegistry for BSON <-> POJO conversion.
 - CRUD examples.

Special Topics

L3. Ask Me Anything

Example Topics

- Differences between: startups, Microsoft, Google, Facebook.
- Resumes.
- Interviews.
- Day-in-the-life.
- Software engineering roles.
- Career growth.
- Motivations for teaching.
- *Your questions here*