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Databases & Web Applications

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Overview

- ▶ Introduction & Structure of MongoDB
- ▶ CRUD operations in MongoDB
- ▶ Using MongoDB from NodeJS
- ▶ Further topics & Conclusion

Introduction (1): Document-oriented databases

- ▶ document-oriented databases
 - ▶ stores documents
 - ▶ create, read, update and delete documents
- ▶ documents do **not** have to be of the same shape
 - ▶ oriented on the data itself, not the shape
 - ▶ flexible w.r.t. data inside them
 - ▶ missing / optional values easy to incorporate
 - ▶ easy to change format of data on-demand
 - ▶ referential integrity (if applicable) difficult

Introduction (2): Structure of MongoDB

- ▶  **mongoDB** is an open-source, document database designed for ease of development and scaling
 - ▶ so it is document-oriented
- ▶ stores documents so-called “records”
 - ▶ documents are essentially JSON, i.e. key-value pairs
 - ▶ keys are strings
 - ▶ values can for example be strings, numbers, other documents, arrays of values, arrays of other documents

Introduction (3): Structure of MongoDB

```
{
  "_id" : ObjectId("54c955492b7c8eb21818bd09"),
  "address" : {
    "street" : "2 Avenue",
    "zipcode" : "10075",
    "building" : "1480",
    "coord" : [ -73.9557413, 40.7720266 ],
  },
  "borough" : "Manhattan",
  "cuisine" : "Italian",
  "grades" : [
    {
      "date" : ISODate("2014-10-01T00:00:00Z"),
      "grade" : "A",
      "score" : 11
    },
    {
      "date" : ISODate("2014-01-16T00:00:00Z"),
      "grade" : "B",
      "score" : 17
    }
  ],
  "name" : "Vella",
  "restaurant_id" : "41704620"
}
```

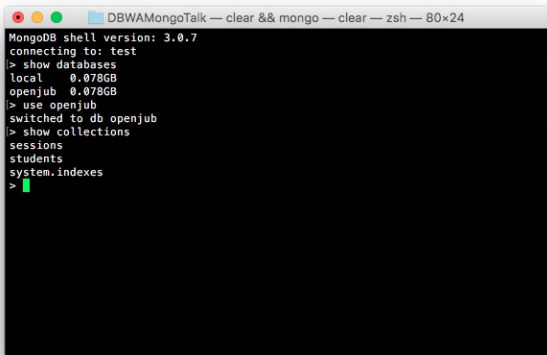
Introduction (4): Structure of MongoDB

- ▶ each mongodb server can host several databases
 - ▶ like in MySQL
- ▶ each database can host several collections
 - ▶ similar to tables
- ▶ each collection contains a set of documents
 - ▶ **but:** documents do not need to be of the same shape

CRUD in MongoDB (1): Via the shell

- ▶ CRUD (Create, Read, Update, Delete) in MongoDB
 - ▶ You need to be able to do something with the database
- ▶ we will use the shell for now
 - ▶ We will talk about integration into programming languages later
- ▶ Queries themselves are JSON
 - ▶ we use a version of javascript to specify the operation itself
- ▶ enter them in an interactive shell
 - ▶ the “mongo” executable

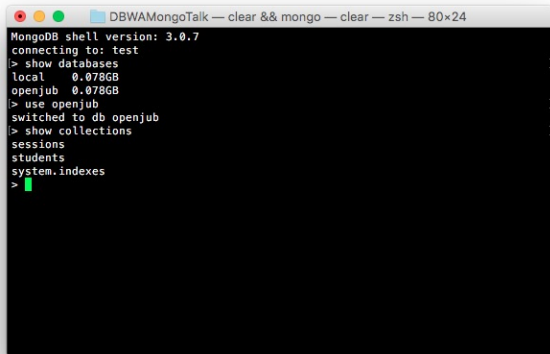
CRUD in MongoDB (2): Selecting Database & Collection



```
DBWAMongoTalk — clear && mongo — clear — zsh — 80x24
MongoDB shell version: 3.0.7
connecting to: test
> show databases
local    0.078GB
openjub  0.078GB
> use openjub
switched to db openjub
> show collections
sessions
students
system.indexes
> █
```

```
show databases,
use some_awesome_database,
show collections
```


CRUD in MongoDB (3): Find, insert, update, delete

A screenshot of a terminal window titled "DBWAMongoTalk — clear && mongo — clear — zsh — 80x24". The terminal shows the MongoDB shell version 3.0.7 and the process of connecting to a test database. It lists available databases (local, openjub) and collections (sessions, students, system.indexes) within the openjub database. The prompt is ready for the next command.

```
MongoDB shell version: 3.0.7
connecting to: test
[> show databases
local    0.078GB
openjub  0.078GB
[> use openjub
switched to db openjub
[> show collections
sessions
students
system.indexes
> █
```

```
db.my_collection.find(query),

db.my_collection.insert(document),

db.my_collection.update(query,change),

db.my_collection.remove(query)
```

Using MongoDB from NodeJS

- ▶ stuff
 - ▶ ...

Further topics

- ▶ Indexing
 - ▶ be faster
- ▶ Aggregation Queries
 - ▶ do some fancy operations in one big query
- ▶ Mongoose: Object-oriented mapper for mongo
 - ▶ we might want to have Schemas

Conclusion

- ▶ stuff
 - ▶ ...

The end

Thank you for your attention!
Any Questions, Comments, etc?

- ▶ Sources:
 - ▶ <https://en.wikipedia.org/wiki/MongoDB>
 - ▶ https://en.wikipedia.org/wiki/Document-oriented_database
- ▶ Image Sources:
 - ▶ <https://www.mongodb.com/brand-resources>