Basic CRUD

MongoDB, ORM, Mongoose and CRUD Operations

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MongoDB

- Free **open-source** cross-platform document-oriented program
- Uses **JSON**-like documents with schemata.
- Good for **e-commerce** product catalog, blogs, evolving data requirements
- **Loosely coupled** objectives – the design **may change** by over time.

Developer Tools

- **Robo 3T**
  - Fully featured IDE with embedded shell
  - Visual Query Builder
  - IntelliShell with Auto-Completion
- Alternatives (**NoSQLBooster**)
  - Shell-centric cross platform GUI
  - Fluent Query Builder

Install MongoDB

- Download from: https://www.mongodb.com/download-center
- When **installed**, MongoDB needs a **driver**
  - One to use with Node.js, .NET, Java, etc..
  - Install MongoDB **driver** for Node.js:

```
npm install mongodb -g
```

Configure MongoDB

- Additional configurations are **needed**:
  - Go to installation folder and **run** a command prompt as an **administrator**
  - Type the following command:

Usually in **C:\Program Files\MongoDB\Server\3.4\bin**

```
"path to mongod.exe" mongod --dbpath "path to store data"
```

  - Additional information at: https://docs.mongodb.com/manual/tutorial/install-mongodb-on-windows/

Run MongoDB as a Windows Service

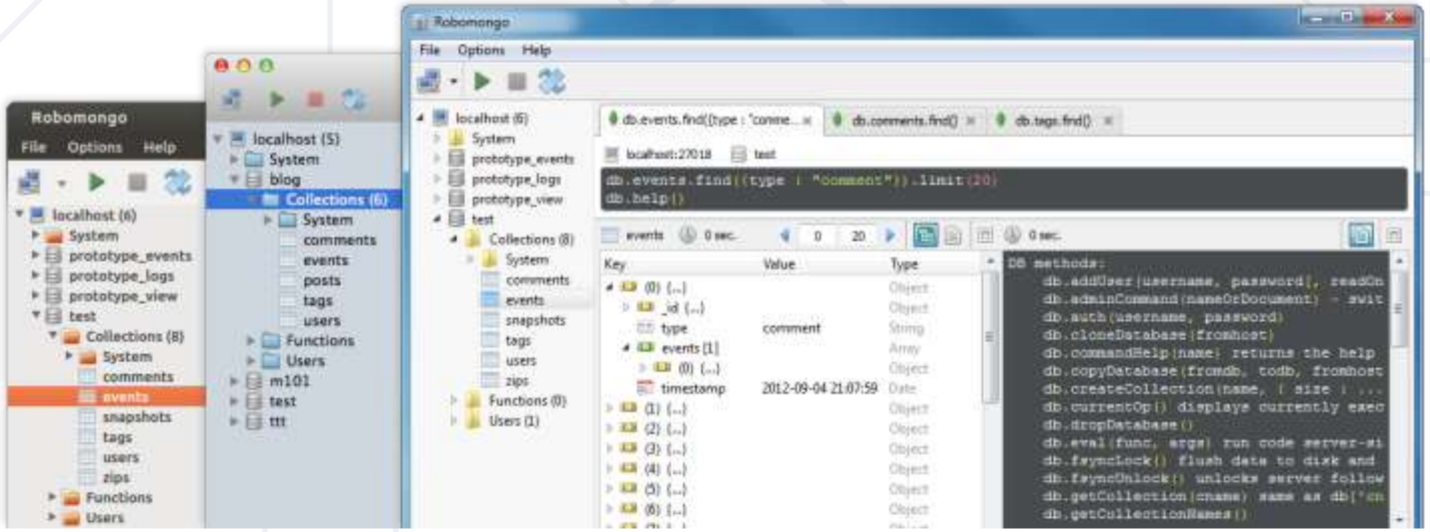
- Instead of **always** opening a CMD we can **run** MongoDB as a **service**

```
mongod --dbpath "C:\mymongodb" --logpath
"C:\mymongodb\logs.txt" --install --serviceName "MongoDB"
```

- After that just type **'net start MongoDB'** and the database now runs as a service
- Additional information: https://www.mkyong.com/mongodb/how-to-run-mongodb-as-windows-service/

Working with MongoDB GUI

- Choose one of the many
- For example:
  - Robo 3T -> https://robomongo.org/download
  - MongoBooster -> https://mongobooster.com/downloads



```
db.events.find({type : "comment"}).limit(20)
db.help()
```

```
(0) {...}                              Object
  _id {...}                            Object
  type          comment                String
  events [1]                           Array
    (0) {...}                          Object
  timestamp     2012-09-04 21:07:59    Date
(1) {...}                              Object
(2) {...}                              Object
(3) {...}                              Object
(4) {...}                              Object
(5) {...}                              Object
(6) {...}                              Object
```

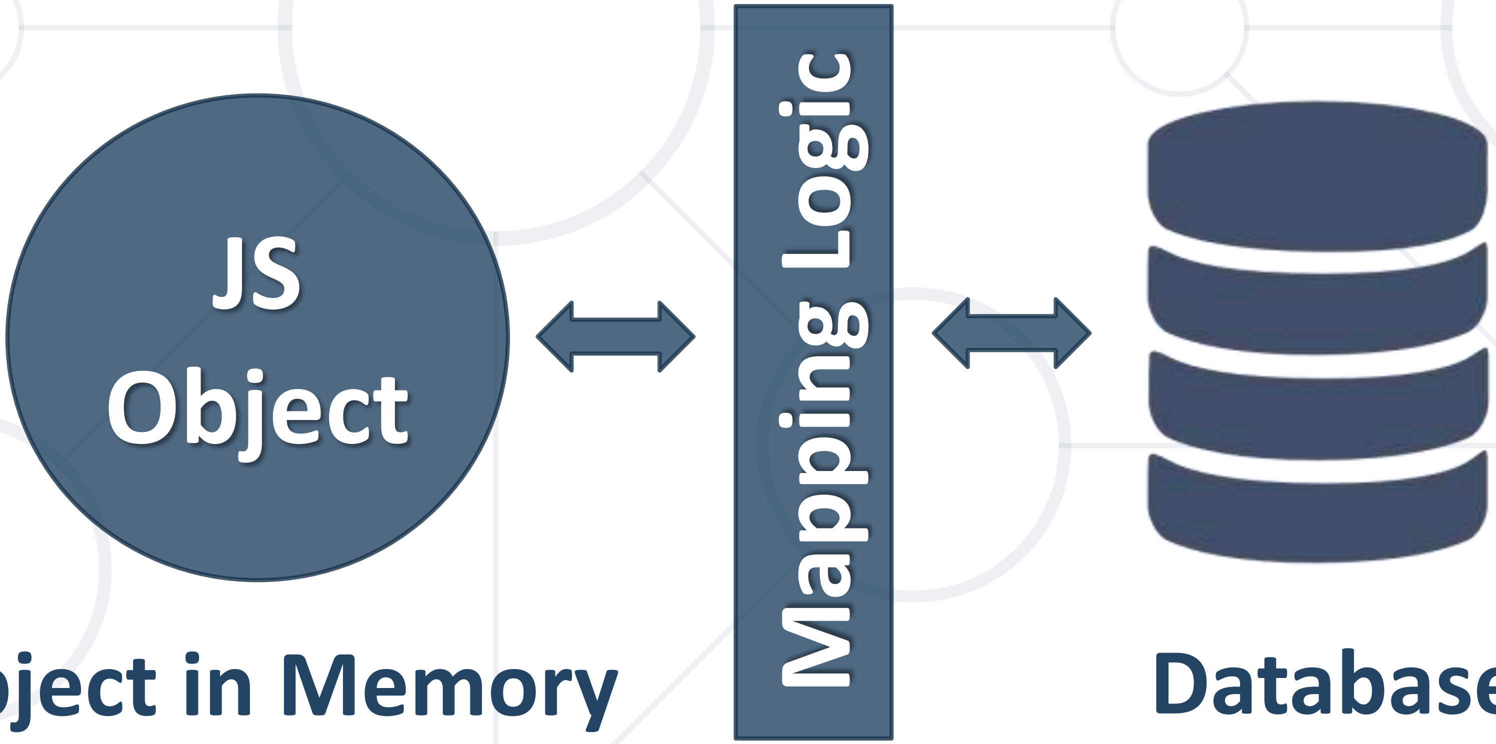
```
DB methods:
    db.addUser(username, password[, readOn
    db.adminCommand(nameOrDocument) - swit
    db.auth(username, password)
    db.cloneDatabase(fromhost)
    db.commandHelp(name) returns the help
    db.copyDatabase(fromdb, todb, fromhost
    db.createCollection(name, { size : ...
    db.currentOp() displays currently exec
    db.dropDatabase()
    db.eval(func, args) run code server-si
    db.fsyncLock() flush data to disk and
    db.fsyncUnlock() unlocks server follow
    db.getCollection(cname) same as db['cn
    db.getCollectionNames()
```

Object-Relational Mapping

Overview, Advantages and Disadvantages

ORM Overview

- **ORM Frameworks** maps OOP **classes** to database **tables**



Object in Memory

Database

ORM Advantages

- Developers can only focus on **business logic** rather than writing interfaces between code and db
- Reduces **development time** and **costs** by avoiding redundant codes
- Capable of connecting to **different databases**, which comes handy during switching from one db to the other
- Helps to **effectively query** from multiple tables

ORM Disadvantages

- Loss in developer **productivity** whilst they learn to program with ORM
- Developers lose understanding of what the code is actually doing - the developer is more in **control** using SQL
- ORM has a tendency to be **slow**
- ORM fails to compete against SQL queries for **complex** queries

Mongoose Introduction

Overview, Mongoose Schemas, Validation, Models

Mongoose Overview

- Mongoose is a object-document **model module** in Node.js for MongoDB
  - It **provides** a straight-forward, **schema-based** solution to **model** your application data.
  - Includes build-in type **casting** and **validation**
  - **Extends** the native **queries** (much **easier** to use)
  - To **install** type in CMD:

```
npm install mongoose --save
```

Working with Mongoose in Node.js

- Load the following module:

```
const mongoose = require('mongoose')
```

- Connecting to the database:

```
mongoose.connect('mongodb://localhost:27017/myapp')
```

Connect to the **database** using mongoose **module**

Mongoose Schemas

- Everything in Mongoose starts with a Schema.
- Each schema **maps** to a MongoDB **collection** and defines the **shape** of the documents within that collection.

```
const Schema = mongoose.Schema;
const studentSchema = new Schema({
  name: String,
  age: Number,
  grades: Array
});
```

Define Schema types. Each **entity property** could be validated.

Mongoose Validations

- Mongoose has **built-in** schema validations to protect from **invalid** data entity insertion

```
const studentSchema = new Schema({
  name: { type: String, required: true },
  age: { type: Number, min: 6, max: 18 },
  grades: [ { type: Number, min: 2, max: 6 } ]
})
```

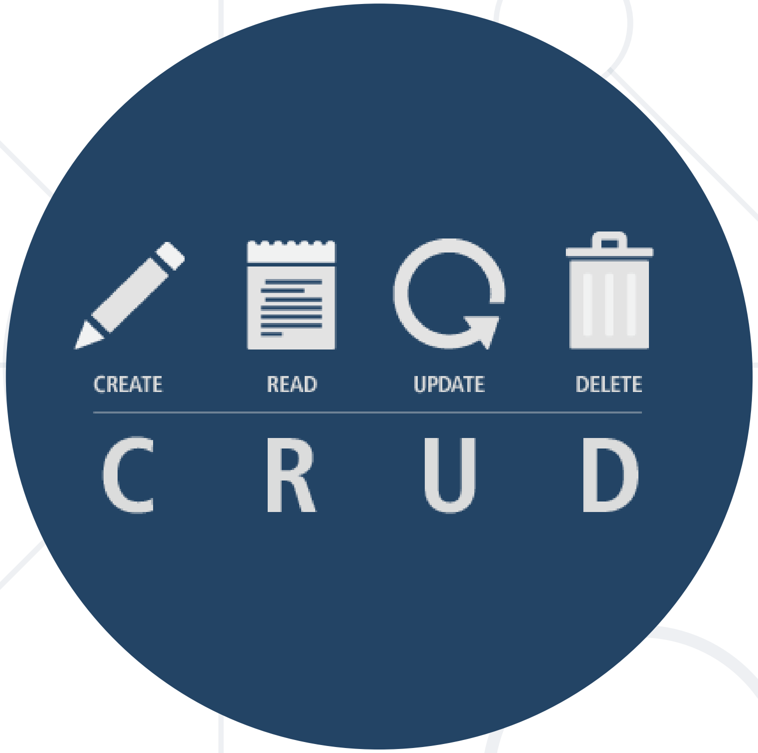
Mongoose Models

- Models are fancy **constructors** compiled from Schema definitions
- An **instance** of a model is called a **document**
- Models are responsible for **creating** and **reading** documents from the underlying MongoDB database

```
const Student = mongoose.model('Student', studentSchema);
```

Name of the **collection** your model is for

The Model Schema



Basic CRUD with MongoDB & Mongoose

Create, Read, Update, Delete

Create an Entity

- This is how we can **create** new items in the database
- This will commonly be from an **HTTP POST** request, although you can do this anywhere you want:

```
Student.create({
  name: 'George',
  age: 12,
  grades: [4, 5, 2]
})
.then((data) => console.log(data))
.catch((err) => console.error(err))
```

CRUD operations inside a database are **asynchronous**

List Entities

- To retrieve **all entities** from a collection use the following:

```
Student.find({})
.then((students) => console.log(students))
.catch((err) => console.error(err))
```

Will return an array with **all students** from the collection

- To fetch only **one student** by **id** use the following:

```
Student.findById(id)
.then((student) => console.log(student))
.catch((err) => console.error(err))
```

Will return a **single object** from the collection

List Entities (2)

- To **filter** by **given criteria** you can insert an **object** inside find:

```
Student.find({ name: 'George', age: 7 })
.then((students) => console.log(students))
.catch((err) => console.error(err))
```

Will return an **array** with **all students** that answer to the **given criteria**.

- To **filter** a **single object** by **given criteria** use the following:

```
Student.findOne({ name: 'George', age: 7 })
.then((student) => console.log(student))
.catch((err) => console.error(err))
```

Will return a single **object**. The **first entity** that matches the **given criteria**.

Update an Entity

- To update an entity we need the **entity id** and the **properties** you want to modify as an **object**. After that use the **findByIdAndUpdate** method:

```
Student.findByIdAndUpdate(id, { age: 13 })
  .then((student) => console.log(student))
  .catch((err) => console.error(err));
```

Will return the **old entity**. List them **again** to see the updated one.

Delete an Entity

- Deleting can be done by **id** and using the **findByIdAndRemove** method:

```
Student.findByIdAndRemove(id)
 .then((student) => console.log(student))
 .catch((err) => console.error(err));
```

Will return a single **object**. The entity that has been **deleted**.

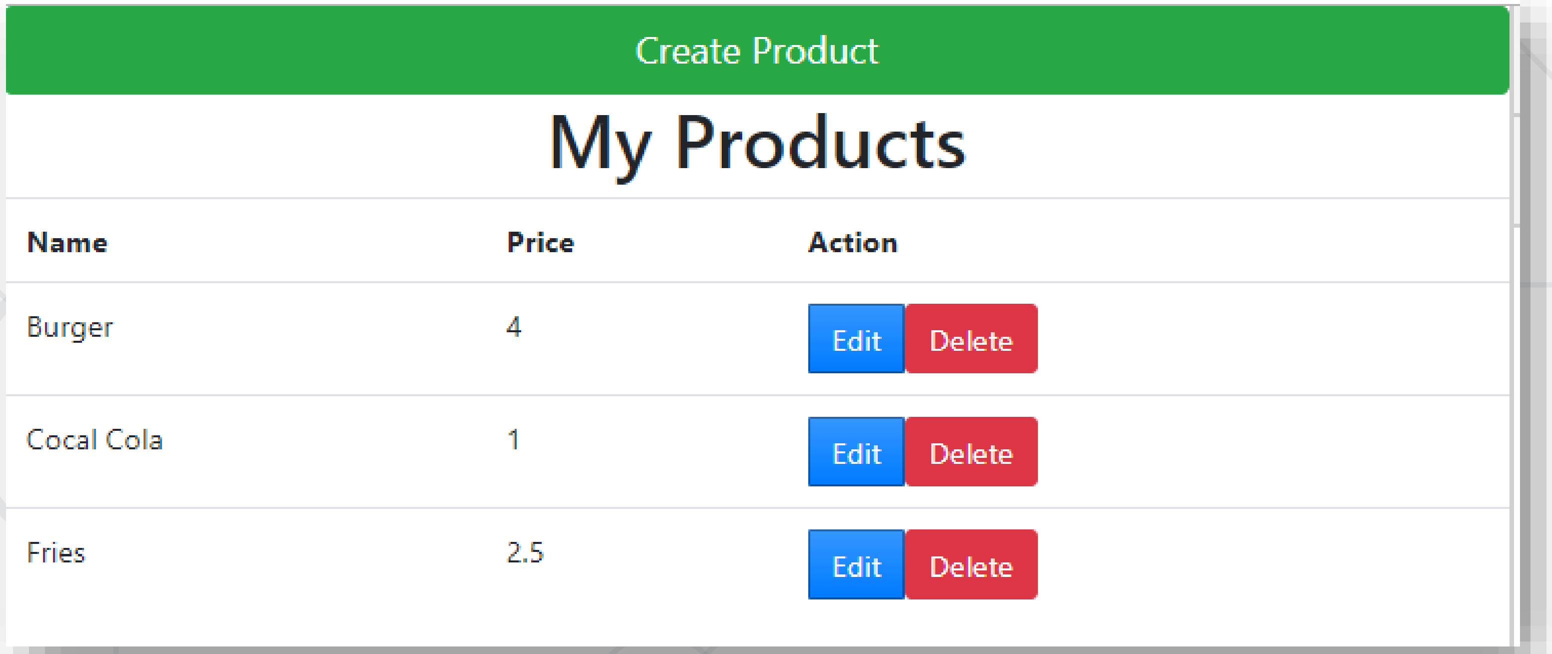
- To delete **many entities** by **criteria** use the following:

```
Student.deleteMany({ name: 'Rick' })
 .then((data) => console.log(data))
 .catch((err) => console.error(err));
```

Will return a single **object** with information **how many** entities have been deleted.

Problem: Simple Products Store

- Write an application that Creates, Lists, Edits and Deletes products
- Use Node.js, Express.js, MongoDB and Mongoose ORM



Create Product

My Products

Name	Price	Action
Burger	4	Edit Delete
Cocal Cola	1	Edit Delete
Fries	2.5	Edit Delete

Live Exercises

Summary

- ORM is used to **map objects** to **database tables**
- Mongoose is a object-document model **module** in Node.js for **MongoDB**
  - It uses **Schemas** & **Models** to connect with the database
- Basic CRUD operations are done using the **Mongoose models**

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