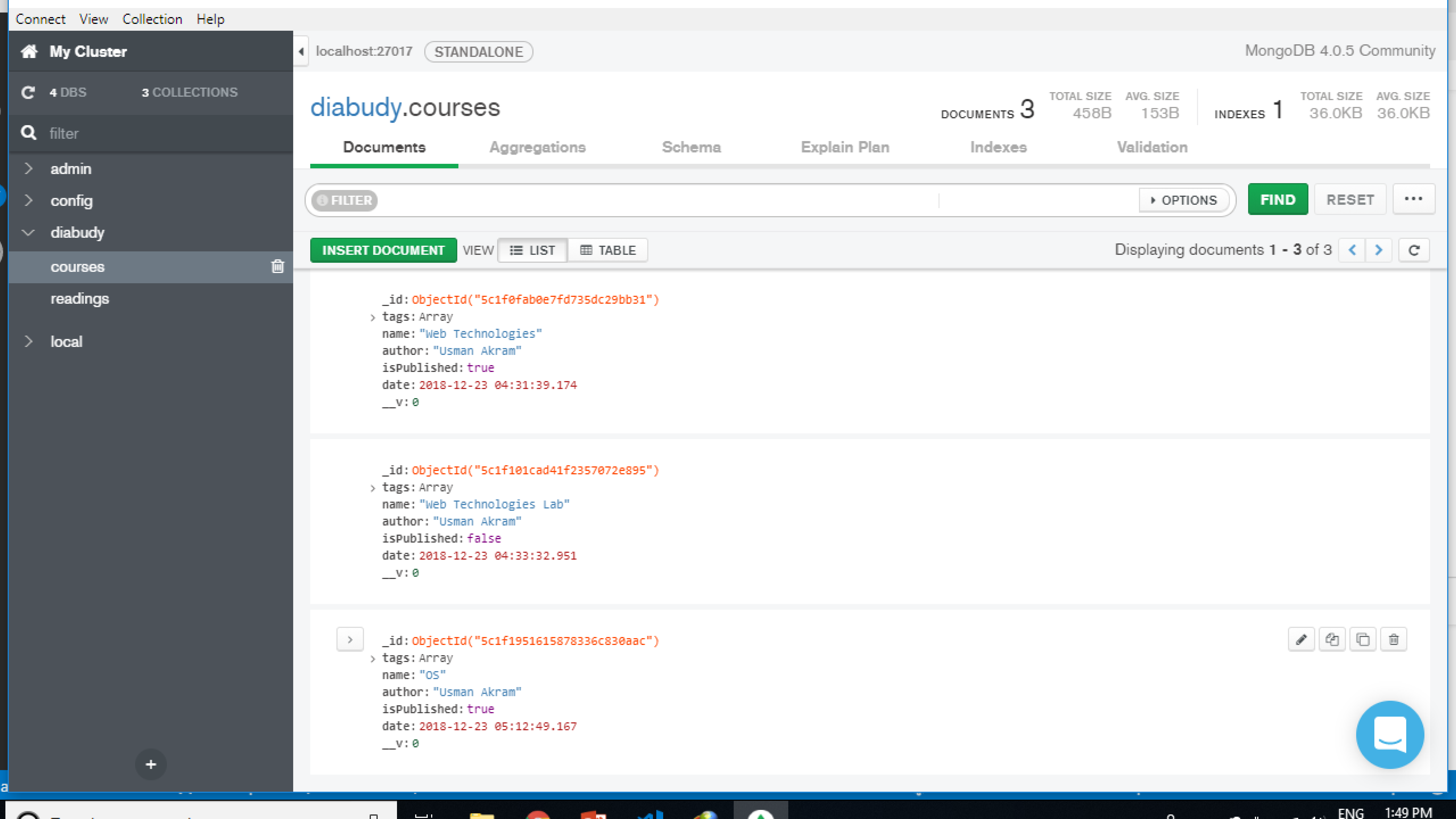
Mongo DB and Mongoose

MONGODB ATLAS
DEPLOY A FULLY MANAGED CLOUD DATABASE IN MINUTES


Connect View Collection Help
My Cluster
4 DBS 3 COLLECTIONS
filter
admin
config
diabudy
courses
readings
local
localhost:27017 STANDALONE
MongoDB 4.0.5 Community
DOCUMENTS 3 TOTAL SIZE 458B AVG. SIZE 153B
INDEXES 1 TOTAL SIZE 36.0KB AVG. SIZE 36.0KB
Documents Aggregations Schema Explain Plan Indexes Validation
FILTER
OPTIONS
FIND RESET
INSERT DOCUMENT VIEW LIST TABLE
Displaying documents 1 - 3 of 3

diabudy.courses

```
_id: ObjectId("5c1f0fab0e7fd735dc29bb31")
> tags: Array
name: "Web Technologies"
author: "Usman Akram"
isPublished: true
date: 2018-12-23 04:31:39.174
__v: 0

_id: ObjectId("5c1f101cad41f2357072e895")
> tags: Array
name: "Web Technologies Lab"
author: "Usman Akram"
isPublished: false
date: 2018-12-23 04:33:32.951
__v: 0

_id: ObjectId("5c1f1951615878336c830aac")
> tags: Array
name: "OS"
author: "Usman Akram"
isPublished: true
date: 2018-12-23 05:12:49.167
__v: 0
```

NoSQL

```
_id
:5c1f0fab0e7fd735dc29bb31
tags
:Array
      0
      :"laravel"
      1
      :"React"
      2
      :"Node"
name
:"Web Technologies"
author
:"Usman Akram"
isPublished
:true
date
:2018-12-23 04:31:39.174
__v
:0
```

Connecting to Mongo use mongoose

```
const mongoose = require('mongoose');
mongoose.connect("mongodb://localhost/diabudy",
{ useNewUrlParser: true })
.then(() => console.log("Connected to Mongo
....."))
.catch((error) => console.log(error.message));
```

Schema

```
const courseSchema = mongoose.Schema({
 name: String,
 author: String,
 tags: [String],
 date: { type: Date, default: Date.now },
 isPublished: Boolean
});
```

Schema Types

String

Number

Date

Buffer

Boolean

Mixed

ObjectId

Array

Decimal128

Map

Schema Type Options

```
var schema2 = new Schema({
  test: {
    type: String,
    lowercase: true // Always convert `test` to lowercase
  }
});
```

Indexes

```
var schema2 = new Schema({
  test: {
    type: String,
    index: true,
    unique: true // Unique index. If you specify `unique: true`
    // specifying `index: true` is optional if you do `unique: true`
  }
});
```

Define Model

```
 const Course = mongoose.model("Course",
courseSchema);
```

Create Course

```
async function createCourse() {
 const course = new Course({
 name: "OS",
 author: "Usman Akram",
 tags: ["React", "Node"],
 isPublished: true
});
const result = await course.save();
 console.log(result);
}
```

Get Courses

```
async function getCourses() {
 const courses = await Course.find({
isPublished: true })
 .limit(10).sort({ name: 1 })
 .select({ name: 1, tags: 1 });
 console.log(courses);
 }
```

Comparison Operators

// eq (equal)

//nq (not equal)

//gt (greater than)

//gte (greater than or equal)

//lt (less than)

//lte (less than or equal)

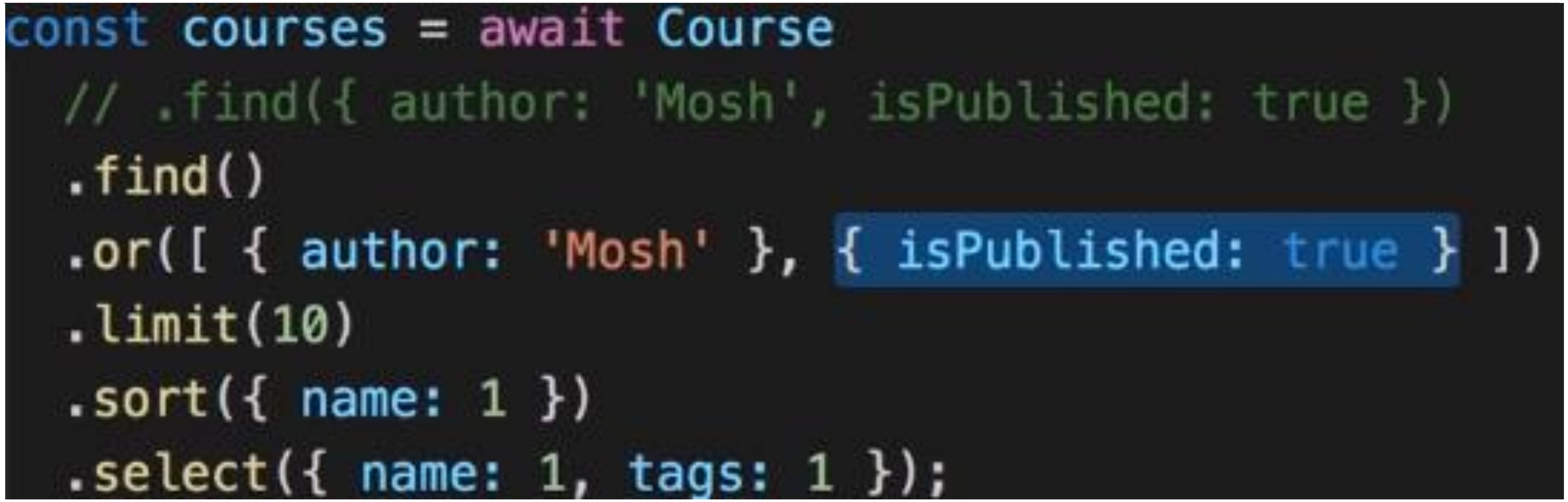
//in

//nin (not in)

Course with price comparison

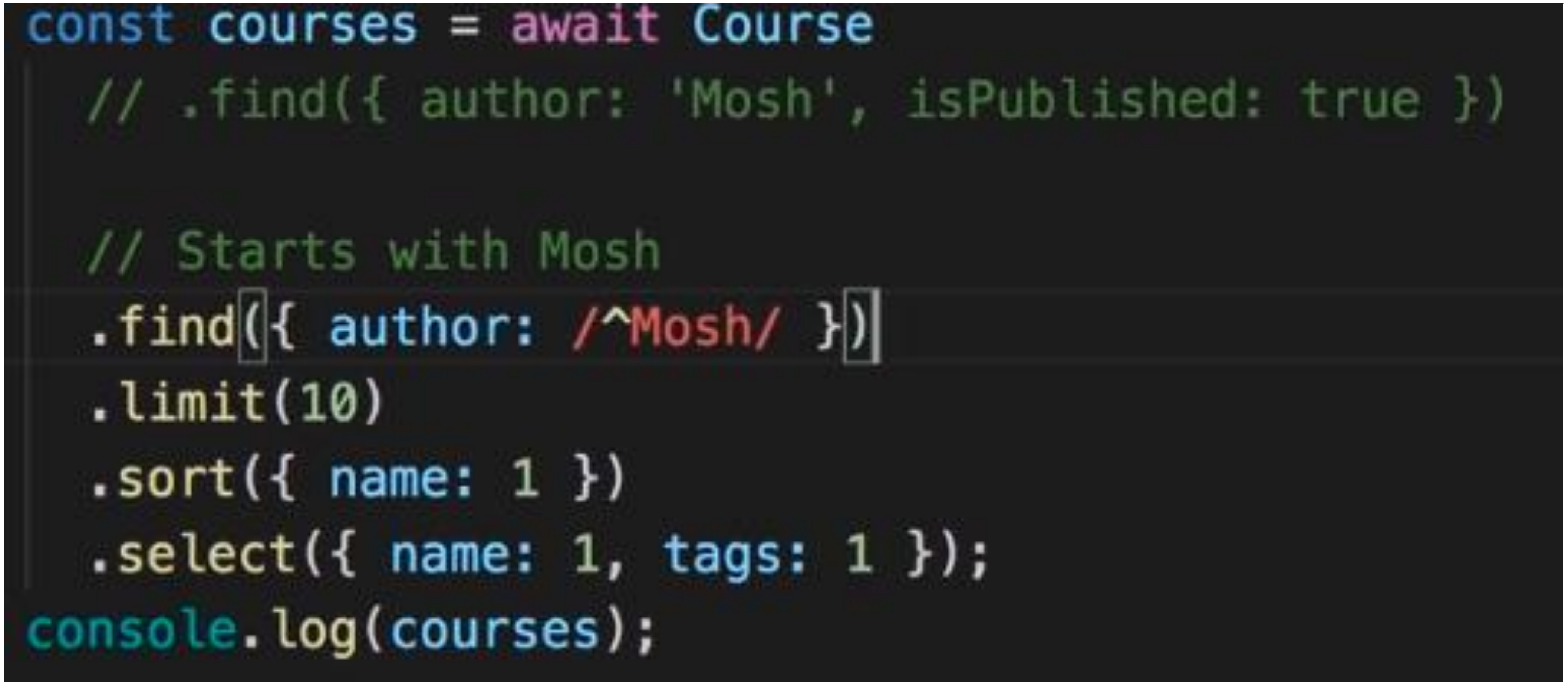
```
async function getCourses() {
const courses = await Course.
find({ price: { $gte: 10 } })
.limit(10).sort({ name: 1 }).select({ name:
1,  tags: 1 });
console.log(courses);
}
```

Logical Comparison



```
const courses = await Course
  // .find({ author: 'Mosh', isPublished: true })
  .find()
  .or([ { author: 'Mosh' }, { isPublished: true } ])
  .limit(10)
  .sort({ name: 1 })
  .select({ name: 1, tags: 1 });
```

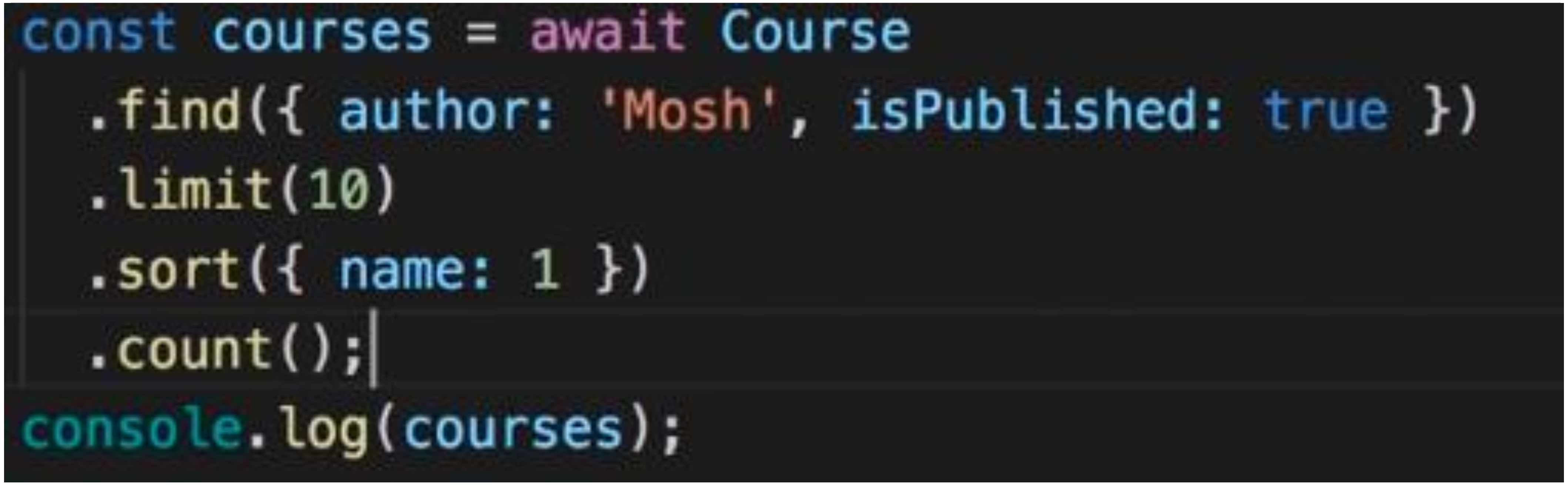
Regex



```
const courses = await Course
  // .find({ author: 'Mosh', isPublished: true })

  // Starts with Mosh
  .find({ author: /^Mosh/ })
  .limit(10)
  .sort({ name: 1 })
  .select({ name: 1, tags: 1 });
console.log(courses);
```

Count



```
const courses = await Course
    .find({ author: 'Mosh', isPublished: true })
    .limit(10)
    .sort({ name: 1 })
    .count();
console.log(courses);
```

api/courses?pagenumber=2&pagesize=10

```
async function getCourses() {
const pageNumber = 2; const pageSize=10;
const courses = await Course.
find({ price: { $gte: 10 } })
.skip((pageNumber-1)*pageSize)
.limit(pageSize)
.sort({ name: 1 }).select({ name: 1, tags: 1 });
console.log(courses);
}
```

Exercise

Download Files from

https://1drv.ms/f/s!AtGKdbMmNBGd0WY-xsTp6iY-9AS4

Run from the folder

```
mongoimport --db mongo-exercises --collection courses --
drop --file exercise-data.json –jsonArray
```

Get All the public backend courses sort them by their names and pick only their names.

Updating

```
async function updateCourse(id){
 //Approach: Query First
 //findById(id)
 //Modify
 //save()

//Approach Update First
 //Update Directly
 //Optionally return updated Doc
}
```

Query First Update

```
async function updateCourse(id) {
const course = await Course.findById(id);
if (!course) return;
course.isPublished = false;
//course.set({isPublished:false});
const result = await course.save();
}
```

Update First

```
async function updateCourse1(id) {
const result = await Course.update(
 { _id, id }, //selection
 {
  $set: { //update operations
  isPublished: false
  }
 })
}
```

Update First… Or

```
async function updateCourse1(id) {
 const result = await Course.findByIdAndUpdate(
  id, //id
  {
   $set: { //update operations
    isPublished: false
   }
  })
}// pass {new:true} to get updated Doc
```

Delete

```
const result = await Course.deleteOne({ _id: id });
const result = await Course.deleteMany({ _id: id });
const course = await Course.findByIdAndRemove(id);
```

Recap

MongoDB is an open-source document database.

It stores data in flexible,JSONlike documents. –

In relational databases we have **tables** and **rows**, in MongoDB we have **collections** and **documents**.

A document can contain sub-documents. - We don’t have relationships between documents.

Validation

MongoDB

By Default every column or property is optional

You can do like this

```
 const courseSchema = mongoose.Schema({
 name: {type:String,required:true},
 });
```

//Promise will be rejected if name is not provided

Use try catch

```
try {
const result = await course.save();
console.log(result);
} catch (err) {
console.log(err.message);
}
//try surround plugin of VS Code for //quick
surrounding with try catch
```

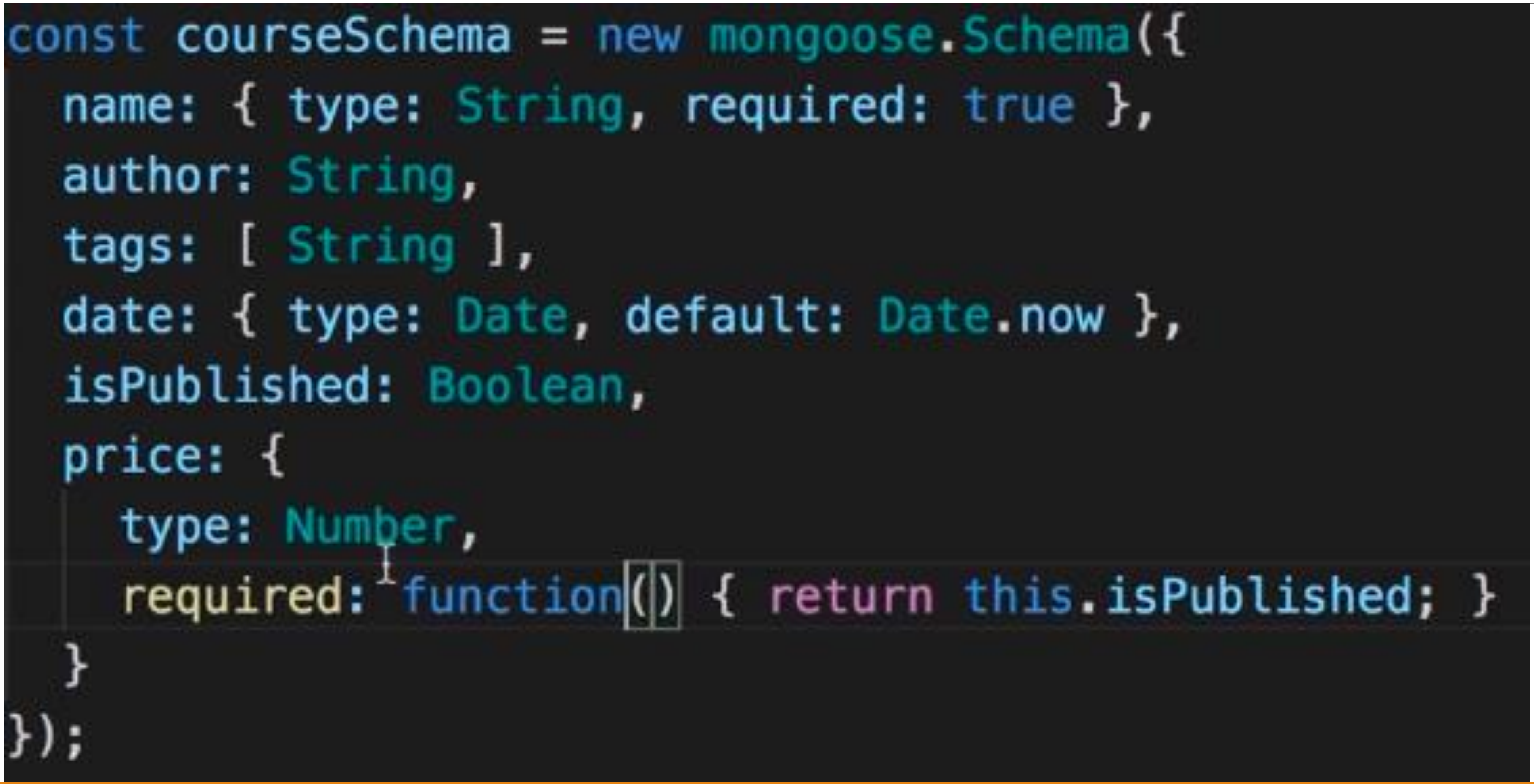
Why Not use JOI

Use both

Mongoose Validation for DB

JOI for RESTFUL API

Mongoose Validation



```
const courseSchema = new mongoose.Schema({
  name: { type: String, required: true },
  author: String,
  tags: [ String ],
  date: { type: Date, default: Date.now },
  isPublished: Boolean,
  price: {
    type: Number,
    required: function() { return this.isPublished; }
  }
});
```

Built in Validators for Mongoose

```
eggs: {
    type: Number,
    min: [6, 'Too few eggs'],
    max: 12
  },
```

Built in Validators for Mongoose

```
bacon: {
  type: Number,
  required: [true, 'Why no bacon?']
 },
```

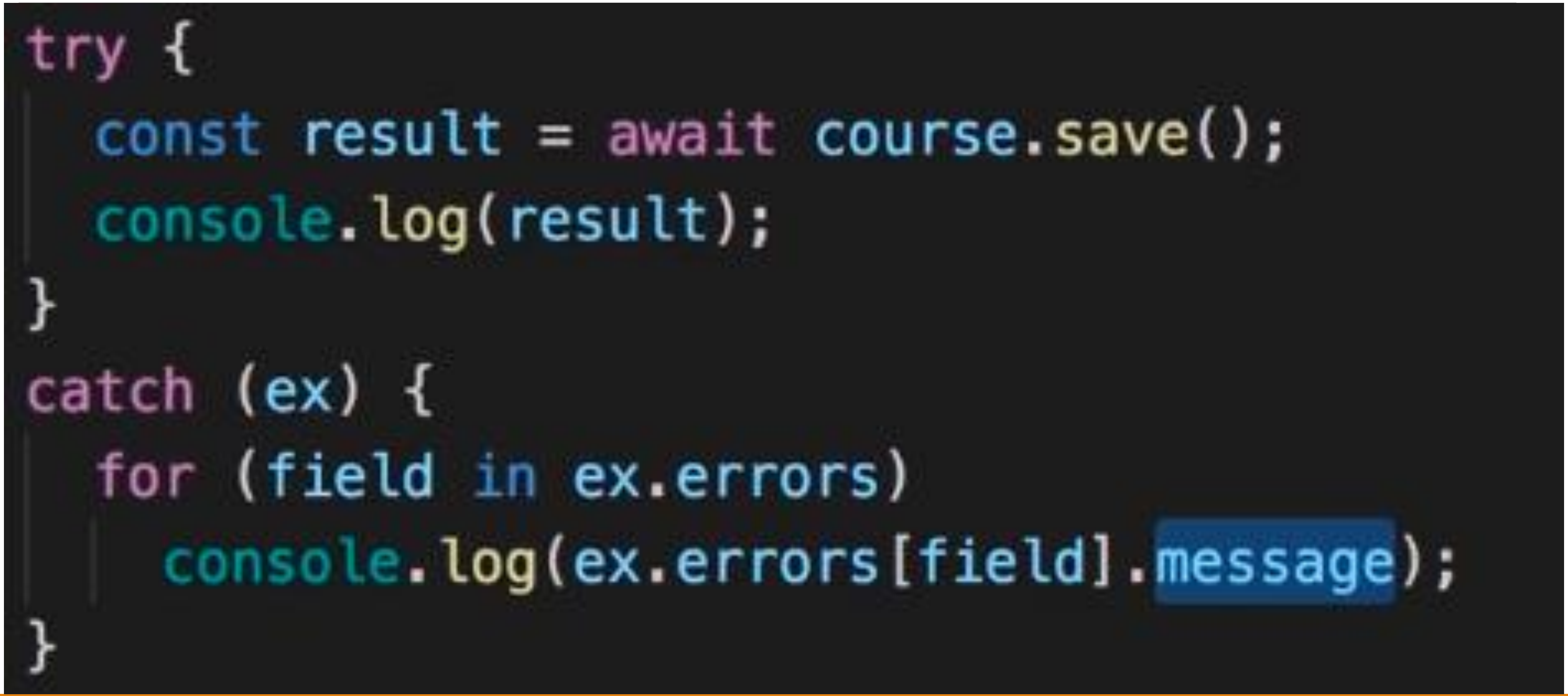
Built in Validators for Mongoose

```
drink: {
  type: String,
  enum: ['Coffee', 'Tea'],
  required: function() {
    return this.bacon > 3;
  }
 }
```

Custom Validator

```
phone: {
   type: String,
   validate: {
     validator: function(v) {
       return /\d{3}-\d{3}-\d{4}/.test(v);
     },
     message: props => `${props.value} is not a valid phone number!`
   },
   required: [true, 'User phone number required']
 }
```

For multiple Errors



```
try {
  const result = await course.save();
  console.log(result);
}
catch (ex) {
  for (field in ex.errors)
    console.log(ex.errors[field].message);
}
```

Practice Project

https://1drv.ms/f/s!AtGKdbMmNBGd0Wobev4gA_rsjbQM

There are two folder

Before – Data is saved in an array

After – Data is handled in mongo db

Practice Project

Browse to folder vidly inside before and run

```
npm install
```

```
node index.js
```

Another Example Project (Customers API)

https://1drv.ms/f/s!AtGKdbMmNBGd0XmKm8lAbQp58sd2

Installation Instructions are the same

Final Restructured Solution

https://1drv.ms/f/s!AtGKdbMmNBGd0hFZG5QQ7v8LM_5I

Advance Topics

Mongoose

Mongoose Virtuals

```
const userSchema = mongoose.Schema({
  email: String
});
// Create a virtual property `domain` that's computed from `email`.
userSchema.virtual('domain').get(function() {
  return this.email.slice(this.email.indexOf('@') + 1);
});
const User = mongoose.model('User', userSchema);
```

Virtual Getter And Setter set multiple values at once

```
userSchema.virtual('fullName').
  get(function() { return `${this.firstName} ${this.lastName}`; }).
  set(function(v) {
    // `v` is the value being set, so use the value to set
    // `firstName` and `lastName`.
    const firstName = v.substring(0, v.indexOf(' '));
    const lastName = v.substring(v.indexOf(' ') + 1);
    this.set({ firstName, lastName });
  });
```

Virtuals in JSON

```
const opts = { toJSON: { virtuals: true } };
const userSchema = mongoose.Schema({
  _id: Number,
  email: String
}, opts);
```

Mongoose Middlewares

Middleware (also called pre and post hooks) are functions which are passed control during execution of asynchronous functions. Middleware is specified on the schema level and is useful for writing plugins.

validate

save

remove

updateOne

deleteOne

init (note: init hooks are synchronous)

Mongoose Pre-Post Hooks

```
const schema = new Schema(..);
schema.pre('save', function(next) {
  // do stuff
  next();
});
```

```
const schema = new Schema(..);
schema.pre('save', function(next) {
  if (foo()) {
    console.log('calling next!');
    // `return next();` will make sure the rest of this function doesn't run
    /*return*/ next();
  }
  // Unless you comment out the `return` above, 'after next' will print
  console.log('after next');
});
```

pre hooks use cases

- complex validation
- removing dependent documents (removing a user removes all their blogposts)
- asynchronous defaults
- asynchronous tasks that a certain action triggers

Post Middle wares

```
schema.post('init', function(doc) {
  console.log('%s has been initialized from the db', doc._id);
});
schema.post('validate', function(doc) {
  console.log('%s has been validated (but not saved yet)',
doc._id);
});
```

Post Middle wares

```
schema.post('save', function(doc) {
  console.log('%s has been saved', doc._id);
});
schema.post('remove', function(doc) {
  console.log('%s has been removed', doc._id);
});
```

Async Post Hooks

```
// Takes 2 parameters: this is an asynchronous post hook
schema.post('save', function(doc, next) {
  setTimeout(function() {
    console.log('post1');
    // Kick off the second post hook
    next();
  }, 10);
});
// Will not execute until the first middleware calls `next()`
schema.post('save', function(doc, next) {
  console.log('post2');
  next();
});
```

Relationships

MONGOOSE

Using References (Normalization)

```
let author = {
 name: "Usman Akram"
}
let course = {
 title: 'Web Technologies',
 author: 'id'
}
```

Using Embedded Documents (Denormalization)

```
let course1 = {
 title: 'Web Technologies',
 author: {
  name: "Usman Akram"
 }
}
```

Trade Off between Query Performance Vs Consistency

NORMALIZATION	DE NORMALIZATION
A change in author would reflect every where	If you need to change the author you will have to modify in multiple records
More Consistent but need extra query to get child records	Not Consistent but More Performance

Hybrid Approach

```
let author = {
name: "Usman Akram"
// 50 More properties
}
```

```
let course = {
 title: 'Web Technologies',
 author: {
  name: "Usman Akram",
  id: 'reference to author'
 }
}
```

// Copy id and some of specific properties. Like facebook top comment should be beside post

Story has One Author And Many Fans. Person has Many Stories

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

const { Schema } = mongoose;

const personSchema = Schema({

  _id: Schema.Types.ObjectId,

  name: String,

  age: Number,

  stories: [{ type: Schema.Types.ObjectId, ref: 'Story' }]

});
```

```
const storySchema = Schema({

  author: { type: Schema.Types.ObjectId, ref: 'Person' },

  title: String,

  fans: [{ type: Schema.Types.ObjectId, ref: 'Person' }]

});

const Story = mongoose.model('Story', storySchema);

const Person = mongoose.model('Person',
personSchema);
```

Find a Story and populate Referenced Author

```
Story.
  findOne({ title: 'Casino Royale' }).
  populate('author')
```

What If There's No Foreign Document?

```
await Person.deleteMany({ name: 'Ian Fleming' });


const story = await Story.findOne({ title: 'Casino Royale'
}).populate('author');

story.author; // `null`
```

Field Selection

```
Story.
  findOne({ title: /casino royale/i }).
  populate('author', 'name'). // only return the Persons name
```

Populate Multiple

```
Story.
  find(...).
  populate('fans').
  populate('author').
```

Conditions on Populattion

```
Story.
  find().
  populate({
    path: 'fans',
    match: { age: { $gte: 21 } },
    // Explicitly exclude `_id`, see http://bit.ly/2aEfTdB
    select: 'name -_id'
  }).
```

Mongoose Instance Methods

We may also define our own custom document instance methods.

```
animalSchema.methods.findSimilarTypes = function(cb) {
  return mongoose.model('Animal').find({ type: this.type }, cb);
};
const Animal = mongoose.model('Animal', animalSchema);
const dog = new Animal({ type: 'dog' });
dog.findSimilarTypes((err, dogs) => {
  console.log(dogs); // woof
});
```

Mongoos model Static Methods

```
animalSchema.statics.findByName = function(name) {
  return this.find({ name: new RegExp(name, 'i') });
};
const Animal = mongoose.model('Animal', animalSchema);
let animals = await Animal.findByName('fido');
animals = animals.concat(await
Animal.findByBreed('Poodle'));
```

Fatty Models
Skinny Controllers

DRY: Do Not repeat yourself

Mongoose Methods

```
var AnimalSchema = new Schema({
    name: String
  , type: String
});
AnimalSchema.methods.findSimilarType = function
findSimilarType (cb) {
  return this.model('Animal').find({ type: this.type }, cb);
};
```

Calling methods

```
var Animal = mongoose.model('Animal', AnimalSchema);
var dog = new Animal({ name: 'Rover', type: 'dog' });

dog.findSimilarType(function (err, dogs) {
  if (err) return ...
  dogs.forEach(..);
})
```

Mongoose static Methods

```
AnimalSchema.statics.search = function search (name, cb) {
  return this.where('name', new RegExp(name, 'i')).exec(cb);
}

Animal.search('Rover', function (err) {
  if (err) ...
})
```