**Exercise 13**

*Create a simple GraphQL server in Node.js using Mongo as a database server*

**Prior Knowledge**

Unix Command Line Shell

Some simple JavaScript (node.js)

**Learning Objectives**

Understand GraphQL

**Software Requirements**

Node.js

npm/yarn

Mongo

Visual Studio Code

Thanks to this guide which this is heavily based on:  
  
<https://freo.me/do-node-graphql>

1. First let’s install MongoDB client tools  
     
   sudo apt install mongodb-clients mongo-tools -y
2. Now let’s run mongodb in a container:  
     
   docker run -p 27017:27017 mongo
3. Check it works:

mongo

﻿MongoDB shell version v3.6.3

connecting to: mongodb://127.0.0.1:27017

MongoDB server version: 3.6.3

Server has startup warnings:

2019-11-27T08:42:30.127+0000 I STORAGE [initandlisten]

2019-11-27T08:42:30.127+0000 I STORAGE [initandlisten] \*\* WARNING: Using the XFS filesystem is strongly recommended with the WiredTiger storage engine

2019-11-27T08:42:30.127+0000 I STORAGE [initandlisten] \*\* See http://dochub.mongodb.org/core/prodnotes-filesystem

2019-11-27T08:42:30.707+0000 I CONTROL [initandlisten]

2019-11-27T08:42:30.707+0000 I CONTROL [initandlisten] \*\* WARNING: Access control is not enabled for the database.

2019-11-27T08:42:30.707+0000 I CONTROL [initandlisten] \*\* Read and write access to data and configuration is unrestricted.

2019-11-27T08:42:30.707+0000 I CONTROL [initandlisten]   
>

1. Type   
   exit   
   to leave the mongo client command prompt.
2. Clone my simple sample repository:

cd ~  
git clone <https://github.com/pzfreo/graphql-example.git>

cd graphql-example

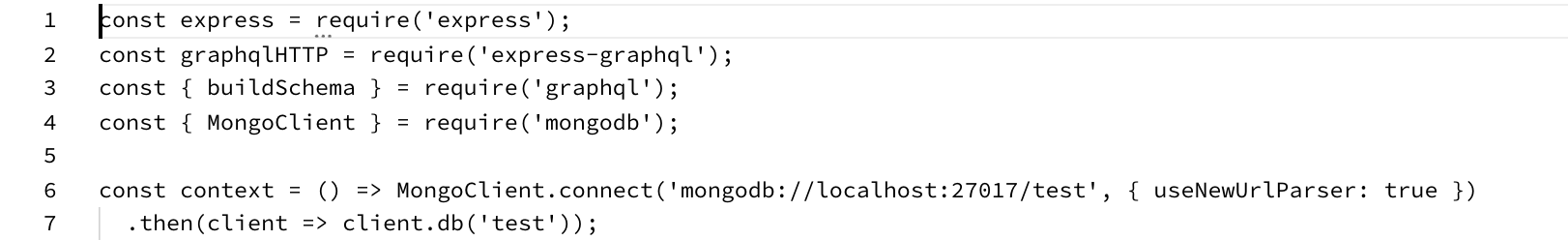
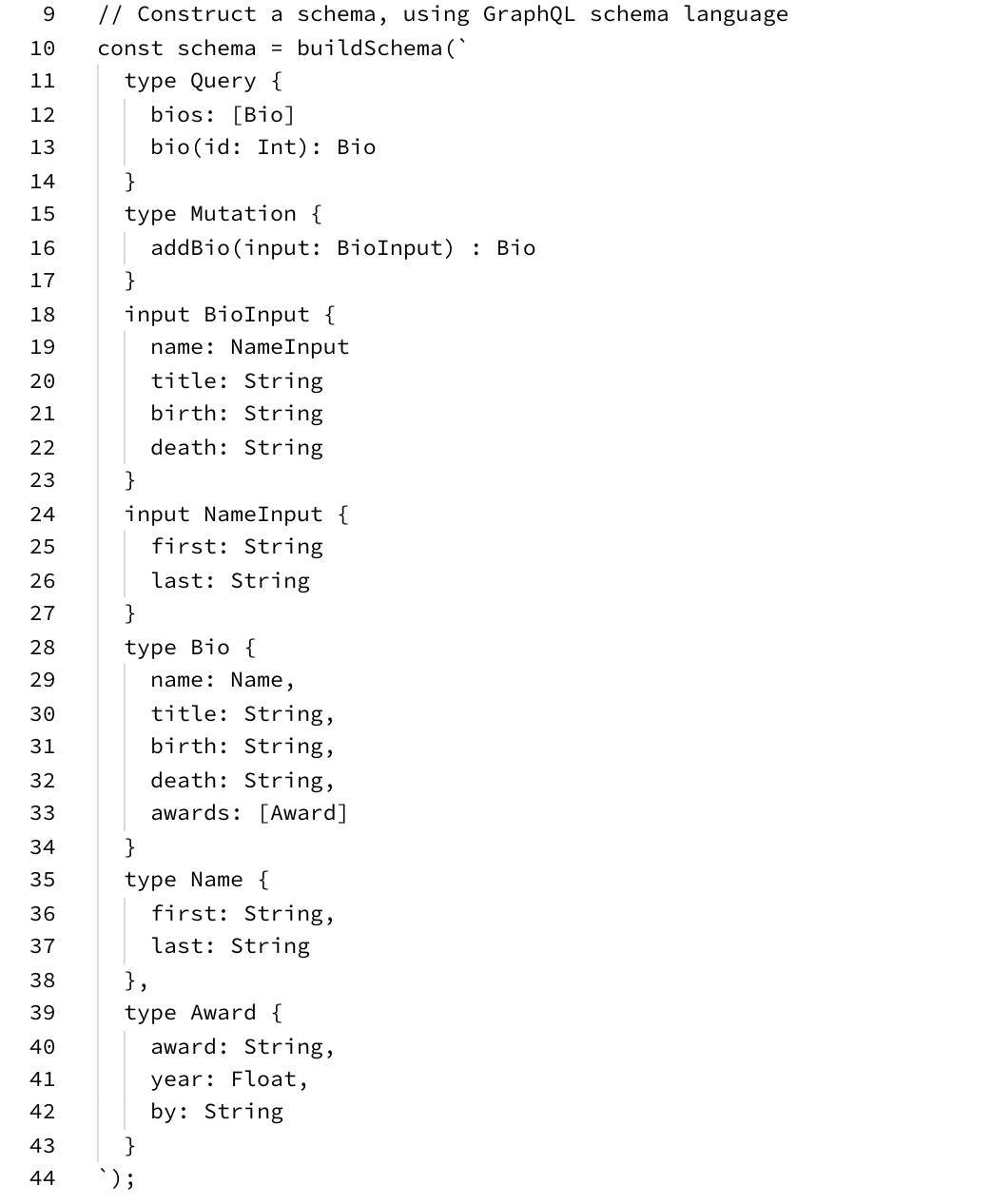
yarn install

1. Import some data into Mongo:  
     
   ﻿mongoimport -d test -c bios bios.json  
     
   This is this data:  
   <https://docs.mongodb.com/manual/reference/bios-example-collection/>

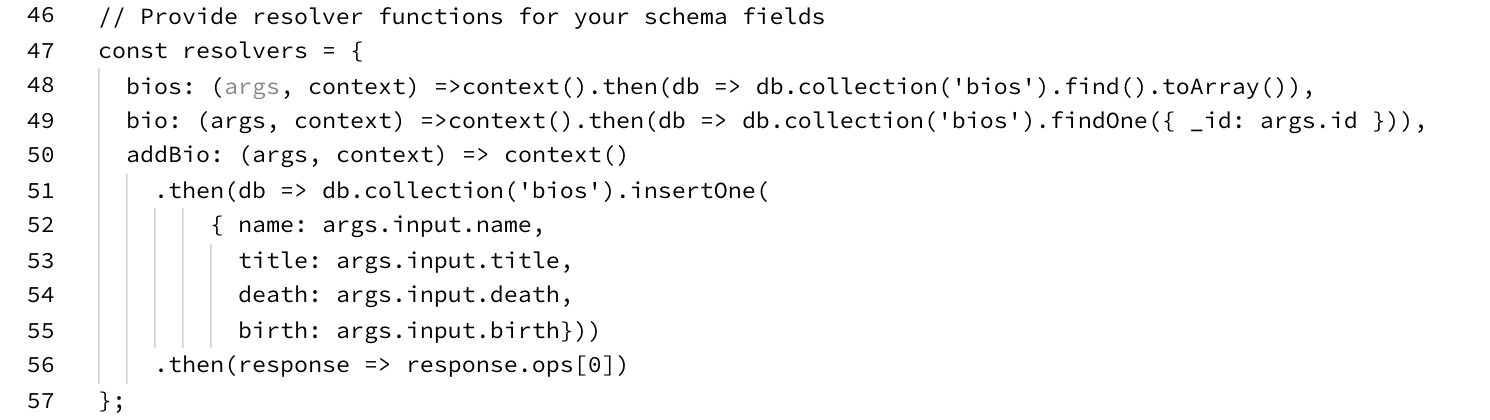
1. Have a look using the mongo client  
     
   mongo  
     
   > use test  
   ﻿switched to db test  
     
   > ﻿db.bios.find({})  
   You should see something like:  
     
   ﻿{ "\_id" : 4, "name" : { "first" : "Kristen", "last" : "Nygaard" }, "birth" : ISODate("1926-08-27T04:00:00Z"), "death" : ISODate("2002-08-10T04:00:00Z"), "contribs" : [ "OOP", "Simula" ], "awards" : [ { "award" : "Rosing Prize", "year" : 1999, "by" : "Norwegian Data Association" }, { "award" : "Turing Award", "year" : 2001, "by" : "ACM" }, { "award" : "IEEE John von Neumann Medal", "year" : 2001, "by" : "IEEE" } ] }
2. Exit the mongo client
3. Please note that we haven’t set up any security for the database. This is not a good thing. Don’t do this in production :-)

1. Take a look at our app:

code index.js

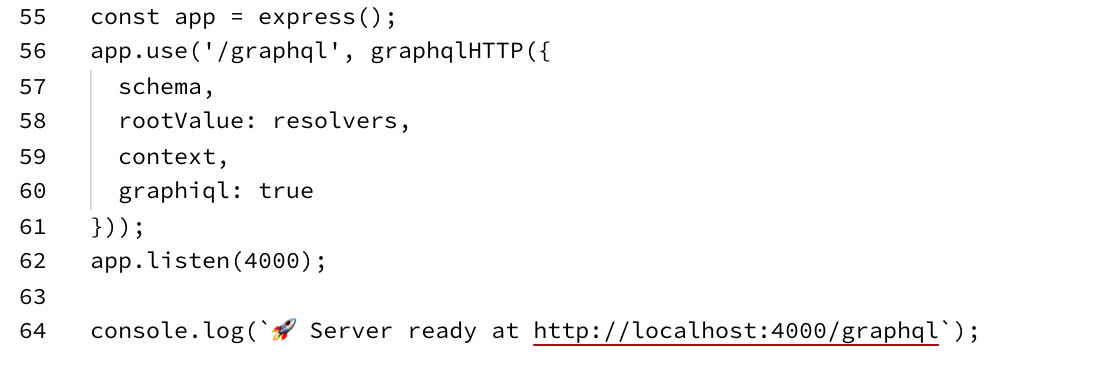
The first part imports and sets up the connection to the Mongo database.  
  
  
  
Next is the definition of the GraphQL schema.  
  


The next interesting part is:



This defines what queries do when called.   
  
For example,

* when you do a GraphQL query “bios”
* this will do a mongodb   
    
  db.collection(‘bios’).find().toArray().

The rest of the file is basically “boilerplate” and would be almost the same in any other example using express-graphql to implement graphql.  
  
  
  
One interesting thing to note is the enabling of *GraphiQL:*

graphiql: true

This is super cool and we’ll see it in a minute.

1. Start the server  
     
   $ node index.js  
   ﻿🚀 Server ready at <http://localhost:4000/graphql>
2. You may see a warning:  
   node:4087) [MONGODB DRIVER] Warning: Current Server Discovery and Monitoring engine is deprecated, and will be removed in a future version. To use the new Server Discover and Monitoring engine, pass option { useUnifiedTopology: true } to the MongoClient constructor.

Ignore this!

1. In a new terminal window try:

﻿http localhost:4000/graphql query='{ bios { name { first }}}'  
  
You should see something like:  
﻿HTTP/1.1 200 OK

Connection: keep-alive

Content-Length: 298

Content-Type: application/json; charset=utf-8

Date: Wed, 27 Nov 2019 08:56:09 GMT

ETag: W/"12a-aMvPeBKQdQnnT/UJvxWxZ4tD9Pc"

X-Powered-By: Express

{

"data": {

"bios": [

{

"name": {

"first": "Kristen"

}

},

{

"name": {

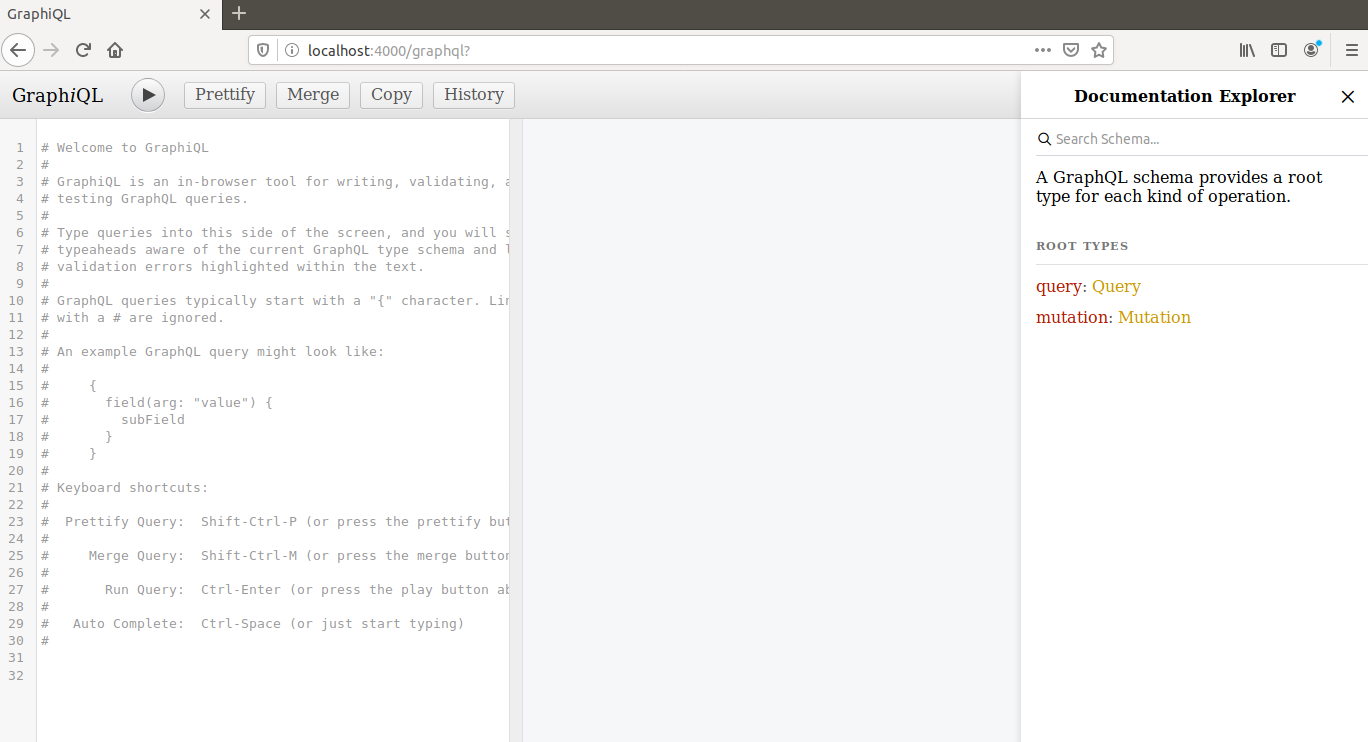
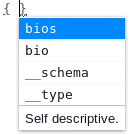
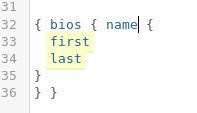
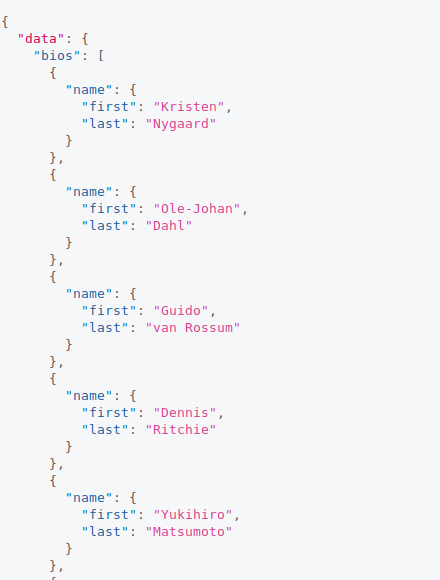
"first": "Ole-Johan"

}

},

…

}

1. Now browse to <http://localhost:4000/graphql>  
   This is the GraphiQL interface (pronounced “graphical”).  
     
   You should see something like:  
   
2. Have a read of the commented out help.
3. Below the comments start typing:   
   { bi  
   You will see the auto-completion kick in:  
     
   
4. Add name to the query:  
   
5. Hit the Play button  or Ctrl-Enter
6. You will see GraphiQL will add first / last into the query to make it into a valid query:  
   
7. You should see the query response like this:  
   
8. ﻿If we look at the schema (in index.js) again, you should see this part:  
   ﻿type Query {

bios: [Bio]

bio(id: Int): Bio

}

And this is the corresponding code:

﻿bios: (args, context) =>context().then(db =>

db.collection('bios').find().toArray()),

bio: (args, context) =>context().then(db =>

db.collection('bios').findOne({ \_id: args.id })),

What this means, is that the “bios” query has no parameters and pulls back all the records from the collection (find()), while the “bio” query has a single parameter (id) and queries the collection to findOne with that id.

1. Try out the find one method:  
     
     
   ﻿{ bio(id:1) {

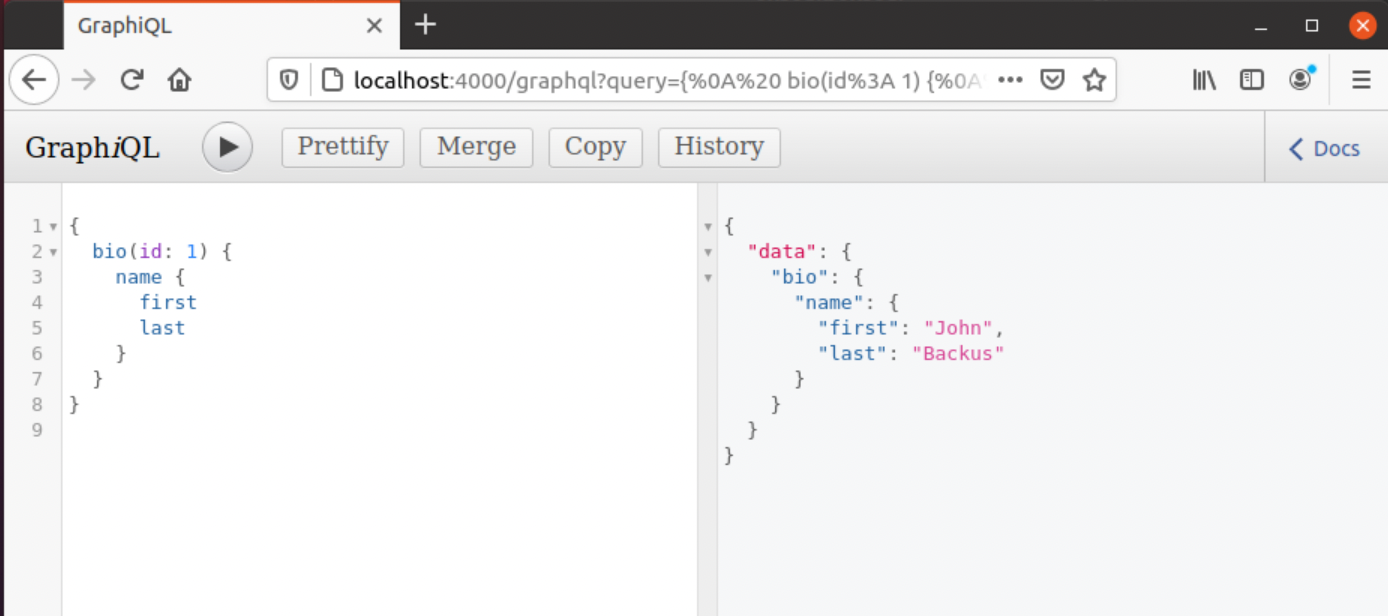
name {

first

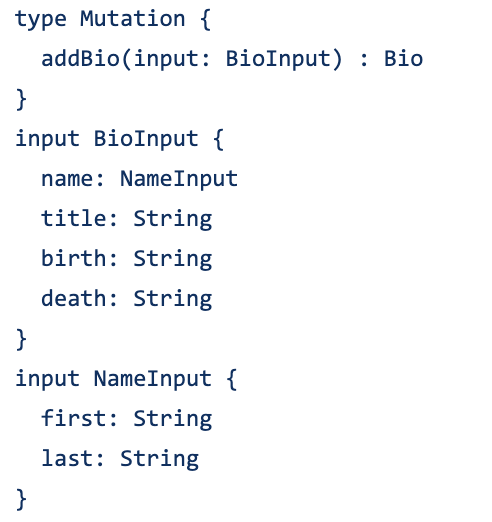
last

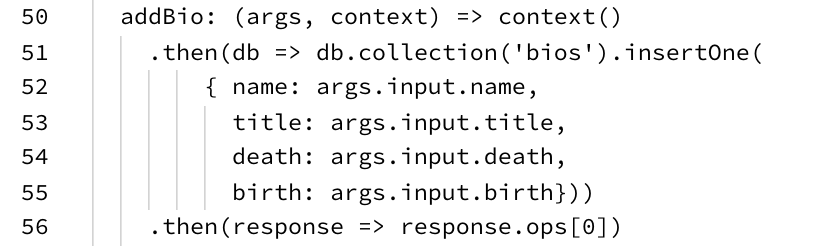
}

}}



1. Updates in GraphQL are called mutations.

Here is the part of the schema that lets us do an update:  


And here is the code that is called when you do a mutation:  


1. Try adding some data into the database:  
     
   mutation {

addBio(input: { name: { first: "John", last: "Smith" } })

{ name { first, last } }

}

1. Rerun the “bios” query and you will now see John Smith in the list
2. Re-run the update and new query from HTTPie (i.e. not using GraphiQL)
3. Is GraphQL “restful”? What reasons do you have for saying yes or no?

That’s all for a basic intro to GraphQL

**Extensions:**

1. Add a query to search by first name and return all the records with that first name.
2. If you have done the API management lab, add your GraphQL API as a managed API  
   (you will need to create the schema as a separate file)  
     
   Hints are here:  
   <https://apim.docs.wso2.com/en/latest/learn/design-api/create-api/create-a-graphql-api/>
3. **(Harder!)**Create an Order service that has a similar schema to our RESTful service but uses GraphQL instead.