Bazy danych – NoSQL MongoDB – zadania

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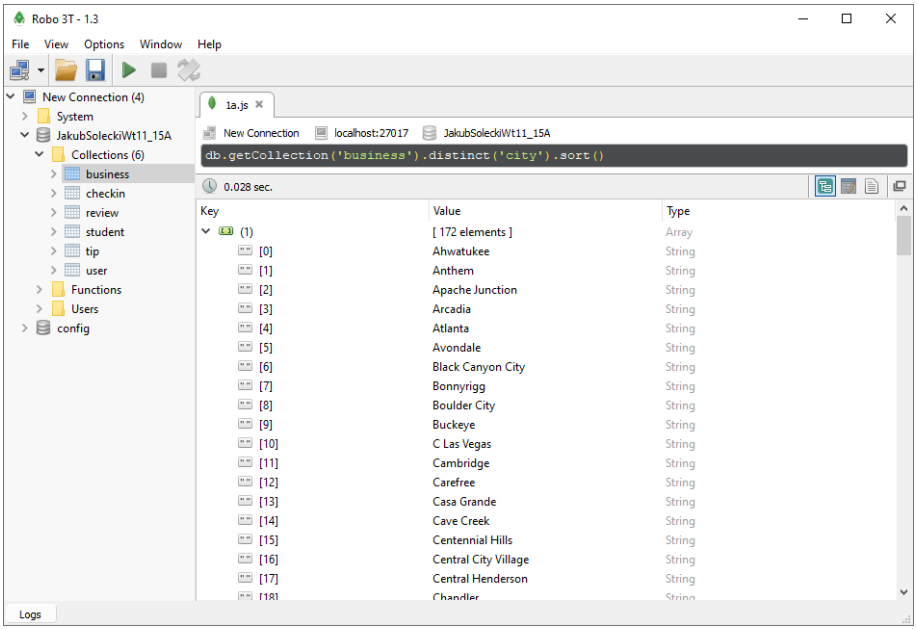
Tydzień A, godz. lab.: 11:15

1. Wykorzystując bazę danych **yelp dataset** wykonaj zapytanie i komendy MongoDB, aby uzyskać następujące rezultaty:

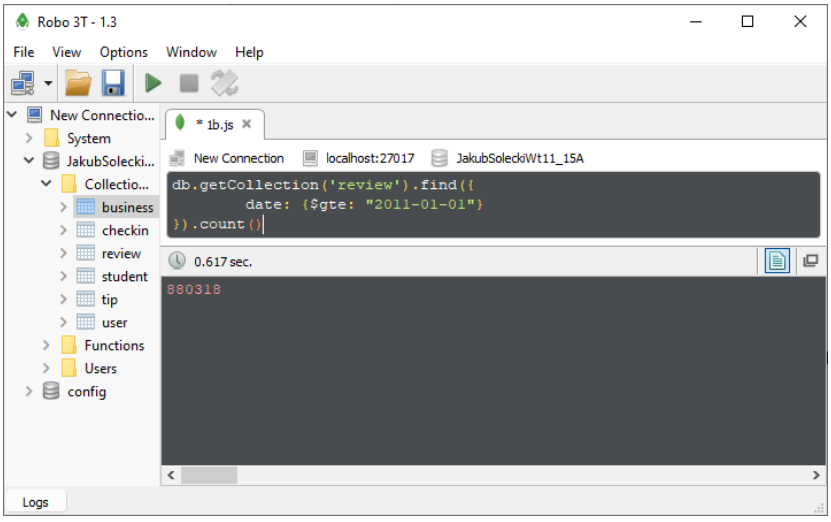
   a. Zwróć bez powtórzeń wszystkie nazwy miast w których znajdują się firmy (business). Wynik posortuj na podstawie nazwy miasta alfabetycznie.

```
db.getCollection('business').distinct('city').sort()
```



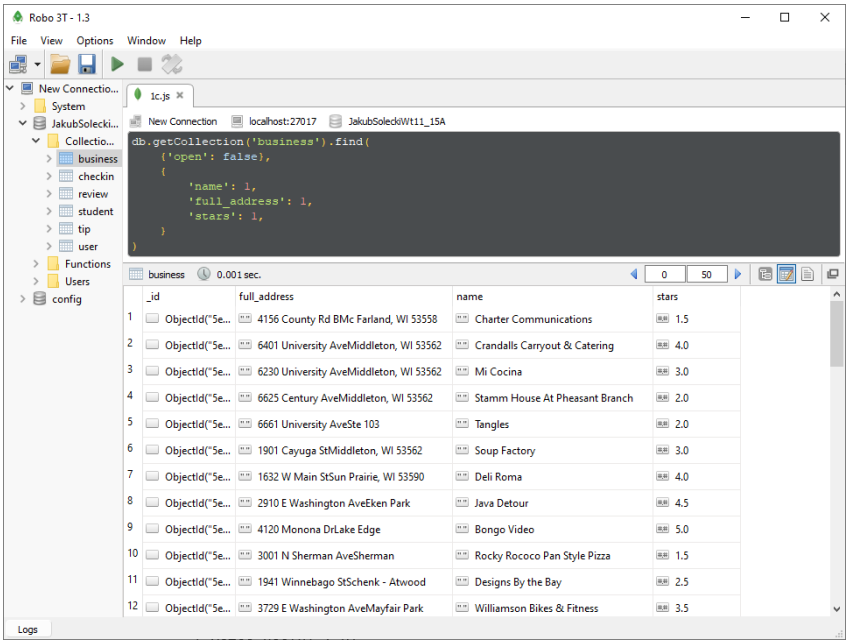
   b. Zwróć liczbę wszystkich recenzji, które pojawiły się po 2011 roku (włącznie).

```
db.getCollection('review').find({
        date: {$gte: "2011-01-01"}
}).count()
```



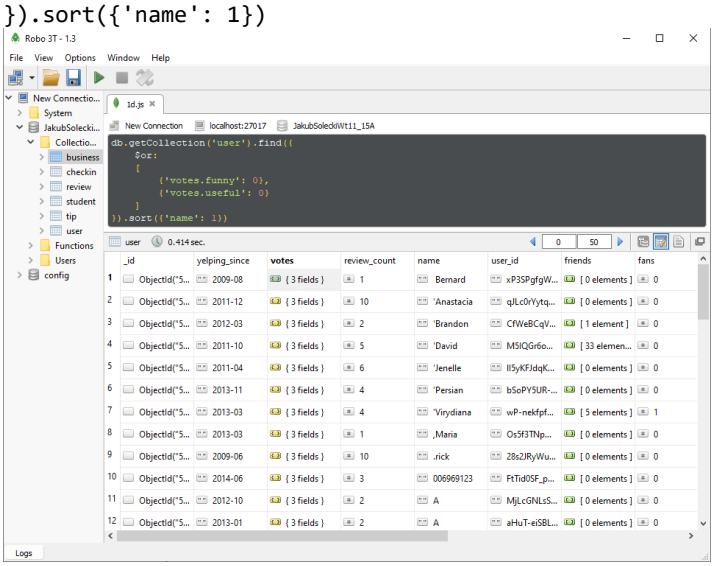
c. Zwróć dane wszystkich zamkniętych (open) firm (business) z pól: nazwa, adres, gwiazdki (stars).

```
db.getCollection('business').find(
    {'open': false},
    {
        'name': 1,
        'full_address': 1,
        'stars': 1,
    }
)
```



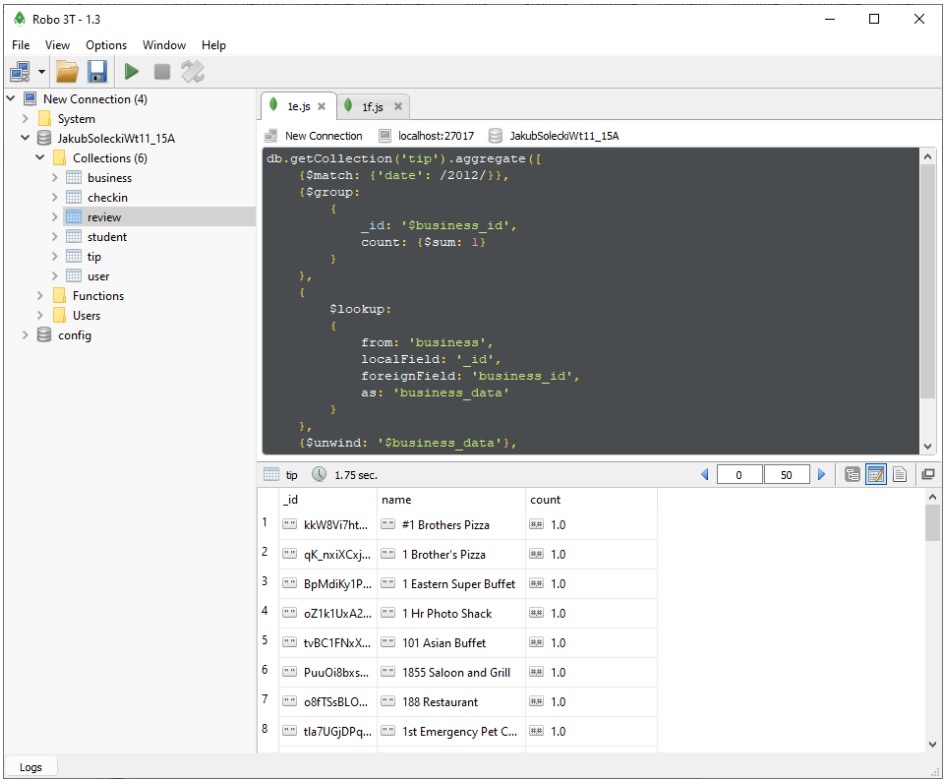
d. Zwróć dane wszystkich użytkowników (user), którzy nie uzyskali ani jednego pozytywnego głosu z kategorii (funny lub useful), wynik posortuj alfabetycznie według imienia użytkownika.

```
db.getCollection('user').find({
    $or: [
        {'votes.funny': 0},
        {'votes.useful': 0}
    ]
}).sort({'name': 1})
```



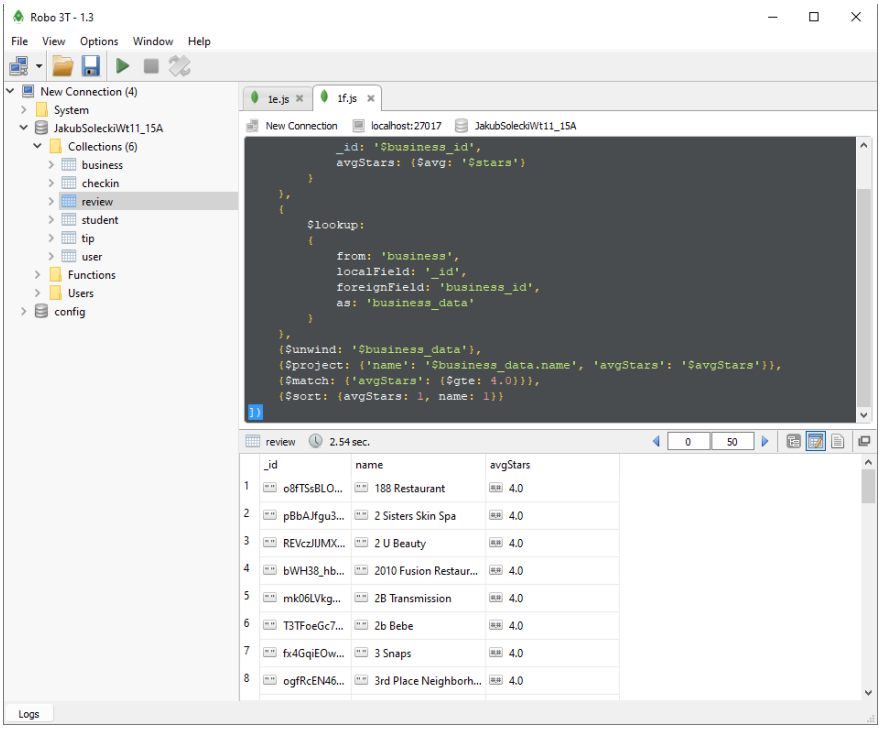
e. Określ, ile każde przedsiębiorstwo otrzymało wskazówek/napiwków (tip) w 2012. Wynik posortuj alfabetycznie według liczby (tip).

```
db.getCollection('tip').aggregate([
    {$match: {'date': /2012/}},
    {$group:
        {
            _id: '$business_id',
            count: {$sum: 1}
        }
    },
    {
        $lookup:
        {
            from: 'business',
            localField: '_id',
            foreignField: 'business_id',
            as: 'business_data'
        }
    },
    {$unwind: '$business_data'},
    {$project: {'name': '$business_data.name', 'count': '$count'}},
    {$sort: {count: 1, name: 1}}
])
```



f. Wyznacz, jaką średnią ocen (stars) uzyskała każda firma (business) na podstawie wszystkich recenzji. Wynik ogranicz do recenzji, które uzyskały min 4.0 gwiazdki.

```
db.getCollection('review').aggregate([
    {$group:
        {
            _id: '$business_id',
            avgStars: {$avg: '$stars'}
        }
    },
    {
        $lookup:
        {
            from: 'business',
            localField: '_id',
            foreignField: 'business_id',
            as: 'business_data'
        }
    },
    {$unwind: '$business_data'},
    {$project: {'name': '$business_data.name', 'avgStars': '$avgStars'}},
    {$match: {'avgStars': {$gte: 4.0}}},
    {$sort: {avgStars: 1, name: 1}}
])
```



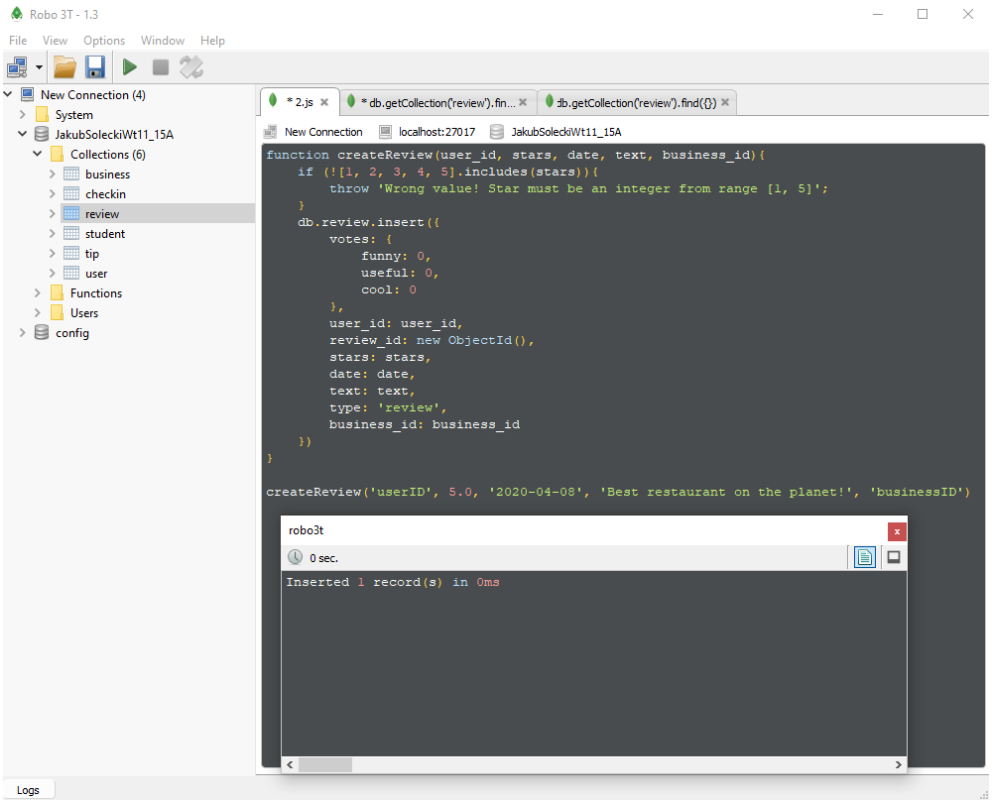
g. Usuń wszystkie firmy (business), które posiadają ocenę (stars) równą 2.0.

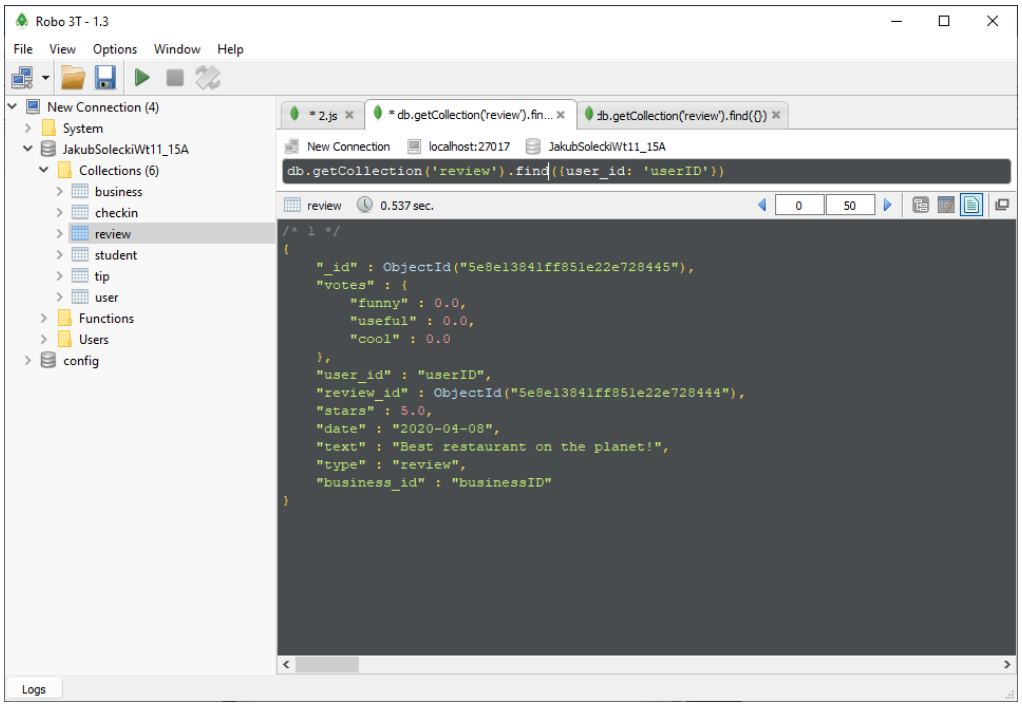
```
db.getCollection('business').deleteMany({'stars': 2.0})
```

2. Zdefiniuj funkcję (MongoDB) umożliwiającą dodanie nowej recenzji (review). Wykonaj przykładowe wywołanie.

```
function createReview(user_id, stars, text, business_id){
    if (![1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5, 5.0].includes(stars)){
        throw 'Wrong value! Star must be from range [1.0, 5.0] and full' +
        'or half value.';
    }
    db.review.insert({
        votes: [
            {funny: 0},
            {useful: 0},
            {cool: 0}
        ],
        user_id: user_id,
        review_id: new ObjectId(),
        stars: stars,
        date: new Date(),
        text: text,
        type: 'review',
        business_id: business_id
    })
}

createReview('userID', 5.0, '2020-04-08', 'Best restaurant on the planet!',
'businessID')
```

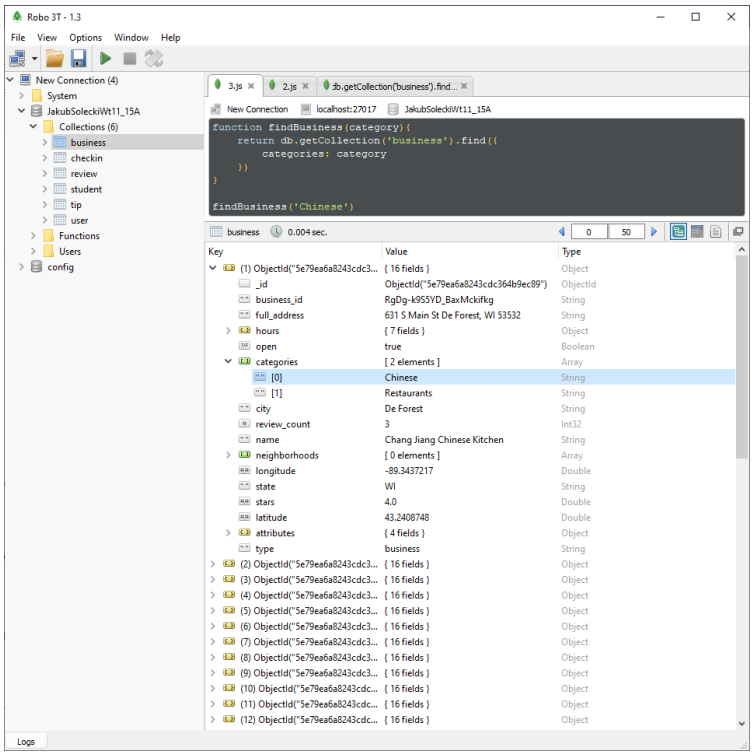




3. Zdefiniuj funkcję (MongoDB), która zwróci wszystkie biznesy (business), w których w kategorii znajduje się podana przez użytkownika cechę. Wartość kategorii należy przekazać do funkcji jako parametr. Wykonaj przykładowe wywołanie zdefiniowanej funkcji.

```
function findBusiness(category){
    return db.getCollection('business').find({
        categories: category
    })
}

findBusiness('Chinese')
```

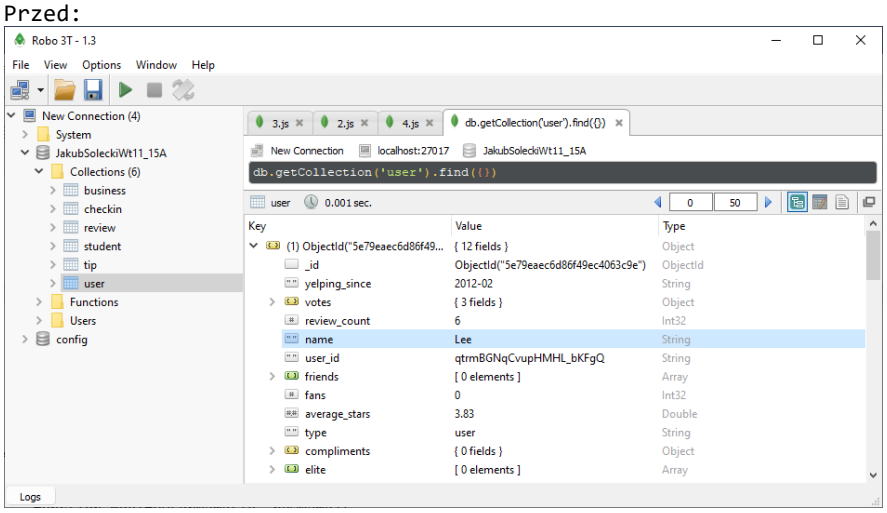


4. Zdefiniuj funkcję (MongoDB), która umożliwi modyfikację nazwy użytkownika (user) na podstawie podanego id. Id oraz nazwa mają być przekazywane jako parametry.

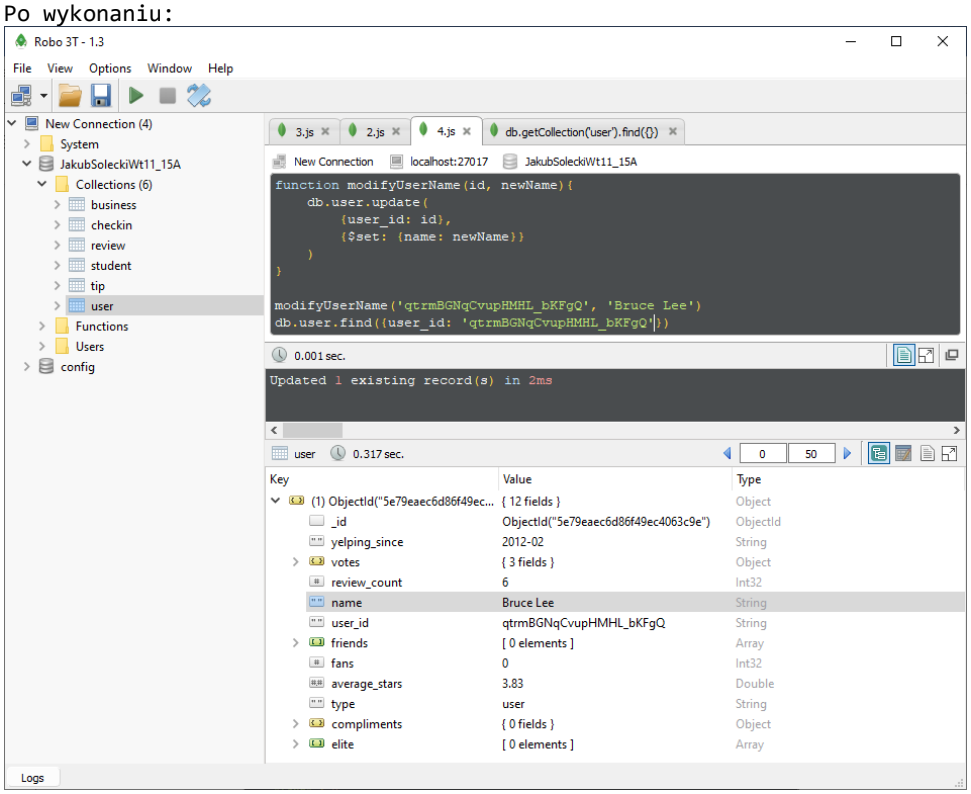
```
function modifyUserName(id, newName){
    db.user.update(
        {user_id: id},
        {$set: {name: newName}}
    )
}

modifyUserName('qtrmBGNqCvupHMHL_bKFgQ', 'Bruce Lee')
```

Przed:



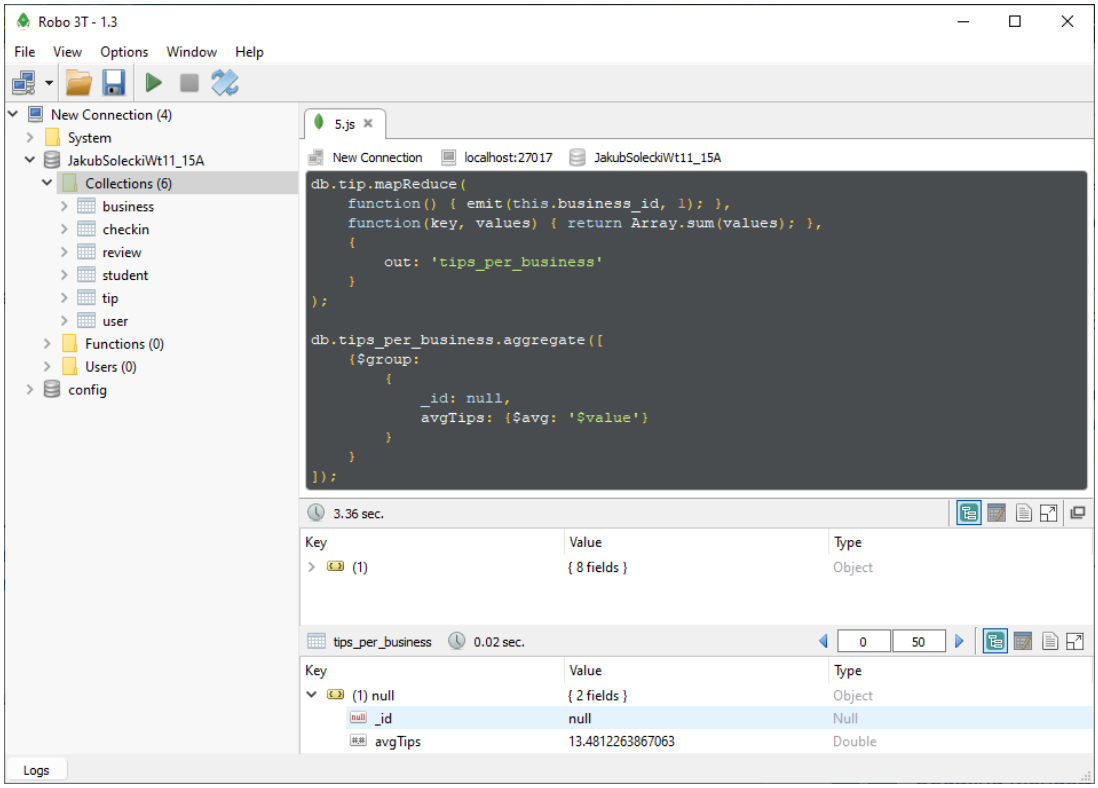
Po wykonaniu:



5. Zwróć średnią ilość wszystkich wskazówek/napiwków dla każdego z biznesów, wykorzystaj map reduce.

```
db.tip.mapReduce(
    function() { emit(this.business_id, 1); },
    function(key, values) { return Array.sum(values); },
    {
        out: 'tips_per_business'
    }
);

db.tips_per_business.aggregate([
    {$group:
        {
            _id: null,
            avgTips: {$avg: '$value'}
        }
    }
]);
```



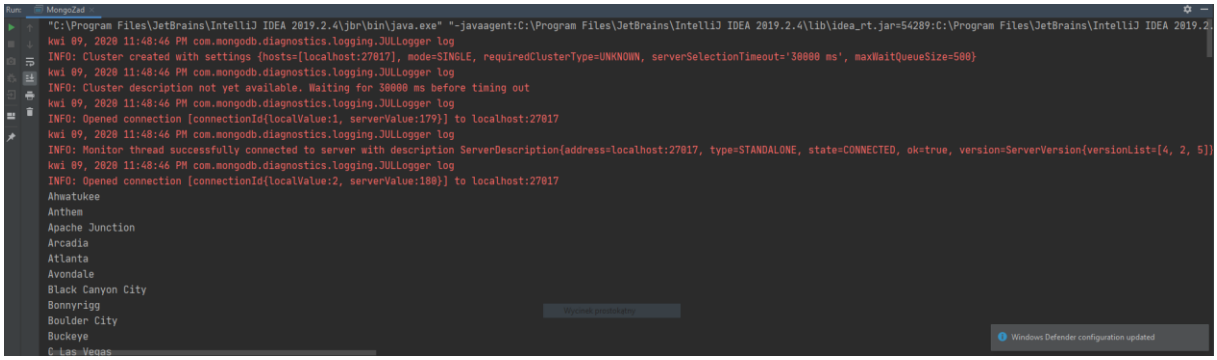
6. Odwzoruj wszystkie zadania z punktu 1 w języku programowania (np. JAVA) z pomocą API do MongoDB. Wykorzystaj dla każdego zadania odrębną metodę.

```
public class MongoZad {
    private MongoClient mongoClient;
    private MongoDatabase db;

    public MongoZad() throws UnknownHostException {
        mongoClient = new MongoClient("localhost" , 27017);
        db = mongoClient.getDatabase("JakubSoleckiWt11_15A");
    }

    private void zad_6_1_a() {
        List<String> res = db.getCollection("business").distinct("city",
String.class).into(new ArrayList<>());
        Collections.sort(res);
```

```
        for(String s: res)
            System.out.println(s);
    }
```




```
    private void zad_6_1_b() {
        MongoCollection<Document> review = db.getCollection("review");
        System.out.println(review.countDocuments(Filters.gte("date", "2011-01-01")));
    }
```

```
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```
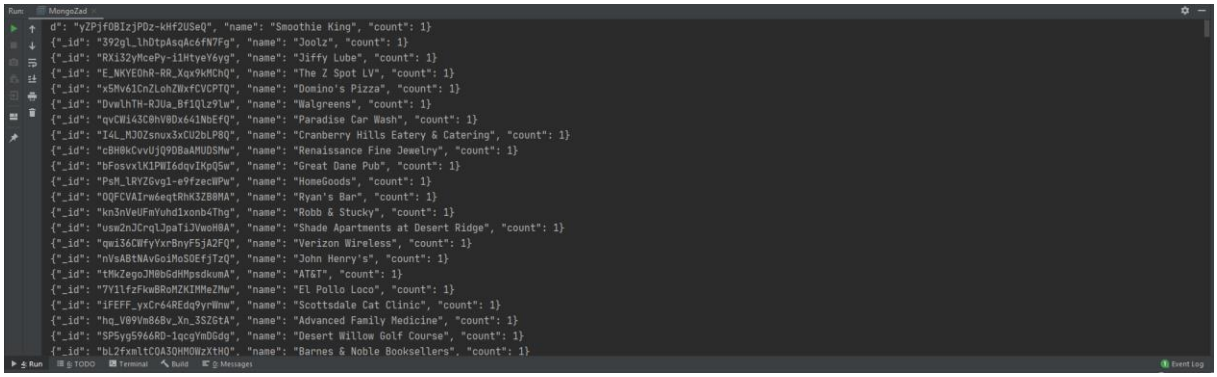
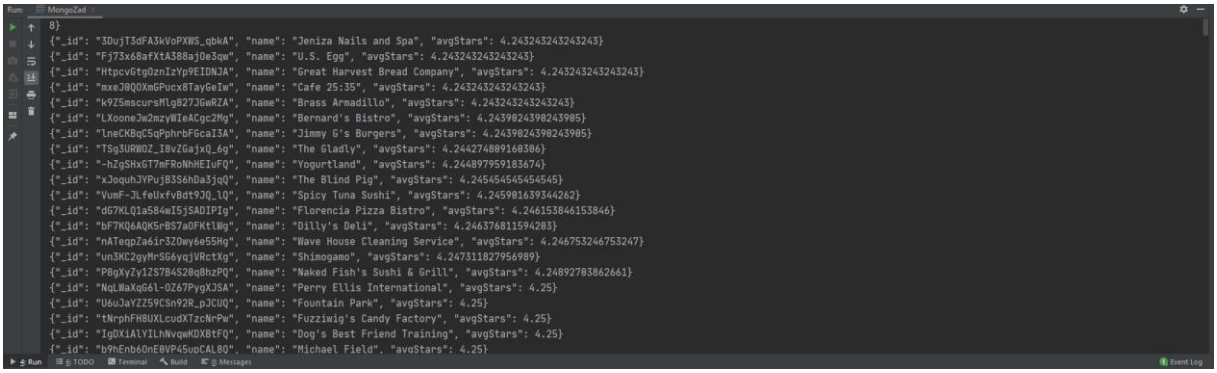

```
    private void zad_6_1_c() {
        List<Document> res = db.getCollection("business")
                .find(new Document("open", false))
                .projection(
                        new Document("name", 1)
                        .append("full_address", 1)
                        .append("stars", 1)
                ).into(new ArrayList<Document>());

        for(Document doc: res)
            System.out.println(doc.toJson());
    }
```


```
    private void zad_6_1_d() {
        MongoCollection<Document> user = db.getCollection("user");

        DBObject clause1 = new BasicDBObject("votes.funny", 0);
        DBObject clause2 = new BasicDBObject("votes.useful", 0);
        BasicDBList or = new BasicDBList();
        or.add(clause1);
        or.add(clause2);
        BasicDBObject query = new BasicDBObject("$or", or);

        FindIterable<Document> res = user.find(query).sort(new Document("name", -1));
        for(Document doc: res)
            System.out.println(doc.toJson());
    }
```


```
private void zad_6_1_e() {
    MongoCollection<Document> tip = db.getCollection("tip");

    AggregateIterable<Document> agg = tip.aggregate(Arrays.asList(
            Aggregates.match(Filters.regex("date", "2012")),
            Aggregates.group("$business_id", sum("count", 1)),
            Aggregates.lookup("business", "_id", "business_id", "business_data"),
            Aggregates.unwind("$business_data"),
            Aggregates.project(
                    new Document("name", "$business_data.name")
                    .append("count", "$count")
            ),
            Aggregates.sort(Sorts.ascending("count"))
    ));

    for(Document doc: agg)
        System.out.println(doc.toJson());
}
```




```
private void zad_6_1_f() {
    MongoCollection<Document> tip = db.getCollection("review");

    AggregateIterable<Document> agg = tip.aggregate(Arrays.asList(
            Aggregates.group("$business_id", avg("avgStars", "$stars")),
            Aggregates.lookup("business", "_id", "business_id", "business_data"),
            Aggregates.unwind("$business_data"),
            Aggregates.project(
                    new Document("name", "$business_data.name")
                            .append("avgStars", "$avgStars")
            ),
            Aggregates.match(Filters.gte("avgStars", 4.0)),
            Aggregates.sort(Sorts.ascending("avgStars"))
    ));

    for(Document doc: agg)
        System.out.println(doc.toJson());
}
```

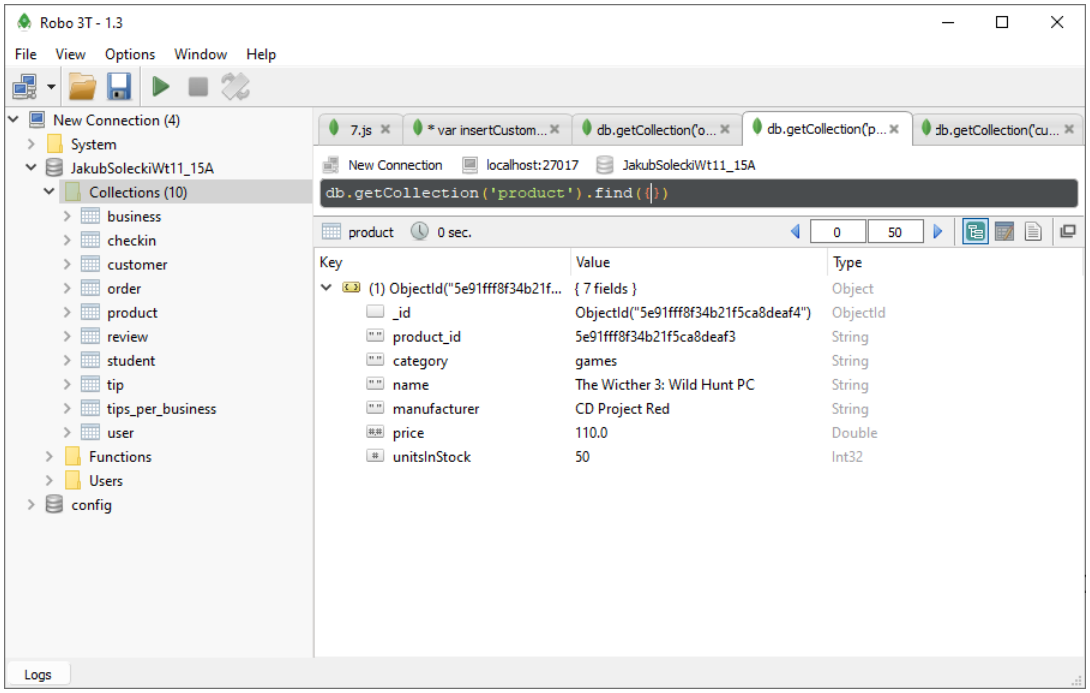



```
    private void zad_6_1_g() {
        db.getCollection("business").deleteMany(Filters.eq("stars", 2));
    }

    public static void main(String[] args) throws UnknownHostException {
        MongoZad mongoZad = new MongoZad();
        mongoZad.zad_6_1_a();
        mongoZad.zad_6_1_b();
        mongoZad.zad_6_1_c();
        mongoZad.zad_6_1_d();
        mongoZad.zad_6_1_e();
        mongoZad.zad_6_1_f();
        mongoZad.zad_6_1_g();

    }

}
```

7. Zaproponuj bazę danych składającą się z 3 kolekcji pozwalającą przechowywać dane dotyczące: klientów, zakupu oraz przedmiotu zakupu. W bazie wykorzystaj: pola proste, złożone i tablice. Zaprezentuj strukturę dokumentów w formie JSON dla przykładowych danych. Uzasadnij swoją propozycję

```
// product
db.createCollection("product", {
   validator: {
      $jsonSchema: {
         bsonType: "object",
         required: [ "name", "product_id", "category", "manufacturer", "price",
"unitsInStock" ],
         properties: {
            name: {
               bsonType: "string",
               description: "Must be a string and is required"
            },
            product_id: {
               bsonType: "string",
               description: "Must be a string and is required"
            },
            category: {
               bsonType: "string",
               description: "Must be a string and is required"
            },
            manufacturer: {
               bsonType: "string",
               description: "Must be a string and is required"
            },
            price: {
               bsonType: "double",
               description: "Must be a double and is required"
```

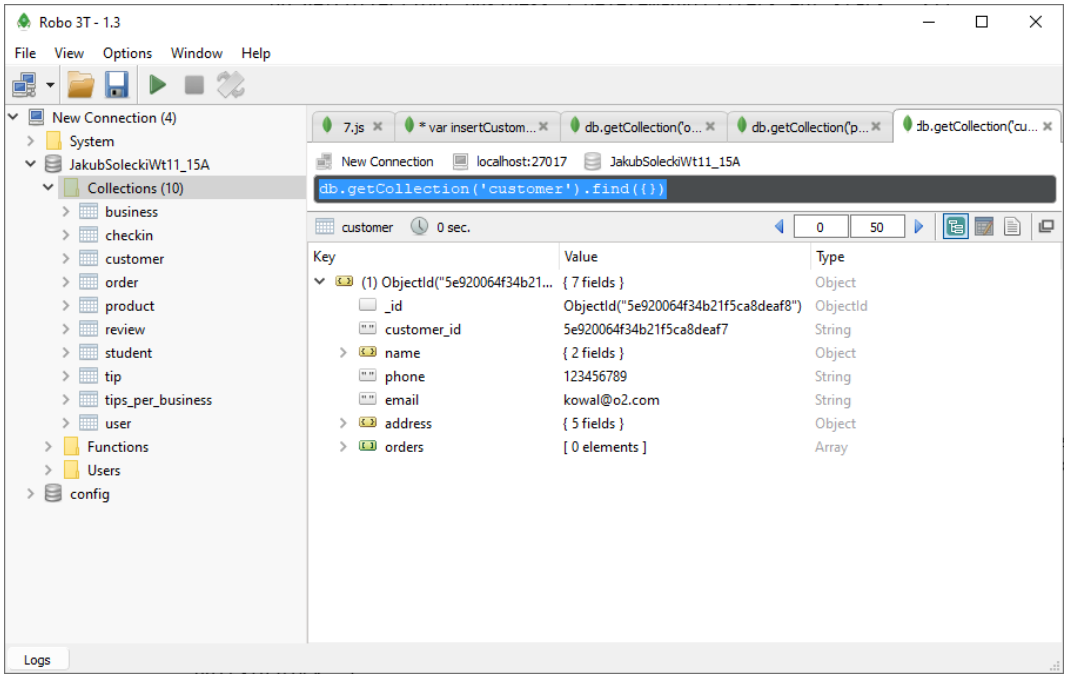
```
            },
            unitsInStock: {
               bsonType: "int",
               description: "Must be a int and is required"
            }
         }
      }
   }
})

var insertProduct = function(name, category, manufacturer, price, unitsInStock) {
    prodID = new ObjectId().valueOf()
    db.product.insert({
        product_id: prodID,
        category: category,
        name: name,
        manufacturer: manufacturer,
        price: price,
        unitsInStock: NumberInt(unitsInStock)
    })
}

insertProduct("The Wicther 3: Wild Hunt PC", "games", "CD Project Red", 110.0, 50)
```




```
// customer
db.createCollection("customer", {
   validator: {
      $jsonSchema: {
         bsonType: "object",
         required: [ "customer_id", "name", "phone", "email", "address", "orders" ],
         properties: {
            customer_id: {
                bsonType: "string",
                description: "Must be a string and is required"
            },
            name: {
               bsonType: "object",
               required: [ "firstname", "lastname" ],
               properties: {
                    firstname: {
                        bsonType: "string",
```

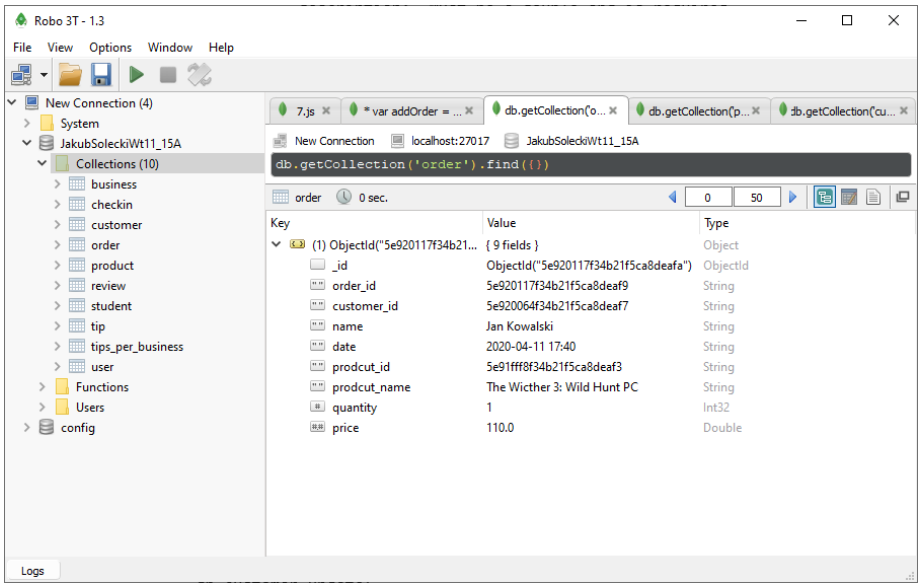
```
                        description: "Must be a string and is required"
                    },
                    lastname: {
                        bsonType: "string",
                        description: "Must be a string and is required"
                    }
                }
            },
            phone: {
               bsonType: "string",
               description: "Must be a string and is required"
            },
            email: {
               bsonType: "string",
               description: "Must be a string and is required"
            },
            address: {
               bsonType: [ "object" ],
               required: [ "country", "city", "postalCode", "street", "buildingNumber"
],
               properties: {
                    country: {
                        bsonType: "string",
                        description: "Must be a string and is required"
                    },
                    city: {
                        bsonType: "string",
                        description: "Must be a string and is required"
                    },
                    postalCode: {
                        bsonType: "string",
                        description: "Must be a string and is required"
                    },
                    street: {
                        bsonType: "string",
                        description: "Must be a string and is required"
                    },
                    buildingNumber: {
                        bsonType: "string",
                        description: "Must be a string and is required"
                    },
               }
            },
           orders: {
                bsonType: "array",
                description: "Must be an arry and is required (can be empty)"
           }
         }
      }
   }
})

var insertCustomer = function
(firstname, lastname, phone, email, country, city, postalCode, street, buildingNumber) {
    custID = new ObjectId().valueOf()
    db.customer.insert({
        customer_id: custID,
        name:
        {
            firstname: firstname,
            lastname: lastname
        },
        phone: phone,
        email: email,
        address:
        {
```

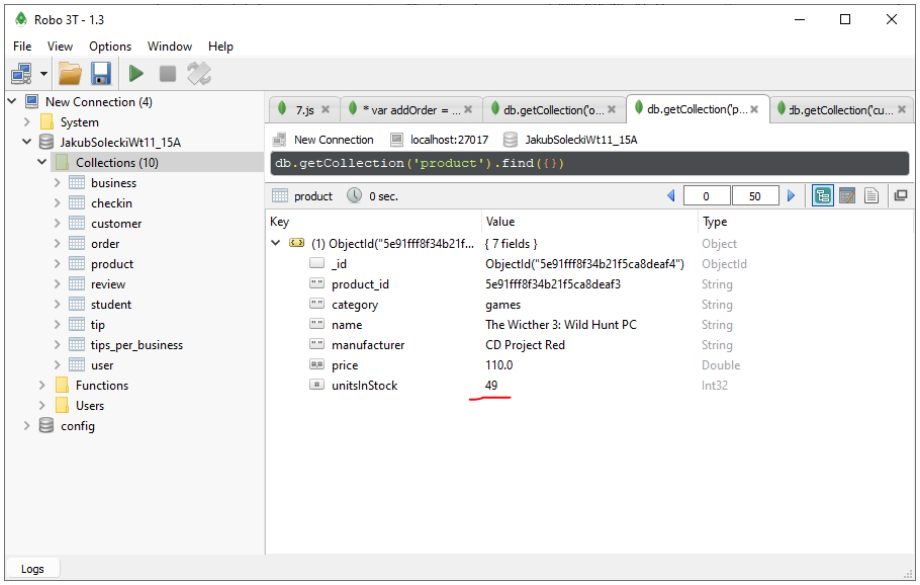
```
            country: country,
            city: city,
            postalCode: postalCode,
            street: street,
            buildingNumber: buildingNumber
        },
        orders: []
    })
}

insertCustomer('Jan', 'Kowalski', '123456789', 'kowal@o2.com', 'Polska', 'Sosnowiec',
'21-370', 'Długa', '5A')
```

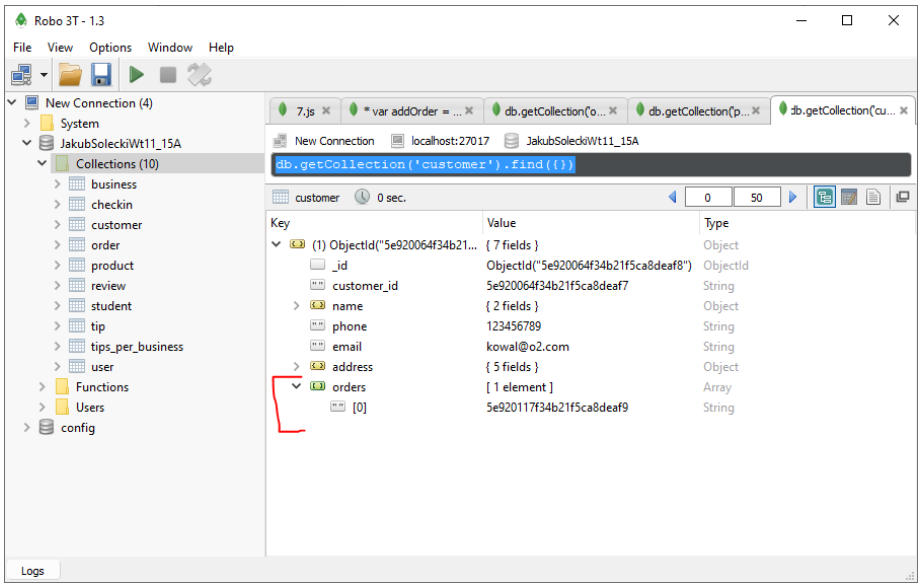



```
// order
db.createCollection("order", {
   validator: {
      $jsonSchema: {
         bsonType: "object",
         required: [ "order_id", "customer_id", "name", "date", "prodcut_id",
"prodcut_name",
          "quantity", "price" ],
         properties: {
            order_id: {
               bsonType: "string",
               description: "Must be a string and is required"
            },
            customer_id: {
               bsonType: "string",
               description: "Must be a string and is required"
            },
            name: {
               bsonType: "string",
               description: "Must be a string and is required"
            },
            date: {
               bsonType: [ "string" ],
               description: "Must be a string and is required"
            },
            prodcut_id: {
               bsonType: "string",
```

```
               description: "Must be a string and is required"
            },
            prodcut_name: {
               bsonType: "string",
               description: "Must be a string and is required"
            },
            quantity: {
               bsonType: "int",
               description: "Must be a int and is required"
            },
            price: {
               bsonType: "double",
               description: "Must be a double and is required"
            }
         }
      }
   }
})

var addOrder = function(productID, customerID, quantity) {
    crs = db.product.find({product_id: productID})
    prod = crs.next()
    if(quantity > prod.unitsInStock)
        throw "Not enough units in stock"

    crs2 = db.customer.find({customer_id: customerID})
    cust = crs2.next()

    ordID = new ObjectId().valueOf()

    db.order.insert({
        order_id: ordID,
        customer_id: customerID,
        name: cust.name.firstname + ' ' + cust.name.lastname,
        date: new Date().toISOString().slice(0, 16).replace('T', ' '),
        prodcut_id: productID,
        prodcut_name: prod.name,
        quantity: NumberInt(quantity),
        price: quantity * prod.price
    })

    db.customer.update(
        {customer_id: customerID},
        {$addToSet: {orders: ordID}}
    )

    db.product.update(
        {product_id: productID},
        {$inc: {unitsInStock: NumberInt(-quantity)}}
    )
}

addOrder('5e91f5d1f34b21f5ca8deac1', '5e91f78ef34b21f5ca8dead1', 1)
```


Robo 3T - 1.3
File View Options Window Help
New Connection (4)
System
JakubSoleckiWt11_15A
Collections (10)
business
checkin
customer
order
product
review
student
tip
tips_per_business
user
Functions
Users
config
7.js
* var addOrder = ...
db.getCollection('o...
db.getCollection('p...
db.getCollection('cu...
New Connection
localhost:27017
JakubSoleckiWt11_15A
db.getCollection('order').find({})
order
0 sec.
0
50
Key
Value
Type
(1) ObjectId("5e920117f34b21...
{ 9 fields }
Object
_id
ObjectId("5e920117f34b21f5ca8deafa")
ObjectId
order_id
5e920117f34b21f5ca8deaf9
String
customer_id
5e920064f34b21f5ca8deaf7
String
name
Jan Kowalski
String
date
2020-04-11 17:40
String
prodcut_id
5e91fff8f34b21f5ca8deaf3
String
prodcut_name
The Wicther 3: Wild Hunt PC
String
quantity
1
Int32
price
110.0
Double
Logs


Robo 3T - 1.3
File View Options Window Help
New Connection (4)
System
JakubSoleckiWt11_15A
Collections (10)
business
checkin
customer
order
product
review
student
tip
tips_per_business
user
Functions
Users
config
7.js
* var addOrder = ...
db.getCollection('o...
db.getCollection('p...
db.getCollection('cu...
New Connection
localhost:27017
JakubSoleckiWt11_15A
db.getCollection('product').find({})
product
0 sec.
0
50
Key
Value
Type
(1) ObjectId("5e91fff8f34b21f...
{ 7 fields }
Object
_id
ObjectId("5e91fff8f34b21f5ca8deaf4")
ObjectId
product_id
5e91fff8f34b21f5ca8deaf3
String
category
games
String
name
The Wicther 3: Wild Hunt PC
String
manufacturer
CD Project Red
String
price
110.0
Double
unitsInStock
49
Int32
Logs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db.getCollection('o...
db.getCollection('p...
db.getCollection('cu...
New Connection
localhost:27017
JakubSoleckiWt11_15A
db.getCollection('customer').find({})
customer
0 sec.
0
50
Key
Value
Type
(1) ObjectId("5e920064f34b21...
{ 7 fields }
Object
_id
ObjectId("5e920064f34b21f5ca8deaf8")
ObjectId
customer_id
5e920064f34b21f5ca8deaf7
String
name
{ 2 fields }
Object
phone
123456789
String
email
kowal@o2.com
String
address
{ 5 fields }
Object
orders
[1 element]
Array
[0]
5e920117f34b21f5ca8deaf9
String
Logs

Zdecydowałem się na powyższy schemat, ponieważ wydaje mi się on odpowiedni do wymagań postawionych w treści zadania. 3 stworzone kolekcje znajdują się w tej samej bazie co yelp z zajęć, jednak zasada działania pozostaje niezmienna. Kolekcja *product* przechowuje informacje o produktach, *customer* o kupujących a *order* o ich zamówieniach. W moim zamyśle klienci istnieją niezależnie od produktów i na odwrót. Kiedy klient składa zamówienie tworzy nowy dokument w kolekcji *order*, zawierający informacje o zakupie konkretnej pozycji spośród istniejących produktów. Jednocześnie aktualizowane są odpowiednie pola w dokumencie produktu oraz klienta: zmniejsza się liczba dostępnych produktów (o liczbę wykupionych sztuk) a w dokumencie klienta id produktu zostaje dodane do tablicy z dokonanymi zamówieniami (*orders*). Uważam takie rozwiązanie za czytelne i pozwalające szybko orientować się w historii zamówień, jednak bez zbędnego przeładowywania dokumentów danymi.