

ФЕДЕРАЛЬНОЕ ГОСУДАРСТВЕННОЕ АВТОНОМНОЕ ОБРАЗОВАТЕЛЬНОЕ УЧРЕЖДЕНИЕ ВЫСШЕГО
ОБРАЗОВАНИЯ

САНКТ-ПЕТЕРБУРГСКИЙ НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ УНИВЕРСИТЕТ
ИНФОРМАЦИОННЫХ ТЕХНОЛОГИЙ, МЕХАНИКИ И ОПТИКИ

Факультет «Инфокоммуникационных технологий»

Направление подготовки «09.03.03 Мобильные и сетевые технологии»

О Т Ч Е Т

ЛАБОРАТОРНАЯ РАБОТА №6

Тема задания: ЗНАКОМСТВО С MONGO DB

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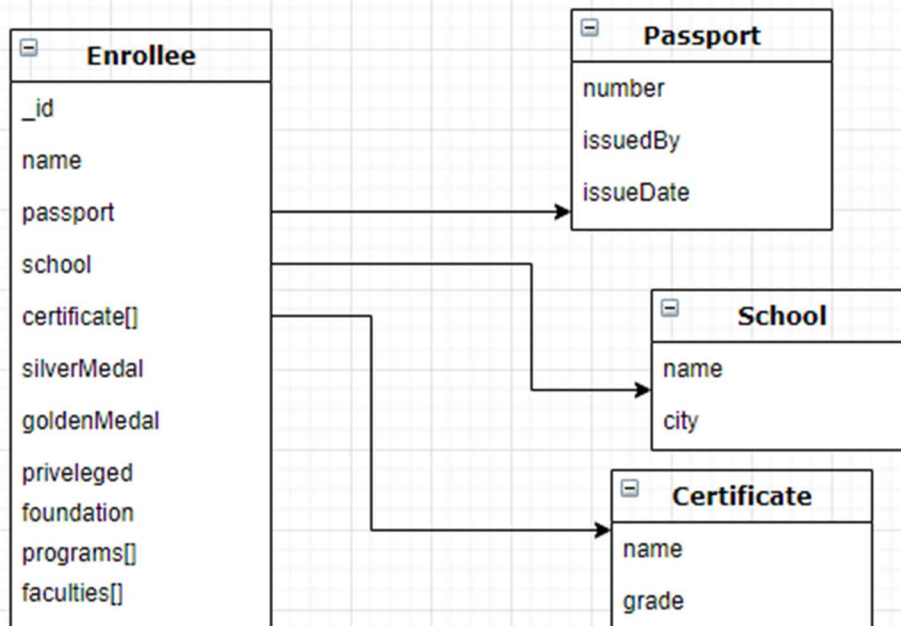
2020

Цель: овладеть практическими навыками и умениями реализации баз данных в MongoDB.

Программное обеспечение: MongoDB server.

Отчет:

1) Модель данных была обновлена. Данные развернуты внутри одной коллекции «Enrollee»



2) Заполним таблицу тестовыми данными

```
db.enrollee.insert({
  name: "Mr. Nekto",
  passport: {
    number: "4728572336",
    issueDate: "2016-02-02",
    issuedBy: "Some OUFMS"
  },
  school: {
    name: "School #777",
    city: "Moscow"
  },
  certificate: {
    math: "5",
    english: "5",
    history: "5"
  },
  silverMedal: "false",
```

```
goldenMedal: "true",
priveleged: "false",
foundation: "commercial",
programs: ["Political science"],
faculties: ["Faculty of law"]
})
```

```
db.enrollee.insert({
  name: "Navalny Alexey",
  passport: {
    number: "1114232556",
    issueDate: "2016-02-02",
    issuedBy: "Some OUFMS"
  },
  school: {
    name: "School #777",
    city: "Moscow"
  },
  certificate: {
    math: "5",
    english: "5",
    history: "5"
  },
  silverMedal: "false",
  goldenMedal: "true",
  priveleged: "false",
  foundation: "commercial",
  programs: ["Political science"],
  faculties: ["Faculty of law"]
})
```

```
db.enrollee.insert({
  name: "Putin Vladimir",
  passport: {
    number: "1114232556",
    issueDate: "2016-02-02",
    issuedBy: "Some OUFMS"
  },
  school: {
    name: "School #77",
    city: "Leningrad"
  },
  certificate: {
    math: "2",
    english: "2",
    history: "2"
  }
})
```

```
},
silverMedal: "false",
goldenMedal: "true",
priveleged: "true",
foundation: "budget",
programs: ["Corruption"],
faculties: ["Faculty of corruption"]
})
```

```
db.enrollee.insert({
  name: "Lord Handsome",
  passport: {
    number: "1114232446",
    issueDate: "2017-02-02",
    issuedBy: "Some OUFMS"
  },
  school: {
    name: "School #77",
    city: "Moscow"
  },
  certificate: {
    math: "5",
    english: "5",
    history: "4"
  },
  silverMedal: "false",
  goldenMedal: "true",
  priveleged: "true",
  foundation: "budget",
  programs: ["Math"],
  faculties: ["Faculty of math"]
})
```

```
db.enrollee.insert({
  name: "Lorem Ipsum",
  passport: {
    number: "1214232446",
    issueDate: "2018-02-02"
    issuedBy: "Some OUFMS"
  },
  school: {
    name: "School #45",
    city: "Grozny"
  },
  certificate: {
    math: "4",
```

```

english: "5"
},
silverMedal: "false",
goldenMedal: "true",
priveleged: "false",
foundation: "budget",
programs: ["Computer Science", "Math"],
faculties: ["Faculty of informatics", "Faculty of math"]
}

```

3) Выполним запросы к полученной базе данных

1. Имя абитуриента и его паспортные данные

```
db.enrollee.find({}, {name: 1, passport: 1}).sort({"passport.number":-1})
```

```

{ "_id" : ObjectId("5ee771713879085da8ee72bc"), "name" : "Mr. Nekto", "passport" : { "number" : "4728572336", "issueDate" : "2016-02-02", "issuedBy" : "Some OUFMS" } }
{ "_id" : ObjectId("5ee76dd33879085da8ee72bb"), "name" : "Navalny Alexey", "passport" : { "number" : "1214574444", "issueDate" : "2016-02-02", "issuedBy" : "Some OUFMS" } }
{ "_id" : ObjectId("5ee76ab33879085da8ee72b9"), "name" : "Lord Handsome", "passport" : { "number" : "1114232446", "issueDate" : "2017-02-02", "issuedBy" : "Some OUFMS" } }
{ "_id" : ObjectId("5ee76cb33879085da8ee72ba"), "name" : "Putin Vladimir", "passport" : { "number" : "1114232556", "issueDate" : "2016-02-02", "issuedBy" : "Some OUFMS" } }
{ "_id" : ObjectId("5ee76dd33879085da8ee72bb"), "name" : "Navalny Alexey", "passport" : { "number" : "1214574444", "issueDate" : "2016-02-02", "issuedBy" : "Some OUFMS" } }
{ "_id" : ObjectId("5ee771713879085da8ee72bc"), "name" : "Mr. Nekto", "passport" : { "number" : "4728572336", "issueDate" : "2016-02-02", "issuedBy" : "Some OUFMS" } }

```

2. Имена паспортные данные всех абитуриентов кроме абитуриента с именем "Putin Vladimir"

```
db.enrollee.find({name:{$ne:"Putin Vladimir"}}, {name: 1, passport: 1})
```

```

{ "_id" : ObjectId("5ee76ab33879085da8ee72b8"), "name" : "Lorem Ipsum", "passport" : { "number" : "1214232446", "issueDate" : "2018-02-02", "issuedBy" : "Some OUFMS" } }
{ "_id" : ObjectId("5ee76b803879085da8ee72b9"), "name" : "Lord Handsome", "passport" : { "number" : "1114232446", "issueDate" : "2017-02-02", "issuedBy" : "Some OUFMS" } }
{ "_id" : ObjectId("5ee76cb33879085da8ee72ba"), "name" : "Navalny Alexey", "passport" : { "number" : "1214574444", "issueDate" : "2016-02-02", "issuedBy" : "Some OUFMS" } }
{ "_id" : ObjectId("5ee771713879085da8ee72bc"), "name" : "Mr. Nekto", "passport" : { "number" : "4728572336", "issueDate" : "2016-02-02", "issuedBy" : "Some OUFMS" } }

```

3. Имя абитуриента и информация о его школе.

```
db.enrollee.find({}, {name: 1, school: 1})
```

```

{ "_id" : ObjectId("5ee76ab33879085da8ee72b8"), "name" : "Lorem Ipsum", "school" : { "name" : "School #45", "city" : "Grozny" } }
{ "_id" : ObjectId("5ee76b803879085da8ee72b9"), "name" : "Lord Handsome", "school" : { "name" : "School #77", "city" : "Moscow" } }
{ "_id" : ObjectId("5ee76cb33879085da8ee72ba"), "name" : "Putin Vladimir", "school" : { "name" : "School #77", "city" : "Leningrad" } }
{ "_id" : ObjectId("5ee76dd33879085da8ee72bb"), "name" : "Navalny Alexey", "school" : { "name" : "School #777", "city" : "Moscow" } }
{ "_id" : ObjectId("5ee771713879085da8ee72bc"), "name" : "Mr. Nekto", "school" : { "name" : "School #777", "city" : "Moscow" } }

```

4

4. Таблица выпускников каждой школы

```
db.enrollee.aggregate([{$group:{_id:{name:"$school.name", city:"$school.city"}, graduates:{$push:"$name"}}}])
```

```

{ "_id" : { "name" : "School #45", "city" : "Grozny" }, "graduates" : [ "Lorem Ipsum" ] }
{ "_id" : { "name" : "School #777", "city" : "Moscow" }, "graduates" : [ "Navalny Alexey", "Mr. Nekto" ] }
{ "_id" : { "name" : "School #77", "city" : "Leningrad" }, "graduates" : [ "Putin Vladimir" ] }
{ "_id" : { "name" : "School #777", "city" : "Moscow" }, "graduates" : [ "Lord Handsome" ] }

```

5. Количество поданных заявлений на каждый факультет

```
db.enrollee.aggregate([{$unwind:"$faculties", {$group:{_id:"$faculties", count:{$sum:1}}}]])
```

```

{ "_id" : "Faculty of corruption", "count" : 1 }
{ "_id" : "Faculty of informatics", "count" : 1 }
{ "_id" : "Faculty of law", "count" : 2 }
{ "_id" : "Faculty of math", "count" : 2 }

```

6. MapReduce

Конкатенация оценок каждой школы в одну строку

```
> db.enrollee.mapReduce(map_function, reduce_function, {out:"MapReduceRes"})
{
  "result" : "MapReduceRes",
  "timeMillis" : 120,
  "counts" : {
    "input" : 5,
    "emit" : 5,
    "reduce" : 2,
    "output" : 3
  },
  "ok" : 1
}
> db.MapReduceRes.find({})
{ "_id" : "School #45", "value" : "4" }
{ "_id" : "School #77", "value" : "52" }
{ "_id" : "School #777", "value" : "55" }
```

Вывод: в результате выполнения лабораторной работы были изучены принципы проектирования нереляционных (NoSQL) баз данных.