

**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**

**Вариант 12**

**Выполнил:**

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**Проверил:**

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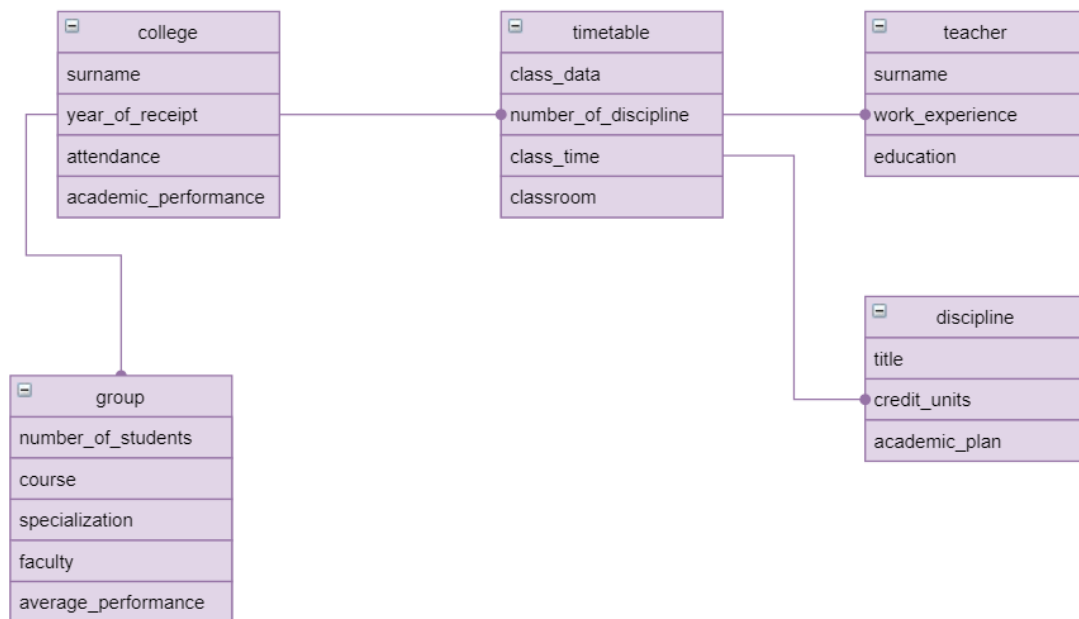
**2020**

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

### Описание варианта:

Создать программную систему, предназначенную для учебной части колледжа.

### Схема модели данных:



### Логи процесса реализации модели:

```
> load("C:/mongodb/college.json")
true
```

#### College.json

```
db.college.insertMany([
{
  "surname": "Ivanov",
  "year_of_receipt":1998,
  "attendance":65,
  "academic_performance":78,
  "timetable":
  {
    "class_data": new Date("2020-12-15"),
    "number_of_discipline": 3,
    "class_time": new Date("2000-01-01T07:00:00Z"),
    "classroom": 134,
    "teacher":
    {
```

```

        "surname": "Ivanova",
        "work_experience": "3 years",
        "education": "MGU"
    },
    "discipline":
    {
        "title": "math",
        "credit_units": 8,
        "academic_plan": "09.06.90"
    },
},
"group":
{
    "number_of_students": 30,
    "course": 3,
    "specialization": "bio",
    "faculty": "ICT",
    "average_performance": 65,
},
},

{
    "surname": "Berg",
    "year_of_receipt": 1999,
    "attendance": 70,
    "academic_performance": 90,
    "timetable":
    {
        "class_data": new Date("2020-08-26"),
        "number_of_discipline": 2,
        "class_time": new Date("2000-01-01T07:30:00Z"),
        "classroom": 255,
        "teacher":
        {
            "surname": "Filipov",
            "work_experience": "15 years",
            "education": "KrasGU"
        },
        "discipline":
        {
            "title": "db",
            "credit_units": 6,
            "academic_plan": "09.06.80"
        },
    },
},
"group":
{
    "number_of_students": 15,
    "course": 3,
    "specialization": "proga",

```

```

        "faculty": "ICT",
        "average_performance": 50,
    },
},

{
    "surname": "Kravets",
    "year_of_receipt": 2005,
    "attendance": 98,
    "academic_performance": 64,
    "timetable":
    {
        "class_data": new Date("2020-07-14"),
        "number_of_discipline": 2,
        "class_time": new Date("2000-01-01T06:00:00Z"),
        "classroom": 300,
        "teacher":
        {
            "surname": "Utkina",
            "work_experience": "7 years",
            "education": "MPHTY"
        },
        "discipline":
        {
            "title": "vizualization",
            "credit_units": 4,
            "academic_plan": "09.06.80"
        },
    },
},
"group":
{
    "number_of_students": 25,
    "course": 4,
    "specialization": "pharmacy",
    "faculty": "THR",
    "average_performance": 57,
},
},

{
    "surname": "Hitman",
    "year_of_receipt": 2004,
    "attendance": 87,
    "academic_performance": 75,
    "timetable":
    {
        "class_data": new Date("2020-09-10"),
        "number_of_discipline": 4,
        "class_time": new Date("2000-01-01T07:30:00Z"),
        "classroom": 120,
    },
},

```

```

    "teacher":
    {
        "surname": "Lapina",
        "work_experience": "5 months",
        "education": "Gertsena"
    },
    "discipline":
    {
        "title": "proga",
        "credit_units": 6,
        "academic_plan": "09.06.60"
    },
},
"group":
{
    "number_of_students": 14,
    "course": 1,
    "specialization": "sport",
    "faculty": "UFC",
    "average_performance": 75,
},
},
{
    "surname": "Tess",
    "year_of_receipt": 2010,
    "attendance": 45,
    "academic_performance": 30,
    "timetable":
    {
        "class_data": new Date("2020-12-17"),
        "number_of_discipline": 1,
        "class_time": new Date("2000-01-01T08:30:00Z"),
        "classroom": 456,
        "teacher":
        {
            "surname": "Larin",
            "work_experience": "1 month",
            "education": "ITMO"
        },
        "discipline":
        {
            "title": "russian",
            "credit_units": 3,
            "academic_plan": "09.06.80"
        },
    },
},
"group":
{
    "number_of_students": 19,

```

```

        "course":2,
        "specialization":"art",
        "faculty":"OKL",
        "average_performance":75,
    },
},
    })

```

## Список запросов:

1. Выбор всех значений из таблицы студенты и сортировка по успеваемости

```

> db.college.find(null, {_id:0, group:0, timetable:0}).sort({academic_performance:1});
{ "surname" : "Tess", "year_of_receipt" : 2010, "attendance" : 45, "academic_performance" : 30 }
{ "surname" : "Kravets", "year_of_receipt" : 2005, "attendance" : 98, "academic_performance" : 64 }
{ "surname" : "Hitman", "year_of_receipt" : 2004, "attendance" : 87, "academic_performance" : 75 }
{ "surname" : "Ivanov", "year_of_receipt" : 1998, "attendance" : 65, "academic_performance" : 78 }
{ "surname" : "Berg", "year_of_receipt" : 1999, "attendance" : 70, "academic_performance" : 90 }

```

2. Выбор всех значений из таблицы группы и сортировка по специализации

```

> db.college.find(null, {group:1, _id:0}).sort({"group.specialization":1});
{ "group" : { "number_of_students" : 19, "course" : 2, "specialization" : "art", "faculty" : "OKL", "average_performance" : 75 } }
{ "group" : { "number_of_students" : 30, "course" : 3, "specialization" : "bio", "faculty" : "ICT", "average_performance" : 65 } }
{ "group" : { "number_of_students" : 25, "course" : 4, "specialization" : "pharmacy", "faculty" : "THR", "average_performance" : 57 } }
{ "group" : { "number_of_students" : 15, "course" : 3, "specialization" : "proga", "faculty" : "ICT", "average_performance" : 50 } }
{ "group" : { "number_of_students" : 14, "course" : 1, "specialization" : "sport", "faculty" : "UFC", "average_performance" : 75 } }

```

3. Выбрать все фамилии студентов, у которых успеваемость больше 50 и год поступления до 2000

```

> db.college.find(
... {$or : [{academic_performance:{>50}}, {year_of_receipt: {<2000}}]},
... {surname:1, _id:0}
... );
{ "surname" : "Ivanov" }
{ "surname" : "Berg" }
{ "surname" : "Kravets" }
{ "surname" : "Hitman" }

```

4. Вывести объединение строк таблицы студенты, в которых выполняется какое-либо из условий: фамилия студента Иванов, год выпуска студента больше 2000

```

> db.college.find(
... {$or : [{surname:"Ivanov"}, {year_of_receipt: {>2000}}]},
... {surname:1, year_of_receipt:1, _id:0}
... );
{ "surname" : "Ivanov", "year_of_receipt" : 1998 }
{ "surname" : "Kravets", "year_of_receipt" : 2005 }
{ "surname" : "Hitman", "year_of_receipt" : 2004 }
{ "surname" : "Tess", "year_of_receipt" : 2010 }

```

5. Вывести даты занятий и кто их ведет

```

> db.college.find( null,
... {"timetable.class_data":1, "timetable.teacher.surname":1, _id:0}
... );
{ "timetable" : { "class_data" : ISODate("2020-12-15T00:00:00Z"), "teacher" : { "surname" : "Ivanova" } } }
{ "timetable" : { "class_data" : ISODate("2020-08-26T00:00:00Z"), "teacher" : { "surname" : "Filipov" } } }
{ "timetable" : { "class_data" : ISODate("2020-07-14T00:00:00Z"), "teacher" : { "surname" : "Utkina" } } }
{ "timetable" : { "class_data" : ISODate("2020-09-10T00:00:00Z"), "teacher" : { "surname" : "Lapina" } } }
{ "timetable" : { "class_data" : ISODate("2020-12-17T00:00:00Z"), "teacher" : { "surname" : "Larin" } } }

```

6. Выбрать все из таблицы расписания, где у групп средняя успеваемость больше 70

```
> db.college.find(
... {"group.average_performance": {$gt : 70}},
... {"timetable:1, _id:0}
... );
{ "timetable" : { "class_data" : ISODate("2020-09-10T00:00:00Z"), "number_of_discipline" : 4, "class_time" : ISODate("2000-01-01T07:30:00Z"), "classroom" : 120, "teacher" : { "surname" : "Lapina", "work_experience" : "5 months", "education" : "Gertsena" }, "discipline" : { "title" : "proga", "credit_units" : 6, "academic_plan" : "09.06.60" } } }
{ "timetable" : { "class_data" : ISODate("2020-12-17T00:00:00Z"), "number_of_discipline" : 1, "class_time" : ISODate("2000-01-01T08:30:00Z"), "classroom" : 456, "teacher" : { "surname" : "Larin", "work_experience" : "1 month", "education" : "ITMO" }, "discipline" : { "title" : "russian", "credit_units" : 3, "academic_plan" : "09.06.80" } } }
```

7. Выбрать те пары, которые начинаются позже 7, но раньше 12

```
> db.college.find(
... { "timetable.class_time": { $gt: ISODate("2000-01-01T07:00:00Z"), $lt: ISODate("2000-01-01T12:00:00Z") }
... },
... {"timetable.discipline.title":1, _id:0}
... );
{ "timetable" : { "discipline" : { "title" : "db" } } }
{ "timetable" : { "discipline" : { "title" : "proga" } } }
{ "timetable" : { "discipline" : { "title" : "russian" } } }
```

8. Выбрать фамилию преподавателя, у которого опыт работы не 1 месяц и образование в мгу или итмо

```
> db.college.find(
... {$and: [
... {"timetable.teacher.work_experience": { $ne : "1 month" } },
... {$or: [ {"timetable.teacher.education" : "MGU"}, {"timetable.teacher.education" : "ITMO"} ]}
... ]},
... {"timetable.teacher.surname":1, _id:0}
... );
{ "timetable" : { "teacher" : { "surname" : "Ivanova" } } }
```