

**МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ  
НАЦІОНАЛЬНОМУ УНІВЕРСИТЕТУ “ЛЬВІВСЬКА ПОЛІТЕХНІКА”**

## **Лабораторна робота №14**

з дисципліни  
«Організація баз даних та знань»

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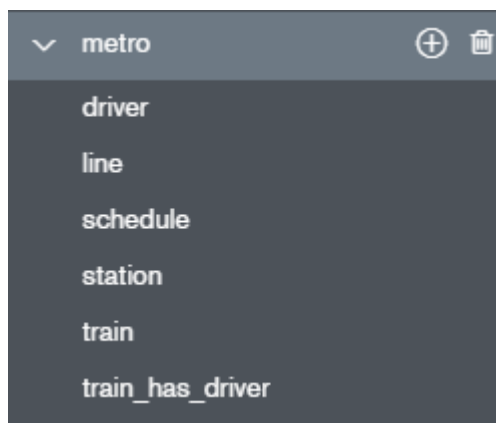
## Мета роботи

Здобуття практичних навичок створення та обробки бази даних типу nosql на прикладі СУБД mongodb.

## Хід роботи

1. Створимо схеми предметної області «Київський метрополітен»

```
> use metro
switched to db metro
> db.createCollection("train")
{ "ok" : 1 }
> db.createCollection("driver")
{ "ok" : 1 }
> db.createCollection("train_has_driver")
{ "ok" : 1 }
> db.createCollection("line")
{ "ok" : 1 }
> db.createCollection("station")
{ "ok" : 1 }
> db.createCollection("schedule")
{ "ok" : 1 }
>
```



2. Заповнимо дані колекції, перетворивши сутності бази даних MySQL у структури MongoDB

Для Train:

```
> db.train.insertMany([
... {
...   "capacity": 2200,
...   "num_of_cars": 9,
...   "passangers": 900
... },
... {
...   "capacity": 2500,
...   "num_of_cars": 10,
...   "passangers": 1000
... },
... {
...   "capacity": 2300,
...   "num_of_cars": 8,
...   "passangers": 800
... },
... ],
```

```
{
  "acknowledged" : true,
  "insertedIds" : [
    ObjectId("5cf9a6bb38f532e3de592a1b"),
    ObjectId("5cf9a6bb38f532e3de592a1c"),
    ObjectId("5cf9a6bb38f532e3de592a1d"),
    ObjectId("5cf9a6bb38f532e3de592a1e"),
    ObjectId("5cf9a6bb38f532e3de592a1f"),
    ObjectId("5cf9a6bb38f532e3de592a20"),
    ObjectId("5cf9a6bb38f532e3de592a21"),
    ObjectId("5cf9a6bb38f532e3de592a22"),
    ObjectId("5cf9a6bb38f532e3de592a23"),
    ObjectId("5cf9a6bb38f532e3de592a24")
  ]
}
```

```
_id: ObjectId("5cf9a6bb38f532e3de592a1b")
capacity: 2200
num_of_cars: 9
passangers: 900
```

```
_id: ObjectId("5cf9a6bb38f532e3de592a1c")
capacity: 2500
num_of_cars: 10
passangers: 1000
```

```
> _id: ObjectId("5cf9a6bb38f532e3de592a1d")
capacity: 2300
num_of_cars: 8
passangers: 800
```

```
_id: ObjectId("5cf9a6bb38f532e3de592a1e")
capacity: 2200
num_of_cars: 8
passangers: 800
```

Для Driver:

```
> db.driver.insertMany([
... {
...   "first_name": "Petro",
...   "second_name": "Jdanovych",
...   "experience": 2,
...   "phone_num": 88002525,
...   "age": 34
... },
... {
...   "first_name": "Ivan",
...   "second_name": "Gregor",
...   "experience": 7,
...   "phone_num": 88001524,
...   "age": 45
... },
... {
...   "first_name": "Semen",
...   "second_name": "Wiun",
...   "experience": 5,
...   "phone_num": 88001342,
...   "age": 42
... },
... ],
```

```
{
  "acknowledged" : true,
  "insertedIds" : [
    ObjectId("5cf9acc038f532e3de592a25"),
    ObjectId("5cf9acc038f532e3de592a26"),
    ObjectId("5cf9acc038f532e3de592a27"),
    ObjectId("5cf9acc038f532e3de592a28"),
    ObjectId("5cf9acc038f532e3de592a29"),
    ObjectId("5cf9acc038f532e3de592a2a"),
    ObjectId("5cf9acc038f532e3de592a2b"),
    ObjectId("5cf9acc038f532e3de592a2c"),
    ObjectId("5cf9acc038f532e3de592a2d"),
    ObjectId("5cf9acc038f532e3de592a2e")
  ]
}
```

```
_id: ObjectId("5cf9acc038f532e3de592a25")
first_name: "Petro"
second_name: "Jdanovych"
experience: 2
phone_num: 88002525
age: 34
```

```
> _id: ObjectId("5cf9acc038f532e3de592a26")
first_name: "Ivan"
second_name: "Gregor"
experience: 7
phone_num: 88001524
age: 45
```

```
_id: ObjectId("5cf9acc038f532e3de592a27")
first_name: "Semen"
second_name: "Wiun"
experience: 5
phone_num: 88001342
age: 42
```

Для Line:

```
> db.line.insertMany([
... {
...   "Colour": "Red",
...   "Stations_count": 18
... },
... {
...   "Colour": "Blue",
...   "Stations_count": 18
... },
... {
...   "Colour": "Green",
...   "Stations_count": 16
... }
... ])
{
  "acknowledged" : true,
  "insertedIds" : [
    ObjectId("5cf9aebf38f532e3de592a2f"),
    ObjectId("5cf9aebf38f532e3de592a30"),
    ObjectId("5cf9aebf38f532e3de592a31")
  ]
}
```

```
_id: ObjectId("5cf9aebf38f532e3de592a2f")
Colour: "Red"
Stations_count: 18
```

```
> _id: ObjectId("5cf9aebf38f532e3de592a30")
Colour: "Blue"
Stations_count: 18
```

```
_id: ObjectId("5cf9aebf38f532e3de592a31")
Colour: "Green"
Stations_count: 16
```

Для Station:

```

... {
...   "name": "Syrets",
...   "Passangers_amount": 1500,
...   "num_of_doors": 1
... },
... {
...   "name": "Dorogozhychi",
...   "Passangers_amount": 2700,
...   "num_of_doors": 2
... },
... {
...   "name": "Lukianivska",
...   "Passangers_amount": 1900,
...   "num_of_doors": 1
... }
... ])
{
  "acknowledged" : true,
  "insertedIds" : [
    ObjectId("5cf9b1bc38f532e3de592a32"),
    ObjectId("5cf9b1bc38f532e3de592a33"),
    ObjectId("5cf9b1bc38f532e3de592a34"),
    ObjectId("5cf9b1bc38f532e3de592a35"),
    ObjectId("5cf9b1bc38f532e3de592a36"),
    ObjectId("5cf9b1bc38f532e3de592a37"),
    ObjectId("5cf9b1bc38f532e3de592a38"),
    ObjectId("5cf9b1bc38f532e3de592a39"),
    ObjectId("5cf9b1bc38f532e3de592a3a")
  ]
}

```

```

_id: ObjectId("5cf9b1bc38f532e3de592a32")
name: "Lisova"
Passangers_amount: 5000
num_of_doors: 2

```

```

_id: ObjectId("5cf9b1bc38f532e3de592a33")
name: "Chernihyvska"
Passangers_amount: 1500
num_of_doors: 2

```

```

_id: ObjectId("5cf9b1bc38f532e3de592a34")
name: "Darnytsya"
Passangers_amount: 2900
num_of_doors: 2

```

Для Schedule:

```

... {
...   "time": '08:15',
...   "Station_id": ObjectId("5cf9b1bc38f532e3de592a39"),
...   "Train_id": ObjectId("5cf9a6bb38f532e3de592a23"),
...   "Line_id": ObjectId("5cf9aebf38f532e3de592a31")
... },
... {
...   "time": '08:20',
...   "Station_id": ObjectId("5cf9b1bc38f532e3de592a3a"),
...   "Train_id": ObjectId("5cf9a6bb38f532e3de592a24"),
...   "Line_id": ObjectId("5cf9aebf38f532e3de592a31")
... }
... ])
{
  "acknowledged" : true,
  "insertedIds" : [
    ObjectId("5cf9bcab5e08b69e7bd414ec"),
    ObjectId("5cf9bcab5e08b69e7bd414ed"),
    ObjectId("5cf9bcab5e08b69e7bd414ee"),
    ObjectId("5cf9bcab5e08b69e7bd414ef"),
    ObjectId("5cf9bcab5e08b69e7bd414f0"),
    ObjectId("5cf9bcab5e08b69e7bd414f1"),
    ObjectId("5cf9bcab5e08b69e7bd414f2"),
    ObjectId("5cf9bcab5e08b69e7bd414f3"),
    ObjectId("5cf9bcab5e08b69e7bd414f4")
  ]
}
>

```

```

_id: ObjectId("5cf9bcab5e08b69e7bd414ec")
time: "08:00"
Station_id: ObjectId("5cf9b1bc38f532e3de592a32")
Train_id: ObjectId("5cf9a6bb38f532e3de592a1b")
Line_id: ObjectId("5cf9aebf38f532e3de592a2f")

```

```

> _id: ObjectId("5cf9bcab5e08b69e7bd414ed")
time: "08:05"
Station_id: ObjectId("5cf9b1bc38f532e3de592a33")
Train_id: ObjectId("5cf9a6bb38f532e3de592a1d")
Line_id: ObjectId("5cf9aebf38f532e3de592a2f")

```

```

_id: ObjectId("5cf9bcab5e08b69e7bd414ee")
time: "08:10"
Station_id: ObjectId("5cf9b1bc38f532e3de592a34")
Train_id: ObjectId("5cf9a6bb38f532e3de592a1e")
Line_id: ObjectId("5cf9aebf38f532e3de592a2f")

```

### 3. Реалізуємо функції редагування, додавання та видалення інформації в сутності

Оновлення інформації:

```

> db.driver.find()
{"_id": ObjectId("5cf9acc038f532e3de592a25"), "first_name": "Petro", "second_name": "Jdanovych", "experience": 2, "phone_num": 88002525, "age": 34 }
{"_id": ObjectId("5cf9acc038f532e3de592a26"), "first_name": "Ivan", "second_name": "Gregor", "experience": 7, "phone_num": 88001524, "age": 45 }
{"_id": ObjectId("5cf9acc038f532e3de592a27"), "first_name": "Semen", "second_name": "Wiun", "experience": 5, "phone_num": 88001342, "age": 42 }
{"_id": ObjectId("5cf9acc038f532e3de592a28"), "first_name": "Pavlo", "second_name": "Limanski", "experience": 17, "phone_num": 88001298, "age": 52 }
{"_id": ObjectId("5cf9acc038f532e3de592a29"), "first_name": "Dmytro", "second_name": "Vovych", "experience": 3, "phone_num": 88009556, "age": 22 }
{"_id": ObjectId("5cf9acc038f532e3de592a2a"), "first_name": "Gavrylo", "second_name": "Bachynski", "experience": 5, "phone_num": 88001573, "age": 25 }
{"_id": ObjectId("5cf9acc038f532e3de592a2b"), "first_name": "Pylyp", "second_name": "Orlyck", "experience": 15, "phone_num": 88001728, "age": 50 }
{"_id": ObjectId("5cf9acc038f532e3de592a2c"), "first_name": "Sergiy", "second_name": "Bubka", "experience": 7, "phone_num": 88003741, "age": 50 }
{"_id": ObjectId("5cf9acc038f532e3de592a2d"), "first_name": "Orest", "second_name": "Lytiy", "experience": 6, "phone_num": 88001415, "age": 56 }
{"_id": ObjectId("5cf9acc038f532e3de592a2e"), "first_name": "Dmytro", "second_name": "Lesiv", "experience": 1, "phone_num": 88009876, "age": 20 }
> db.driver.update({"phone_num": 88002525}, {$set: {"first_name": "Vasylii"}})
2019-06-07T04:48:10.914+0300 E QUERY [js] SyntaxError: missing } after property list @(<shell>):1:71
> db.driver.update({"phone_num": 88002525}, {$set: {"first_name": "Vasylii"}})
WriteResult({ "nMatched" : 1, "nUpserted" : 0, "nModified" : 1 })
> db.driver.find()
{"_id": ObjectId("5cf9acc038f532e3de592a25"), "first_name": "Vasylii", "second_name": "Jdanovych", "experience": 2, "phone_num": 88002525, "age": 34 }
{"_id": ObjectId("5cf9acc038f532e3de592a26"), "first_name": "Ivan", "second_name": "Gregor", "experience": 7, "phone_num": 88001524, "age": 45 }
{"_id": ObjectId("5cf9acc038f532e3de592a27"), "first_name": "Semen", "second_name": "Wiun", "experience": 5, "phone_num": 88001342, "age": 42 }
{"_id": ObjectId("5cf9acc038f532e3de592a28"), "first_name": "Pavlo", "second_name": "Limanski", "experience": 17, "phone_num": 88001298, "age": 52 }
{"_id": ObjectId("5cf9acc038f532e3de592a29"), "first_name": "Dmytro", "second_name": "Vovych", "experience": 3, "phone_num": 88009556, "age": 22 }
{"_id": ObjectId("5cf9acc038f532e3de592a2a"), "first_name": "Gavrylo", "second_name": "Bachynski", "experience": 5, "phone_num": 88001573, "age": 25 }
{"_id": ObjectId("5cf9acc038f532e3de592a2b"), "first_name": "Pylyp", "second_name": "Orlyck", "experience": 15, "phone_num": 88001728, "age": 50 }
{"_id": ObjectId("5cf9acc038f532e3de592a2c"), "first_name": "Sergiy", "second_name": "Bubka", "experience": 7, "phone_num": 88003741, "age": 50 }
{"_id": ObjectId("5cf9acc038f532e3de592a2d"), "first_name": "Orest", "second_name": "Lytiy", "experience": 6, "phone_num": 88001415, "age": 56 }
{"_id": ObjectId("5cf9acc038f532e3de592a2e"), "first_name": "Dmytro", "second_name": "Lesiv", "experience": 1, "phone_num": 88009876, "age": 20 }

```

## Видалення інформації

```

> db.driver.find()
{"_id": ObjectId("5cf9acc038f532e3de592a25"), "first_name": "Vasylii", "second_name": "Jdanovych", "experience": 2, "phone_num": 88002525, "age": 34 }
{"_id": ObjectId("5cf9acc038f532e3de592a26"), "first_name": "Ivan", "second_name": "Gregor", "experience": 7, "phone_num": 88001524, "age": 45 }
{"_id": ObjectId("5cf9acc038f532e3de592a27"), "first_name": "Semen", "second_name": "Wiun", "experience": 5, "phone_num": 88001342, "age": 42 }
{"_id": ObjectId("5cf9acc038f532e3de592a28"), "first_name": "Pavlo", "second_name": "Limanski", "experience": 17, "phone_num": 88001298, "age": 52 }
{"_id": ObjectId("5cf9acc038f532e3de592a29"), "first_name": "Dmytro", "second_name": "Vovych", "experience": 3, "phone_num": 88009556, "age": 22 }
{"_id": ObjectId("5cf9acc038f532e3de592a2a"), "first_name": "Gavrylo", "second_name": "Bachynski", "experience": 5, "phone_num": 88001573, "age": 25 }
{"_id": ObjectId("5cf9acc038f532e3de592a2b"), "first_name": "Pylyp", "second_name": "Orlyck", "experience": 15, "phone_num": 88001728, "age": 50 }
{"_id": ObjectId("5cf9acc038f532e3de592a2c"), "first_name": "Sergiy", "second_name": "Bubka", "experience": 7, "phone_num": 88003741, "age": 50 }
{"_id": ObjectId("5cf9acc038f532e3de592a2d"), "first_name": "Orest", "second_name": "Lytiy", "experience": 6, "phone_num": 88001415, "age": 56 }
{"_id": ObjectId("5cf9acc038f532e3de592a2e"), "first_name": "Dmytro", "second_name": "Lesiv", "experience": 1, "phone_num": 88009876, "age": 20 }
> db.driver.remove({"second_name": "Lesiv"})
WriteResult({ "nRemoved" : 1 })
> db.driver.find()
{"_id": ObjectId("5cf9acc038f532e3de592a25"), "first_name": "Vasylii", "second_name": "Jdanovych", "experience": 2, "phone_num": 88002525, "age": 34 }
{"_id": ObjectId("5cf9acc038f532e3de592a26"), "first_name": "Ivan", "second_name": "Gregor", "experience": 7, "phone_num": 88001524, "age": 45 }
{"_id": ObjectId("5cf9acc038f532e3de592a27"), "first_name": "Semen", "second_name": "Wiun", "experience": 5, "phone_num": 88001342, "age": 42 }
{"_id": ObjectId("5cf9acc038f532e3de592a28"), "first_name": "Pavlo", "second_name": "Limanski", "experience": 17, "phone_num": 88001298, "age": 52 }
{"_id": ObjectId("5cf9acc038f532e3de592a29"), "first_name": "Dmytro", "second_name": "Vovych", "experience": 3, "phone_num": 88009556, "age": 22 }
{"_id": ObjectId("5cf9acc038f532e3de592a2a"), "first_name": "Gavrylo", "second_name": "Bachynski", "experience": 5, "phone_num": 88001573, "age": 25 }
{"_id": ObjectId("5cf9acc038f532e3de592a2b"), "first_name": "Pylyp", "second_name": "Orlyck", "experience": 15, "phone_num": 88001728, "age": 50 }
{"_id": ObjectId("5cf9acc038f532e3de592a2c"), "first_name": "Sergiy", "second_name": "Bubka", "experience": 7, "phone_num": 88003741, "age": 50 }
{"_id": ObjectId("5cf9acc038f532e3de592a2d"), "first_name": "Orest", "second_name": "Lytiy", "experience": 6, "phone_num": 88001415, "age": 56 }
{"_id": ObjectId("5cf9acc038f532e3de592a2e"), "first_name": "Dmytro", "second_name": "Lesiv", "experience": 1, "phone_num": 88009876, "age": 20 }

```

На цій лабораторній роботі я розробив на основі своєї предметної області схему бази даних в СУБД MongoDB, перетворив сутності в структури та забезпечив реалізацію функцій редагування, видалення та оновлення інформації в MongoDB.