

# Lab 12 – NoSQL using MongoDB

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## Questions:

Note: For each Question, you are required to write the Query as well as attach a screenshot of the output. Make sure your screenshots include the executed query.

### 1. Display all students.

```
db.students.find({})
```

```
>db.students.find({})
{ "_id" : ObjectId("6566df87ae88dde94bb9266d"), "FirstName" : "Hina", "LastName" : "Baig", "CGPA" : 3.5, "Major" : "CS", "Address" : { "Street" : "Puran Nagar", "City" : "Faisalabad", "Province" : "Punjab", "Country" : "Pakistan", "Phone" : "3233389064", "Courses" : [ { "course_id" : "CS101", "course_name" : "Pfun", "credits" : 4 }, { "course_id" : "CS121", "course_name" : "OOP", "credits" : 4 } ] }
{ "_id" : ObjectId("6566df87ae88dde94bb9266e"), "FirstName" : "Karim", "LastName" : "Khan", "CGPA" : 3.2, "Major" : "EE", "Address" : { "Street" : "Off Nishtar Road", "City" : "Karachi", "Province" : "Sindh", "Country" : "Pakistan", "Phone" : "9221-7733790", "Courses" : [ { "course_id" : "CH111", "course_name" : "PMAS", "credits" : 3 }, { "course_id" : "CS355", "course_name" : "DB", "credits" : 4 } ] }
{ "_id" : ObjectId("6566df87ae88dde94bb9266f"), "FirstName" : "Abid", "LastName" : "Kasim", "CGPA" : 2.9, "Major" : "SDP", "Address" : { "Street" : "ST-2, North Nazimabad", "City" : "Karachi", "Province" : "Sindh", "Country" : "Pakistan", "Phone" : "9221-6678442", "Courses" : [ { "course_id" : "CS411", "course_name" : "AI", "credits" : 3 }, { "course_id" : "CS121", "course_name" : "OOP", "credits" : 4 }, { "course_id" : "CS411", "course_name" : "AI", "credits" : 3 } ] }
{ "_id" : ObjectId("6566df87ae88dde94bb92670"), "FirstName" : "Zainab", "LastName" : "Karim", "CGPA" : 3.1, "Major" : "CS", "Address" : { "Street" : "3-Khalid Centre, Wahdat Road", "City" : "Karachi", "Province" : "Sindh", "Country" : "Pakistan", "Phone" : "021-4412625", "Courses" : [ { "course_id" : "CS355", "course_name" : "DB", "credits" : 4 }, { "course_id" : "CS101", "course_name" : "Pfun", "credits" : 4 } ] }
{ "_id" : ObjectId("6566df87ae88dde94bb92671"), "FirstName" : "Kumar", "LastName" : "Rani", "CGPA" : 2.8, "Major" : "EE", "Address" : { "Street" : "Malik Park Islam", "City" : "Lahore", "Province" : "Punjab", "Country" : "Pakistan", "Phone" : "042-7113204", "Courses" : [ { "course_id" : "CS101", "course_name" : "Pfun", "credits" : 4 } ] }
{ "_id" : ObjectId("6566df87ae88dde94bb92672"), "FirstName" : "Fahim", "LastName" : "Alam", "CGPA" : 3.7, "Address" : { "Street" : "Wilbert Squares", "City" : "Hunza", "Province" : "Gilgit-Baltistan", "Country" : "Pakistan", "Phone" : "359-99997" }
```

### 2. Display all the students with CS major.

```
db.students.find({ 'Major': 'CS' })
```

```
>db.students.find({ 'Major': 'CS' })
{ "_id" : ObjectId("6566df87ae88dde94bb9266d"), "FirstName" : "Hina", "LastName" : "Baig", "CGPA" : 3.5, "Major" : "CS", "Address" : { "Street" : "Puran Nagar", "City" : "Faisalabad", "Province" : "Punjab", "Country" : "Pakistan", "Phone" : "3233389064", "Courses" : [ { "course_id" : "CS101", "course_name" : "Pfun", "credits" : 4 }, { "course_id" : "CS121", "course_name" : "OOP", "credits" : 4 } ] }
{ "_id" : ObjectId("6566df87ae88dde94bb92670"), "FirstName" : "Zainab", "LastName" : "Karim", "CGPA" : 3.1, "Major" : "CS", "Address" : { "Street" : "3-Khalid Centre, Wahdat Road", "City" : "Karachi", "Province" : "Sindh", "Country" : "Pakistan", "Phone" : "021-4412625", "Courses" : [ { "course_id" : "CS355", "course_name" : "DB", "credits" : 4 }, { "course_id" : "CS101", "course_name" : "Pfun", "credits" : 4 } ] }
```

### 3. Display all the students with SDP major.

```
db.students.find({ 'Major': 'SDP' })
```

```
>db.students.find({ 'Major': 'SDP' })
{ "_id" : ObjectId("6566df87ae88dde94bb9266f"), "FirstName" : "Abid", "LastName" : "Kasim", "CGPA" : 2.9, "Major" : "SDP", "Address" : { "Street" : "ST-2, North Nazimabad", "City" : "Karachi", "Province" : "Sindh", "Country" : "Pakistan", "Phone" : "9221-6678442", "Courses" : [ { "course_id" : "CS411", "course_name" : "AI", "credits" : 3 }, { "course_id" : "CS121", "course_name" : "OOP", "credits" : 4 }, { "course_id" : "CS411", "course_name" : "AI", "credits" : 3 } ] }
```

### 4. Display all the students from Karachi City.

```
db.students.find({ 'Address.City': 'Karachi' })
```

```
>db.students.find({ 'Address.City': 'Karachi' })
{ "_id" : ObjectId("6566df87ae88dde94bb9266e"), "FirstName" : "Karim", "LastName" : "Khan", "CGPA" : 3.2, "Major" : "EE", "Address" : { "Street" : "Off Nishtar Road", "City" : "Karachi", "Province" : "Sindh", "Country" : "Pakistan", "Phone" : "9221-7733790", "Courses" : [ { "course_id" : "CH111", "course_name" : "PMAS", "credits" : 3 }, { "course_id" : "CS355", "course_name" : "DB", "credits" : 4 } ] }
{ "_id" : ObjectId("6566df87ae88dde94bb9266f"), "FirstName" : "Abid", "LastName" : "Kasim", "CGPA" : 2.9, "Major" : "SDP", "Address" : { "Street" : "ST-2, North Nazimabad", "City" : "Karachi", "Province" : "Sindh", "Country" : "Pakistan", "Phone" : "9221-6678442", "Courses" : [ { "course_id" : "CS411", "course_name" : "AI", "credits" : 3 }, { "course_id" : "CS121", "course_name" : "OOP", "credits" : 4 }, { "course_id" : "CS411", "course_name" : "AI", "credits" : 3 } ] }
{ "_id" : ObjectId("6566df87ae88dde94bb92670"), "FirstName" : "Zainab", "LastName" : "Karim", "CGPA" : 3.1, "Major" : "CS", "Address" : { "Street" : "3-Khalid Centre, Wahdat Road", "City" : "Karachi", "Province" : "Sindh", "Country" : "Pakistan", "Phone" : "021-4412625", "Courses" : [ { "course_id" : "CS355", "course_name" : "DB", "credits" : 4 }, { "course_id" : "CS101", "course_name" : "Pfun", "credits" : 4 } ] }
```

5. Display all the students not from Karachi City.

```
db.students.find({ 'Address.City': { $ne: 'Karachi' } })
```

```
{ "_id" : ObjectId("6566e583b9e2658e459f2ccd"), "FirstName" : "Hina", "LastName" : "Baig", "CGPA" : 3.5, "Major" : "CS", "Address" : { "Street" : "Puran Nagar", "City" : "Faisalabad", "Province" : "Punjab", "Country" : "Pakistan" }, "Phone" : "3233389064", "Courses" : [ { "course_id" : "CS101", "course_name" : "Pfun", "credits" : 4 }, { "course_id" : "CS121", "course_name" : "OOP", "credits" : 4 } ] }
{ "_id" : ObjectId("6566e583b9e2658e459f2cd1"), "FirstName" : "Kumar", "LastName" : "Rani", "CGPA" : 2.8, "Major" : "EE", "Address" : { "Street" : "Malik Park Islam", "City" : "Lahore", "Province" : "Punjab", "Country" : "Pakistan" }, "Phone" : "042-7113284", "Courses" : [ { "course_id" : "CS101", "course_name" : "Pfun", "credits" : 4 } ] }
{ "_id" : ObjectId("6566e583b9e2658e459f2cd2"), "FirstName" : "Fahim", "LastName" : "Alam", "CGPA" : 3.7, "Address" : { "Street" : "Wilbert Squares", "City" : "Hunza", "Province" : "Gilgit-Baltistan", "Country" : "Pakistan" }, "Phone" : "359-99997" }
```

6. Display all the students having CGPA more than 3.

```
db.students.find({ 'CGPA': { $gt: 3 } })
```

```
{ "_id" : ObjectId("6566e5d0f709d799d038f9cc"), "FirstName" : "Hina", "LastName" : "Baig", "CGPA" : 3.5, "Major" : "CS", "Address" : { "Street" : "Puran Nagar", "City" : "Faisalabad", "Province" : "Punjab", "Country" : "Pakistan" }, "Phone" : "3233389064", "Courses" : [ { "course_id" : "CS101", "course_name" : "Pfun", "credits" : 4 }, { "course_id" : "CS121", "course_name" : "OOP", "credits" : 4 } ] }
{ "_id" : ObjectId("6566e5d0f709d799d038f9cd"), "FirstName" : "Karim", "LastName" : "Khan", "CGPA" : 3.2, "Major" : "EE", "Address" : { "Street" : "Off Nishter Road", "City" : "Karachi", "Province" : "Sindh", "Country" : "Pakistan" }, "Phone" : "9221-7733790", "Courses" : [ { "course_id" : "CH111", "course_name" : "PMAS", "credits" : 3 }, { "course_id" : "CS355", "course_name" : "DB", "credits" : 4 } ] }
{ "_id" : ObjectId("6566e5d0f709d799d038f9cf"), "FirstName" : "Zainab", "LastName" : "Karim", "CGPA" : 3.1, "Major" : "CS", "Address" : { "Street" : "3-Khalid Centre, Wahdat Road", "City" : "Karachi", "Province" : "Sindh", "Country" : "Pakistan" }, "Phone" : "021-4412625", "Courses" : [ { "course_id" : "CS355", "course_name" : "DB", "credits" : 4 }, { "course_id" : "CS101", "course_name" : "Pfun", "credits" : 4 } ] }
{ "_id" : ObjectId("6566e5d0f709d799d038f9d1"), "FirstName" : "Fahim", "LastName" : "Alam", "CGPA" : 3.7, "Address" : { "Street" : "Wilbert Squares", "City" : "Hunza", "Province" : "Gilgit-Baltistan", "Country" : "Pakistan" }, "Phone" : "359-99997" }
```

7. Display all the students having CGPA equal to 3.5

```
db.students.find({ 'CGPA': 3.5 })
```

```
{ "_id" : ObjectId("6566e619ee29590a8035dec9"), "FirstName" : "Hina", "LastName" : "Baig", "CGPA" : 3.5, "Major" : "CS", "Address" : { "Street" : "Puran Nagar", "City" : "Faisalabad", "Province" : "Punjab", "Country" : "Pakistan" }, "Phone" : "3233389064", "Courses" : [ { "course_id" : "CS101", "course_name" : "Pfun", "credits" : 4 }, { "course_id" : "CS121", "course_name" : "OOP", "credits" : 4 } ] }
```

8. Display all the students from Karachi with a CS Major.

```
db.students.find({
  'Address.City': 'Karachi',
  'Major': 'CS'})

{ "_id" : ObjectId("6566e666ab192b70ce5aa65f"), "FirstName" : "Zainab", "LastName" : "Karim",
  "CGPA" : 3.1, "Major" : "CS", "Address" : { "Street" : "3-Khalid Centre, Wahdat Road", "City" : "Karachi",
  "Province" : "Sindh", "Country" : "Pakistan" }, "Phone" : "021-4412625", "Courses" : [ { "course_id" :
  "CS355", "course_name" : "DB", "credits" : 4 }, { "course_id" : "CS101", "course_name" : "Pfun", "credits"
  : 4 } ] }
```

9. Display all the students for the SDP and EE majors.

```
db.students.find({
  'Major': { $in: ['SDP', 'EE'] }
})

{ "_id" : ObjectId("6566e7051154572c53e937df"), "FirstName" : "Karim", "LastName" : "Khan", "CGPA"
: 3.2, "Major" : "EE", "Address" : { "Street" : " Off Nishter Road", "City" : "Karachi", "Province" : "Sindh",
"Country" : "Pakistan" }, "Phone" : "9221-7733790", "Courses" : [ { "course_id" : "CH111", "course_name"
: "PMAS", "credits" : 3 }, { "course_id" : "CS355", "course_name" : "DB", "credits" : 4 } ] }
{ "_id" : ObjectId("6566e7051154572c53e937e0"), "FirstName" : "Abid", "LastName" : "Kasim", "CGPA"
: 2.9, "Major" : "SDP", "Address" : { "Street" : "ST-2, North Nazimabad,", "City" : "Karachi", "Province" :
"Sindh", "Country" : "Pakistan" }, "Phone" : "9221-6678442", "Courses" : [ { "course_id" : "CS411",
"course_name" : "AI", "credits" : 3 }, { "course_id" : "CS121", "course_name" : "OOP", "credits" : 4 }, {
"course_id" : "CS411", "course_name" : "AI", "credits" : 3 } ] }
{ "_id" : ObjectId("6566e7051154572c53e937e2"), "FirstName" : "Kumar", "LastName" : "Rani", "CGPA"
: 2.8, "Major" : "EE", "Address" : { "Street" : "Malik Park Islam", "City" : "Lahore", "Province" : "Punjab",
"Country" : "Pakistan" }, "Phone" : "042-7113284", "Courses" : [ { "course_id" : "CS101", "course_name" :
"Pfun", "credits" : 4 } ] }
```

10. Display only the first and last name of all students

Result: FirstName, LastName

```
db.students.find({}, { 'FirstName': 1, 'LastName': 1, '_id': 0 })

{ "FirstName" : "Hina", "LastName" : "Baig" }
{ "FirstName" : "Karim", "LastName" : "Khan" }
{ "FirstName" : "Abid", "LastName" : "Kasim" }
{ "FirstName" : "Zainab", "LastName" : "Karim" }
{ "FirstName" : "Kumar", "LastName" : "Rani" }
{ "FirstName" : "Fahim", "LastName" : "Alam" }
```

11. Display only the first name, last name, and city for all students.

Result: FirstName, LastName, City

```
db.students.find({}, { 'FirstName': 1, 'LastName': 1, 'Address.City': 1, '_id': 0 })
```

```
{ "FirstName" : "Hina", "LastName" : "Baig", "Address" : { "City" : "Faisalabad" } }  
{ "FirstName" : "Karim", "LastName" : "Khan", "Address" : { "City" : "Karachi" } }  
{ "FirstName" : "Abid", "LastName" : "Kasim", "Address" : { "City" : "Karachi" } }  
{ "FirstName" : "Zainab", "LastName" : "Karim", "Address" : { "City" : "Karachi" } }  
{ "FirstName" : "Kumar", "LastName" : "Rani", "Address" : { "City" : "Lahore" } }  
{ "FirstName" : "Fahim", "LastName" : "Alam", "Address" : { "City" : "Hunza" } }
```

12. Display only the first name, last name for all the students with CGPA greater than or equal to 3.5 (without Object IDs)

```
db.students.find({ 'CGPA': { $gte: 3.5 } }, { 'FirstName': 1, 'LastName': 1, '_id': 0 })
```

```
{ "FirstName" : "Hina", "LastName" : "Baig" }  
{ "FirstName" : "Fahim", "LastName" : "Alam" }
```

13. Insert a student record with the following information (refer to manual)

```
db.students.insertOne(  
  'FirstName': 'Fatima',  
  'LastName': 'Tariq',  
  'Phone': '03124567891',  
  'Address': {  
    'Street': 'Zainab Street Saddar',  
    'City': 'Karachi'  
  }  
)  
  
{  
  "acknowledged" : true,  
  "insertedId" : ObjectId("6566ec2426e20e28b8e6e6c4")  
}
```

14. Display all the student who do not have major property.

```
db.students.find({ 'Major': { $exists: false } })
```

```
{ "_id" : ObjectId("6566ec37db010efe8fc360db"), "FirstName" : "Fahim", "LastName" : "Alam", "CGPA" :  
3.7, "Address" : { "Street" : "Wilbert Squares", "City" : "Hunza", "Province" : "Gilgit-Baltistan", "Country"  
: "Pakistan" }, "Phone" : "359-99997" }
```

15. Insert the following students using insertMany (refer to manual)

```
db.students.insertMany([
  { 'FirstName': 'Zahid', 'LastName': 'Hakim', 'Major': 'CS' },
  { 'FirstName': 'Ayesha', 'LastName': 'Asif' },
  { 'FirstName': 'Faheem', 'LastName': 'Faiz', 'Phone': '0213456789' }
])

{
  "acknowledged" : true,
  "insertedIds" : [
    ObjectId("6566ec4ed05ce642f887f74b"),
    ObjectId("6566ec4ed05ce642f887f74c"),
    ObjectId("6566ec4ed05ce642f887f74d")
  ]
}
```

16. Display all the students have taken the CS355 course.

```
db.students.find({ 'Courses.course_id': 'CS355' })

{ "_id" : ObjectId("6566ec62a681c875afbfa0ce"), "FirstName" : "Karim", "LastName" : "Khan", "CGPA" :
3.2, "Major" : "EE", "Address" : { "Street" : " Off Nishter Road", "City" : "Karachi", "Province" : "Sindh",
"Country" : "Pakistan" }, "Phone" : "9221-7733790", "Courses" : [ { "course_id" : "CH111", "course_name"
: "PMAS", "credits" : 3 }, { "course_id" : "CS355", "course_name" : "DB", "credits" : 4 } ] }
{ "_id" : ObjectId("6566ec62a681c875afbfa0d0"), "FirstName" : "Zainab", "LastName" : "Karim", "CGPA"
: 3.1, "Major" : "CS", "Address" : { "Street" : "3-Khalid Centre, Wahdat Road", "City" : "Karachi",
"Province" : "Sindh", "Country" : "Pakistan" }, "Phone" : "021-4412625", "Courses" : [ { "course_id" :
"CS355", "course_name" : "DB", "credits" : 4 }, { "course_id" : "CS101", "course_name" : "Pfun", "credits"
: 4 } ] }
```

17. Display all the students have not taken the CS355 course.

```
db.students.find({ 'Courses.course_id': { $ne: 'CS355' } })

{ "_id" : ObjectId("6566ec7ad47398ab64b31342"), "FirstName" : "Hina", "LastName" : "Baig", "CGPA" :
3.5, "Major" : "CS", "Address" : { "Street" : "Puran Nagar", "City" : "Faisalabad", "Province" : "Punjab",
"Country" : "Pakistan" }, "Phone" : "3233389064", "Courses" : [ { "course_id" : "CS101", "course_name" :
"Pfun", "credits" : 4 }, { "course_id" : "CS121", "course_name" : "OOP", "credits" : 4 } ] }
{ "_id" : ObjectId("6566ec7ad47398ab64b31344"), "FirstName" : "Abid", "LastName" : "Kasim", "CGPA"
: 2.9, "Major" : "SDP", "Address" : { "Street" : "ST-2, North Nazimabad,", "City" : "Karachi", "Province" :
"Sindh", "Country" : "Pakistan" }, "Phone" : "9221-6678442", "Courses" : [ { "course_id" : "CS411",
"course_name" : "AI", "credits" : 3 }, { "course_id" : "CS121", "course_name" : "OOP", "credits" : 4 }, {
"course_id" : "CS411", "course_name" : "AI", "credits" : 3 } ] }
{ "_id" : ObjectId("6566ec7ad47398ab64b31346"), "FirstName" : "Kumar", "LastName" : "Rani", "CGPA"
: 2.8, "Major" : "EE", "Address" : { "Street" : "Malik Park Islam", "City" : "Lahore", "Province" : "Punjab",
```

```
"Country" : "Pakistan" }, "Phone" : "042-7113284", "Courses" : [ { "course_id" : "CS101", "course_name" : "Pfun", "credits" : 4 } ] }  
{ "_id" : ObjectId("6566ec7ad47398ab64b31347"), "FirstName" : "Fahim", "LastName" : "Alam", "CGPA" : 3.7, "Address" : { "Street" : "Wilbert Squares", "City" : "Hunza", "Province" : "Gilgit-Baltistan", "Country" : "Pakistan" }, "Phone" : "359-99997" }
```

18. Increment the CGPA of all students by 0.1.

```
db.students.updateMany({}, { $inc: { 'CGPA': 0.1 } })
```

```
{ "acknowledged" : true, "matchedCount" : 6, "modifiedCount" : 6 }
```

19. Set the CGPA of all students to 0.1

```
db.students.updateMany({}, { $set: { 'CGPA': 0.1 } })
```

```
{ "acknowledged" : true, "matchedCount" : 6, "modifiedCount" : 6 }
```

20. Introduce a new attribute Minor for the students with the value CH

```
db.students.updateMany({ 'Major': 'CH' }, { $set: { 'Minor': 'CH' } })
```

```
{ "acknowledged" : true, "matchedCount" : 0, "modifiedCount" : 0 }
```

21. Add a new course all students with the following information (refer to manual)

```
db.students.updateMany({}, { $push: { 'Courses': { 'course_id': 'CH101', 'course_name': 'Liberal Core', 'credits': 1 } } })
```

```
{ "acknowledged" : true, "matchedCount" : 6, "modifiedCount" : 6 }
```

22. Delete all the students with CGPA less than 3.0

```
db.students.deleteMany({ 'CGPA': { $lt: 3.0 } })
```

```
{ "acknowledged" : true, "deletedCount" : 2 }
```