PROJECT

# Complex Filters & Projections:

**Q1**. List the names and departments of students who have more than 85% attendance and are skilled in both "MongoDB" and "Python".

|  |  |
| --- | --- |
| **Solution:**  db.students.find(  {  attendance: { $gt: 85 }, skills: { $all: ["MongoDB",  "Python"] }  },  {  \_id: 0,  name: 1,  department: 1  }  ); | **Output:** |

**Q2.** Show all faculty who are teaching more than 2 courses. Display their names and the total number of courses they teach.

|  |  |
| --- | --- |
| **Solution:**  db.faculty.aggregate( [ {  $project: { name: 1,  totalCourses: { $size: "$courses" }  } },  {  $match: { totalCourses: { $gt: 2 } }  }]); | **Output:** |

# Joins ($lookup) and Aggregations:

**Q3.** Write a query to show each student’s name along with the course titles they are enrolled in (use

$lookup between enrollments, students, and courses).

## Solution:

db.enrollments.aggregate( [

{

$lookup: {

from: "students",

localField: "student\_id", foreignField: "\_id",

as: "studentInfo"

}

},

{

$lookup: {

from: "courses",

localField: "course\_id", foreignField: "\_id",

as: "courseInfo"

}

},

{

$project: {

\_id: 0,

studentName: { $arrayElemAt: ["$studentInfo.name", 0] }, courseTitles: "$courseInfo.title"

}

}

]

);

## Output:



**Q4.** For each course, display the course title, number of students enrolled, and average marks (use

$group).

## Solution:

db.enrollments.aggregate( [

{

$group: {

\_id: "$course\_id", totalStudents: { $sum: 1 },

averageMarks: { $avg: "$marks" }

}

},

{

$lookup: {

from: "courses", localField: "\_id", foreignField: "\_id", as: "courseInfo"

}

},

{

$project: {

\_id: 0,

courseTitle: { $arrayElemAt: ["$courseInfo.title", 0] }, totalStudents: 1,

averageMarks: 1

}

}

]

);

**Output:**



# Grouping, Sorting, and Limiting:

**Q5.** Find the top 3 students with the highest average marks across all enrolled courses.

## Solution:

db.enrollments.aggregate( [

{

$group: {

\_id: "$student\_id",

averageMarks: { $avg: "$marks" }

} },

{

$sort: { averageMarks: -1 }

},

{

$limit:3

},

{ $lookup: {

from: "students", localField: "\_id", foreignField: "\_id", as: "studentInfo"

} },

{ $project: {

\_id: 0,

studentName: { $arrayElemAt: ["$studentInfo.name", 0] }, averageMarks: 1

}

}

]

);

## Output:



**Q6.** Count how many students are in each department. Display the department with the highest number of students.

|  |  |
| --- | --- |
| **Solution:**  db.students.aggregate( [  { | **Output:** |

|  |  |
| --- | --- |
| $group: {  \_id: "$department", totalStudents: { $sum: 1 }  }  },  {  $sort: { totalStudents: -1 }  },  {  $limit: 1  },  {  $project: {  \_id: 0,  department: "$\_id", totalStudents: 1  }  }  ]  ); |  |

# Update, Insert, and Delete:

**Q7.** Update attendance to 100% for all students who won any "Hackathon".

|  |  |
| --- | --- |
| **Solution:**  db.students.updateMany(  {  activities: "Hackathon"  },  {  $set: { attendance: 100 }  }  ); | **Output:** |

**Q8.** Delete all student activity records where the activity year is before 2022.

|  |  |
| --- | --- |
| **Solution:**  db.activities.deleteMany(  {  year: { $lt: 2022 }  }  ); | **Output:** |

**Q9.** Insert a course record for "Data Structures" with ID "C150" and credits 4—if it doesn’t exist, insert it; otherwise update its title to "Advanced Data Structures".

|  |  |
| --- | --- |
| **Solution:**  db.courses.updateOne(  { \_id: "C150" },  {  $set: { title: "Advanced Data Structures", credits: 4 }  },  { upsert: true }  ); | **Output:** |

# Array & Operator Usage:

**Q10.** Find all students who have "Python" as a skill but not "C++".

|  |  |
| --- | --- |
| **Solution:**  db.students.find(  {  $and: [  { skills: "Python" },  { skills: { $ne: "C++" } }  ]  },  {  \_id: 0,  name: 1,  skills: 1  }  ); | **Output:** |

**Q11.** Return names of students who participated in "Seminar" and "Hackathon" both.

|  |  |
| --- | --- |
| **Solution:** | **Output:** |

|  |  |
| --- | --- |
| db.students.find(  {  activities: { $all: ["Seminar", "Hackathon"] }  },  {  \_id: 0,  name: 1,  activities: 1  }  ); |  |

# Subdocuments and Nested Conditions:

**Q12.** Find students who scored more than 80 in "Web Development" only if they belong to the "Computer Science" department.

|  |  |
| --- | --- |
| **Solution:**  db.enrollments.find(  {  course\_title: "Web Development", marks: { $gt: 80 },  department: "Computer Science"  },  {  \_id: 0,  student\_id: 1,  marks: 1,  course\_title: 1,  department: 1  }  ); | **Output:** |

# Advanced Aggregation (Challenge Level):

**Q13.** For each faculty member, list the names of all students enrolled in their courses along with average marks per student per faculty.

## Solution:

db.faculty.aggregate( [

{

$lookup: {

from: "courses", localField: "courses", foreignField: "\_id", as: "courseInfo"

}

},

{ $unwind: "$courseInfo" },

{

$lookup: {

from: "enrollments", localField: "courseInfo.\_id", foreignField: "course\_id", as: "enrolledStudents"

}

},

{ $unwind: "$enrolledStudents" },

{

$lookup: {

from: "students",

localField: "enrolledStudents.student\_id", foreignField: "\_id",

as: "studentInfo"

},

{

$group: {

\_id: { facultyName: "$facultyName", studentName: "$studentName" }, averageMarks: { $avg: "$marks" }

}

},

{

$project: {

\_id: 0,

facultyName: "$\_id.facultyName",

studentName: "$\_id.studentName", averageMarks: 1

}

},

{

$sort: { facultyName: 1, studentName: 1 }

}

]

);

}

},

{

$project: {

\_id: 0,

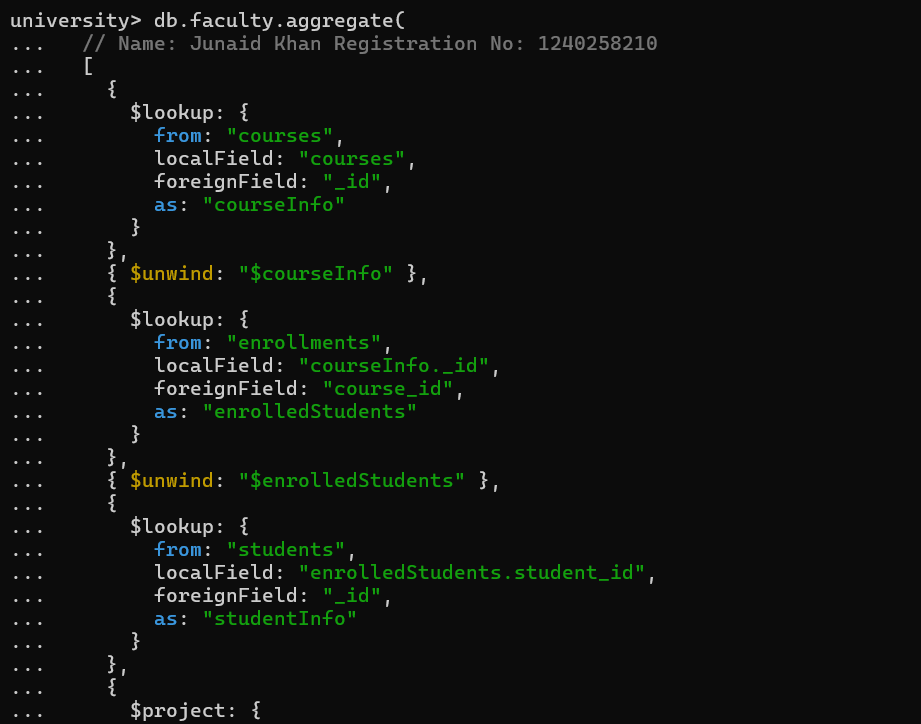
facultyName: "$name",

studentName: { $arrayElemAt: ["$studentInfo.name",0] },

marks: "$enrolledStudents.marks"

}

## Output:

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**Q14.** Show the most popular activity type (e.g., Hackathon, Seminar, etc.) by number of student participants.

|  |  |
| --- | --- |
| **Solution:**  db.students.aggregate( [  { $unwind: "$activities" },  {  $group: {  \_id: "$activities", totalParticipants: { $sum: 1 }  }  },  { $sort: { totalParticipants: -1 } },  { $limit: 1 },  {  $project: {  \_id: 0,  activity: "$\_id", totalParticipants: 1  }  }  ]  ); | **Output:** |