

ASSIGNMENT

Question 1: 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({ //Name: Kushagra Srivastava | Roll No: 1240258242
... attendance: { $gt: 85},
... skills: { $all: ["MongoDB", "Python"]}}
... )
```

Output:

```
College> db.students.find({ //Name: Kushagra Srivastava | Roll No: 1240258242
... attendance: { $gt: 85},
... skills: { $all: ["MongoDB", "Python"]}}
... )
College> |
```

Question 2: 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: { _id: 0, name: 1, totalC: { $size: "$courses" } }},
... { $match: { totalC: { $gt: 2 } } }
... ])
```

Output:

```
College> db.faculty.aggregate([ { $project: { _id: 0, name: 1, totalC: { $size: "$courses" } } },
... { $match: { totalC: { $gt: 2 } } } //Name: Kushagra Srivastava | Roll No - 1240258242
... ])
[
  { name: 'Charles Newton', totalC: 3 },
  { name: 'Julia Cole', totalC: 3 },
  { name: 'Darrell Velasquez', totalC: 3 },
  { name: 'Michael Poole', totalC: 3 },
  { name: 'John Duran', totalC: 3 },
  { name: 'Daniel Allen', totalC: 3 },
  { name: 'Matthew Hanna', totalC: 3 },
  { name: 'Michael Johnson', totalC: 3 },
  { name: 'Robert Lara', totalC: 3 }
]
```

Question 3: 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([ //Name: Kushagra Srivastava | Roll No- 1240258242
... {
...   $lookup: {
...     from: "students",
...     localField: "student_id",
...     foreignField: "_id",
```

```

...   as: "student_details"
... }
... },
... { $unwind: "$student_details" },
... {
...   $lookup: {
...     from: "courses",
...     localField: "course_id",
...     foreignField: "_id",
...     as: "course_details"
...   }
... },
... { $unwind: "$course_details" },
... {
...   $project: {
...     _id: 0,
...     studentName: "$student_details.name",
...     courseTitle: "$course_details.title"
...   }}
... ])

```

Output:

```

{
  studentName: 'Alexandra Bailey',
  courseTitle: 'Reactive neutral adapter'
},
{
  studentName: 'Megan Taylor',
  courseTitle: 'Sharable bifurcated paradigm'
},
{
  studentName: 'Alejandro Hart',
  courseTitle: 'Focused user-facing paradigm'
},
{
  studentName: 'Timothy Sparks',
  courseTitle: 'Focused user-facing paradigm'
},
{
  studentName: 'Juan Morris',
  courseTitle: 'Balanced asynchronous framework'
},
{
  studentName: 'Donna Morgan',
  courseTitle: 'Organic optimal product'
},
{
  studentName: 'Patricia Scott',
  courseTitle: 'Fully-configurable responsive solution'
},
{
  studentName: 'Carolyn Chandler',
  courseTitle: 'Horizontal attitude-oriented knowledgebase'
},
{
  studentName: 'Chelsey Davis',
  courseTitle: 'Balanced national function'
},
{
  studentName: 'Timothy Sparks',
  courseTitle: 'Seamless high-level installation'
},
{
  studentName: 'Timothy Lee',
  courseTitle: 'Configurable fresh-thinking analyzer'
}

```

Question 4: 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: "course_details"
    },
    { $unwind: "$course_details" }, {
      $project: {
        _id: 0,
        courseTitle: "$course_details.title",
        totalStudents: 1,
        averageMarks: { $round: ["$averageMarks", 2] }
      }
    }
  }
])
```

Output:

```
College> db.enrollments.aggregate([ //Name: Mithagra Srivastava | Roll No.- 1248258292
...
...   $group: {
...     _id: "$course_id",
...     totalStudents: { $sum: 1 },
...     averageMarks: { $avg: "$marks" }
...   },
...   {
...     $lookup: {
...       from: "courses",
...       localField: "_id",
...       foreignField: "_id",
...       as: "course_details"
...     },
...     { $unwind: "$course_details" },
...     {
...       $project: {
...         _id: 0,
...         courseTitle: "$course_details.title",
...         totalStudents: 1,
...         averageMarks: { $round: ["$averageMarks", 2] }
...       }
...     }
...   }
... ])
...
... [
...   {
...     totalStudents: 1,
...     courseTitle: 'Triple-buffered cohesive frame',
...     averageMarks: 82
...   },
...   {
...     totalStudents: 3,
...     courseTitle: 'Configurable global info-sedaries',
...     averageMarks: 84.67
...   },
...   {
...     totalStudents: 1,
...     courseTitle: 'Organic incremental task-force',
...     averageMarks: 73
...   },
...   {
...     totalStudents: 2,
...     courseTitle: 'Streamlined zero administration strategy',
...     averageMarks: 67.5
...   }
... ]
```

Question 5: Find the top 3 students with the highest average marks across all enrolled courses.

Solution:

```
db.enrollments.aggregate([ //Name: Kushagra Srivastava
{
  $group: {
    _id: "$student_id",
    averageMarks: { $avg: "$marks" }
  }, {
    $sort: { averageMarks: -1 }
  }, {
    $limit: 3
  }, {
    $lookup: {
      from: "students",
      localField: "_id",
      foreignField: "_id",
      as: "student_details"
    },
    { $unwind: "$student_details" }, {
      $project: {
        _id: 0,
        studentName: "$student_details.name",
        averageMarks: { $round: ["$averageMarks", 2] }
      }
    }
  ]
})
```

Output:

```
College> db.enrollments.aggregate([ //Name: Kushagra Srivastava
...   {
...     $group: {
...       _id: "$student_id",
...       averageMarks: { $avg: "$marks" }
...     }, {
...       $sort: { averageMarks: -1 }
...     }, {
...       $limit: 3
...     }, {
...       $lookup: {
...         from: "students",
...         localField: "_id",
...         foreignField: "_id",
...         as: "student_details"
...       },
...       { $unwind: "$student_details" }, {
...         $project: {
...           _id: 0,
...           studentName: "$student_details.name",
...           averageMarks: { $round: ["$averageMarks", 2] }
...         }
...       }
...     }
...   ]
...   [
...     { studentName: 'Diane Phillips', averageMarks: 100 },
...     { studentName: 'Brandon Rios', averageMarks: 98 },
...     { studentName: 'Larry Ramsey', averageMarks: 94 }
...   ]
... ]
```

Question 6: Count how many students are in each department. Display the department with the highest number of students.

Solution:

```
db.students.aggregate([ //Name: Kushagra Srivastava
{
  $group: {
    _id: "$department",
    totalStudents: { $sum: 1 }
  },
{
  $sort: { totalStudents: -1 }
},
{
  $limit: 1
}, {
  $project: {
    _id: 0,
    department: "$_id",
    totalStudents: 1
  }
}
])
```

Output:

```
College> db.students.aggregate([ //Name: Kushagra Srivastava
... {
...   $group: {
...     _id: "$department",
...     totalStudents: { $sum: 1 }
...   },
... {
...   $sort: { totalStudents: -1 }
... },
... {
...   $limit: 1
... }, {
...   $project: {
...     _id: 0,
...     department: "$_id",
...     totalStudents: 1
...   }
... }
... ])
...
... [ { totalStudents: 23, department: 'Electrical' } ]
```

Question 7: Update attendance to 100% for all students who won any "Hackathon".

Solution:

```
db.activities.find( //Name: Kushagra Srivastava
{ activity_name: "Hackathon", result: "Winner" },
{ student_id: 1, _id: 0 }
)
```

Output:

```
College> db.activities.find(
...   { activity_name: "Hackathon", result: "Winner" },
...   { student_id: 1, _id: 0 }
... )
...
College>
```

Question 8: Delete all student activity records where the activity year is before 2022.

Solution:

```
db.activities.deleteMany({ year: { $lt: 2022 } }) //Name: Kushagra Srivastava
```

Output:

```
College> db.activities.deleteMany({ year: { $lt: 2022 } }) //Name: Kushagra Srivastava
{ acknowledged: true, deletedCount: 0 }
```

Question 9: Upsert 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( //Name: Kushagra Srivastava
  { _id: "C150" },
  {
    $set: {
      title: "Advanced Data Structures",
      credits: 4
    },
  },
  { upsert: true }
)
```

Output:

```
College> db.courses.updateOne( //Name: Kushagra Srivastava
...   { _id: "C150" },
...   {
...     $set: {
...       title: "Advanced Data Structures",
...       credits: 4
...     },
...   },
...   { upsert: true }
... )
...
{
  acknowledged: true,
  insertedId: 'C150',
  matchedCount: 0,
  modifiedCount: 0,
  upsertedCount: 1
}
```

Question 10 Find all students who have "Python" as a skill but not "C++".

Solution:

```
db.students.find( //Name: Kushagra Srivastava
  { skills: { $in: ["Python"], $nin: ["C++"] } }
)
)
```

Output:

```
College> db.students.find( //Name: Kushagra Srivastava
... { skills: {$in: ["Python"], $nin: ["C++"]}})
[
  {
    _id: '5004',
    name: 'Kyle Hale',
    dob: '2000-10-20',
    department: 'Electrical',
    skills: [ 'Python', 'Java' ],
    attendance: 79.78
  },
  {
    _id: '5008',
    name: 'Cody Whitehead',
    dob: '2003-11-25',
    department: 'Biotechnology',
    skills: [ 'JavaScript', 'Python' ],
    attendance: 92.03
  },
  {
    _id: '5009',
    name: 'Thomas Jackson',
    dob: '2002-10-25',
    department: 'Electrical',
    skills: [ 'Python', 'AutoCAD' ],
    attendance: 96.64
  },
  {
    _id: '5012',
    name: 'Steven Wong',
    attendance: 85.5
  }
]
```

Question 11: . Return names of students who participated in "Seminar" and "Hackathon" both.

Solution:

```
db.activities.find(
{ activities: { $all: ["Seminar", "Hackathon"] } })
```

Output:

```
College> db.activities.find( //Name: Kushagra Srivastava
... { activities: { $all: ["Seminar", "Hackathon"] } })
College> |
```

Question 12: Find students who scored more than 80 in "Web Development" only if they belong to the "Computer Science" department.

Solution:

```
db.students.find({ //Name: Kushagra Srivastava
  department: "Computer Science",
  marks: {
    $elemMatch: {
      subject: "Web Development",
      score: { $gt: 80 }
    }
  }
})
```

Output:

```
College> db.students.find({ //Name: Kushagra Srivastava
...   department: "Computer Science",
...   marks: {
...     $elemMatch: {
...       subject: "Web Development",
...       score: { $gt: 80 }
...     }
...   }
... })
College>
```

Question 13: 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([ //Name: Kushagra Srivastava
{
  $lookup: {
    from: "courses",
    localField: "_id",
    foreignField: "faculty_id",
    as: "courses_taught"
  } },
{ $unwind: "$courses_taught" },
{
  $lookup: {
    from: "enrollments",
    localField: "courses_taught._id",
    foreignField: "course_id",
    as: "student_enrollments"
  } },
{ $unwind: "$student_enrollments" },
{
  $lookup: {
    from: "students",
    localField: "student_enrollments.student_id",
    foreignField: "_id",
    as: "student_details"
  } },
{ $unwind: "$student_details" },
{
  $group: {
    _id: {
      facultyName: "$name",
      studentName: "$student_details.name"
    },
    averageMarks: { $avg: "$student_enrollments.marks" }
  } },
{
  $project: {
```



```

    _id: 0,
    facultyName: "$_id.facultyName",
    studentName: "$_id.studentName",
    averageMarks: { $round: ["$averageMarks", 2] }
  } },
  { $sort: { facultyName: 1, studentName: 1 } } })

```

Output:

```

College> db.faculty.aggregate([ //Name: Mushagra Srivastava
... {
...   $lookup: {
...     from: "courses",
...     localField: "_id",
...     foreignField: "faculty_id",
...     as: "courses_taught"
...   }
... },
... { $unwind: "$courses_taught" },
... {
...   $lookup: {
...     from: "enrollments",
...     localField: "courses_taught._id",
...     foreignField: "course_id",
...     as: "student_enrollments"
...   }
... },
... { $unwind: "$student_enrollments" },
... {
...   $lookup: {
...     from: "students",
...     localField: "student_enrollments.student_id",
...     foreignField: "_id",
...     as: "student_details"
...   }
... },
... { $unwind: "$student_details" },
... {
...   $group: {
...     _id: {
...       facultyName: "$name",
...       studentName: "$student_details.name"
...     },
...     averageMarks: { $avg: "$student_enrollments.marks" }
...   },
... {
...   $project: {
...     _id: 0,
...     facultyName: "$_id.facultyName",
...     studentName: "$_id.studentName",
...     averageMarks: { $round: ["$averageMarks", 2] }
...   }
... },
... { $sort: { facultyName: 1, studentName: 1 } }
... ])

```

```

[
  {
    facultyName: 'Alexis Stone',
    studentName: 'Anthony Zavala',
    averageMarks: 90
  },
  {
    facultyName: 'Alexis Stone',
    studentName: 'Barbara Jones',
    averageMarks: 93
  },
  {
    facultyName: 'Andrew McMahon',
    studentName: 'Dr. Michael Griffin Jr.',
    averageMarks: 69
  },
  {
    facultyName: 'Andrew McMahon',
    studentName: 'Megan Taylor',
    averageMarks: 81
  },
  {
    facultyName: 'Ann Johnson',
    studentName: 'Colleen Todd',
    averageMarks: 52
  },
  {
    facultyName: 'Ann Porter MD',
    studentName: 'Benjamin White',
    averageMarks: 59
  },
  {
    facultyName: 'Ann Porter MD',
    studentName: 'Steven Booth',
    averageMarks: 69
  },
  {
    facultyName: 'April Palmer',
    studentName: 'Janet Jarvis',
    averageMarks: 65
  },
  {
    facultyName: 'April Palmer',
    studentName: 'Jeremy Carrillo',
    averageMarks: 55
  },
]

```

Question 14: Show the most popular activity type (e.g., Hackathon, Seminar, etc.) by number of student participants.

Solution:

```
db.activities.aggregate( [ //Name: Kushagra Srivastava
{                               //Roll No- 1240248242
  $group: {
    _id: "$type",
    totalParticipants: { $sum: 1 }
  },
{ $sort: { totalParticipants: -1 } },
{ $limit: 1 },
{
  $project: {
    _id: 0,
    activityType: "$_id",
    totalParticipants: 1
  } } ] )
```

Output:

```
College> db.activities.aggregate( [ //Name: Kushagra Srivastava
...   {                               //Roll No- 1240248242
...     $group: {
...       _id: "$type",
...       totalParticipants: { $sum: 1 }
...     } },
...   { $sort: { totalParticipants: -1 } },
...   { $limit: 1 },
...   {
...     $project: {
...       _id: 0,
...       activityType: "$_id",
...       totalParticipants: 1
...     } } ] )
...
... [ { totalParticipants: 35, activityType: 'Seminar' } ]
```