Big Data GHW – 3

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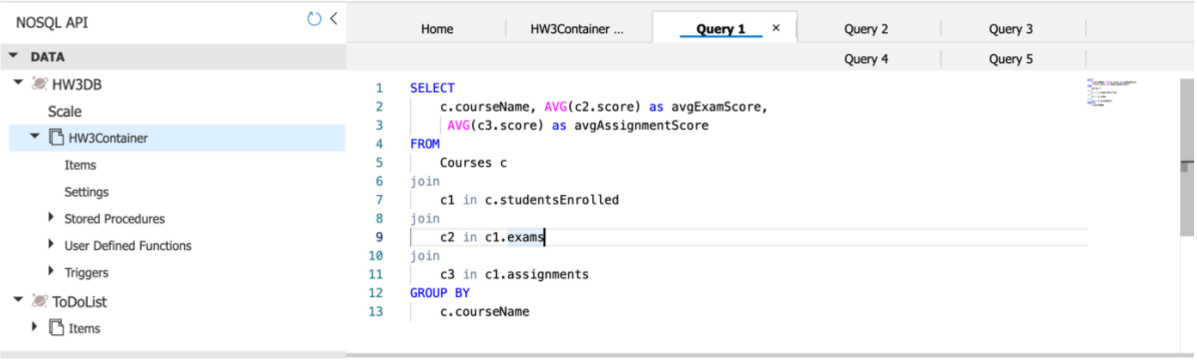
Course: Big Data Section – D
Semester: Fall 2023

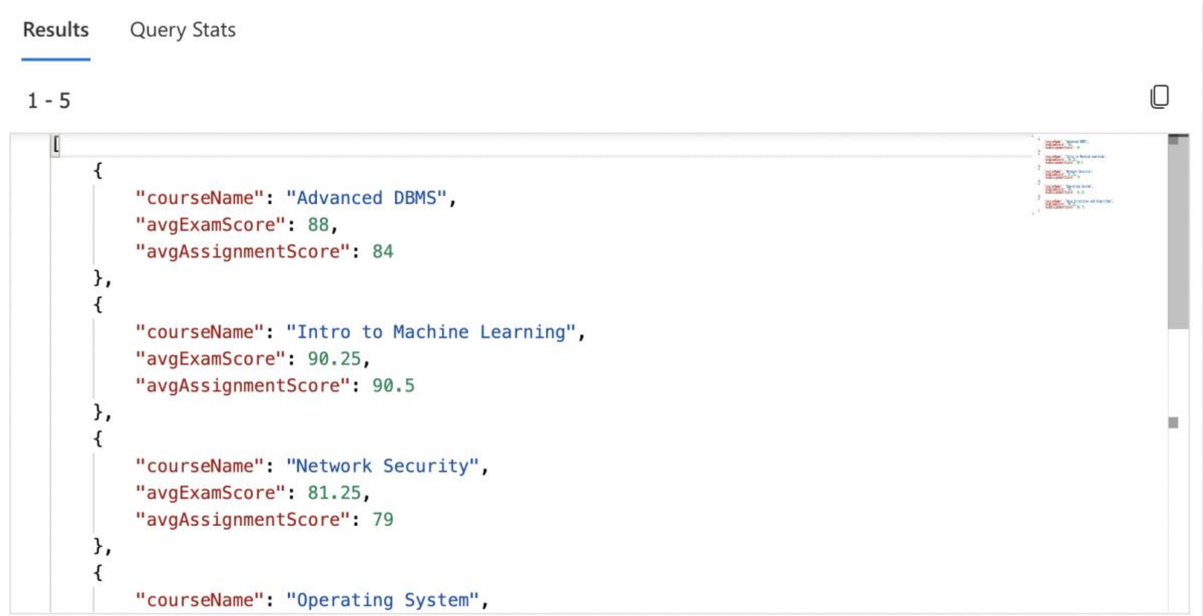
Q1. Fetch the course name and the average exam and average assignment score for all courses.

Solution 1.
For the above question, the query executed is:-

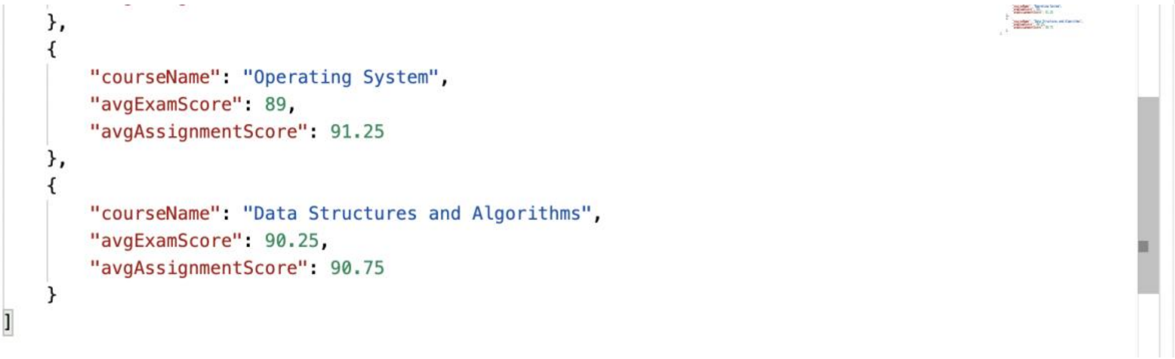


```
SELECT
    c.courseName, AVG(c2.score) as avgExamScore,
     AVG(c3.score) as avgAssignmentScore
FROM
    Courses c
join
    c1 in c.studentsEnrolled
join
    c2 in c1.exams
join
    c3 in c1.assignments
GROUP BY
    c.courseName
```

The output of the query is:-



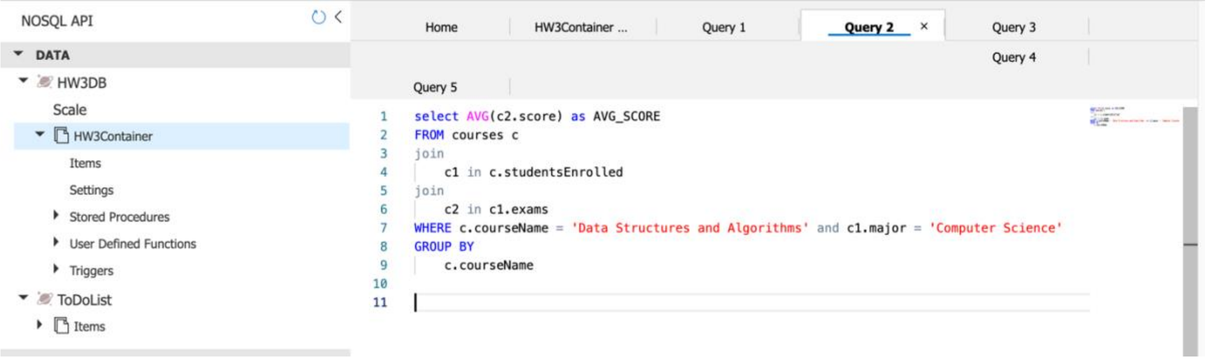
```
[
    {
        "courseName": "Advanced DBMS",
        "avgExamScore": 88,
        "avgAssignmentScore": 84
    },
    {
        "courseName": "Intro to Machine Learning",
        "avgExamScore": 90.25,
        "avgAssignmentScore": 90.5
    },
    {
        "courseName": "Network Security",
        "avgExamScore": 81.25,
        "avgAssignmentScore": 79
    },
    {
        "courseName": "Operating System",
```



```
    },
    {
        "courseName": "Operating System",
        "avgExamScore": 89,
        "avgAssignmentScore": 91.25
    },
    {
        "courseName": "Data Structures and Algorithms",
        "avgExamScore": 90.25,
        "avgAssignmentScore": 90.75
    }
]
```

Q2. Calculate the average exam score for students majoring in "Computer Science" who are enrolled in the "Data Structures and Algorithms" course.

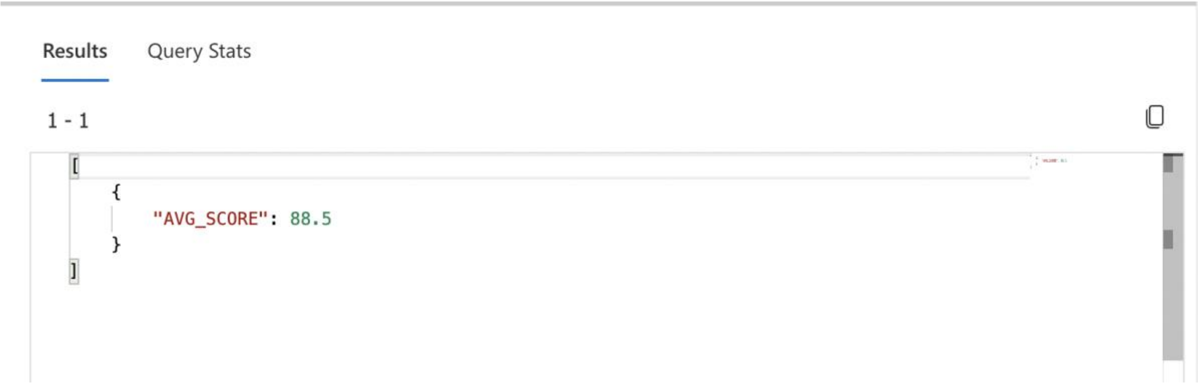
Solution 2.
For the above question, the query executed is:-



```
select AVG(c2.score) as AVG_SCORE
FROM courses c
join
    c1 in c.studentsEnrolled
join
    c2 in c1.exams
WHERE c.courseName = 'Data Structures and Algorithms' and c1.major = 'Computer Science'
GROUP BY
    c.courseName

```

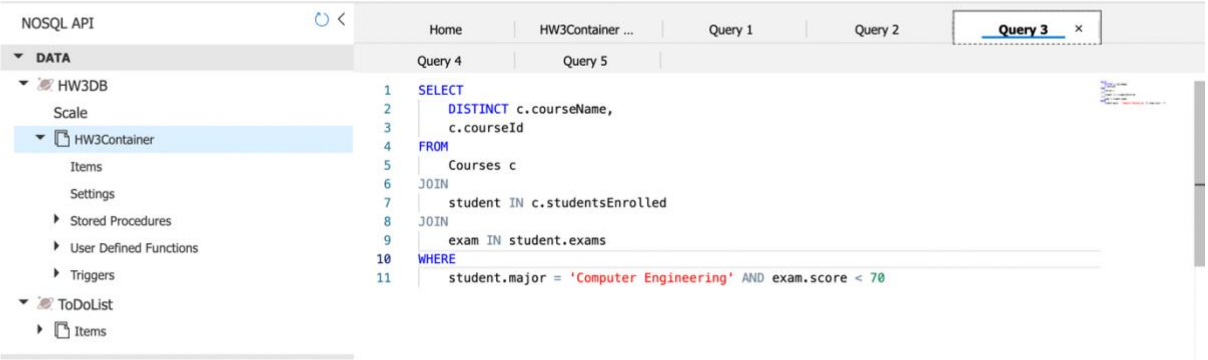
The output of this query is:-



```
[
    {
        "AVG_SCORE": 88.5
    }
]
```

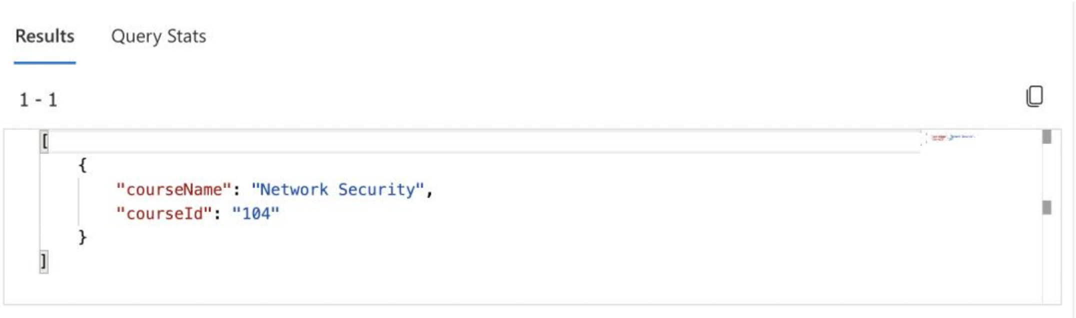
Q3. Find the courses where at least one student's major is "Computer Engineering" and they scored below 70 on exams.

Solution 3.
For the above question, the query executed is:-



```
SELECT
    DISTINCT c.courseName,
    c.courseId
FROM
    Courses c
JOIN
    student IN c.studentsEnrolled
JOIN
    exam IN student.exams
WHERE
    student.major = 'Computer Engineering' AND exam.score < 70
```

The output of the query:-

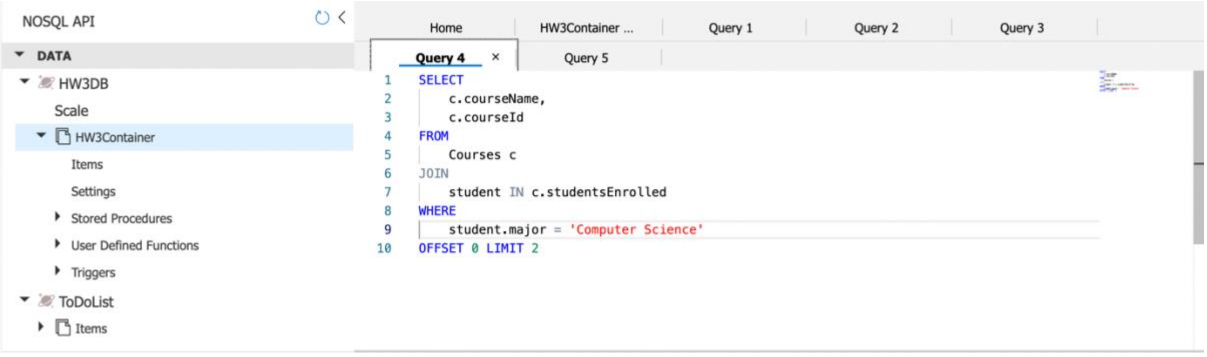


```
[
    {
        "courseName": "Network Security",
        "courseId": "104"
    }
]
```

Q4. Select any two courses where there is at least one student’s major that is “Computer Science” (There must be at least three students in different courses, who’s major is Computer Science)

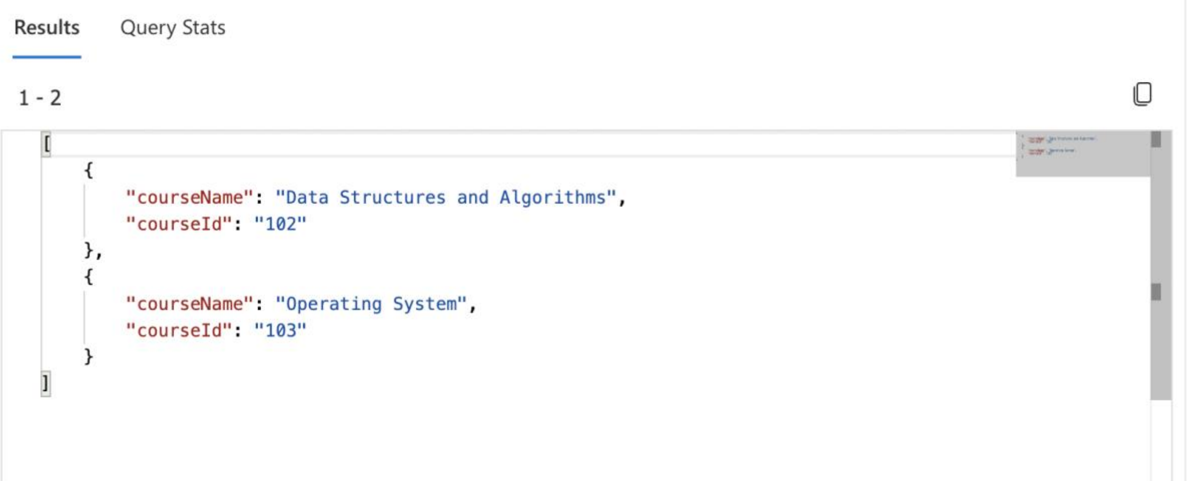
Solution 4.

For the above question, the query executed is:-



```
SELECT
    c.courseName,
    c.courseId
FROM
    Courses c
JOIN
    student IN c.studentsEnrolled
WHERE
    student.major = 'Computer Science'
OFFSET 0 LIMIT 2
```

The output of the query:-

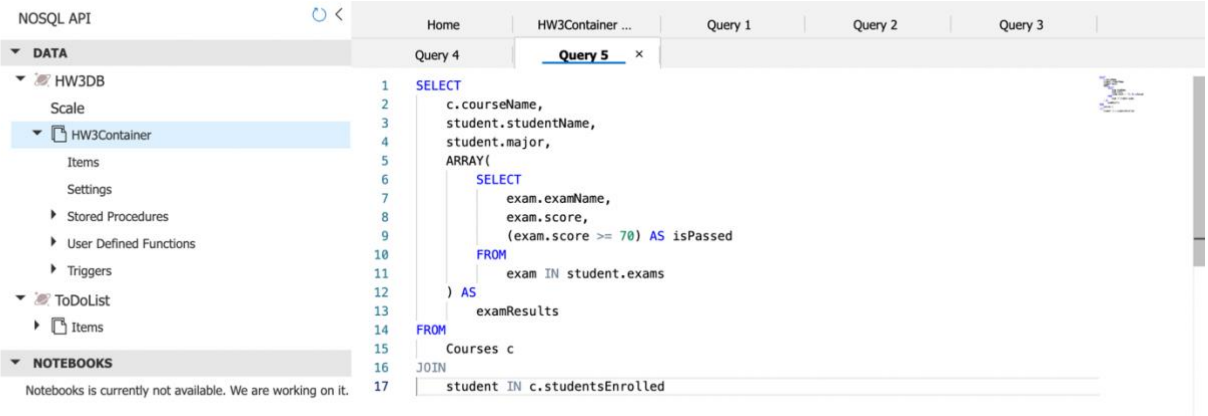


```
[
    {
        "courseName": "Data Structures and Algorithms",
        "courseId": "102"
    },
    {
        "courseName": "Operating System",
        "courseId": "103"
    }
]
```

Q5. Calculate the overall pass grade (if they passed or failed) for each student, considering a passing grade as an exam score (exams) of 70 or higher. (Make sure at least one student fails in your database)

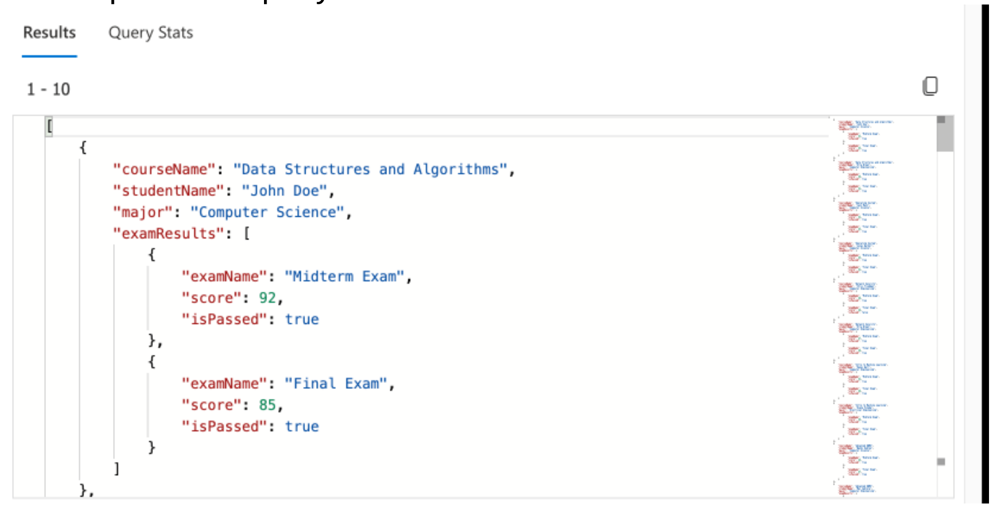
Solution 5.

For the above question, the query executed is:-

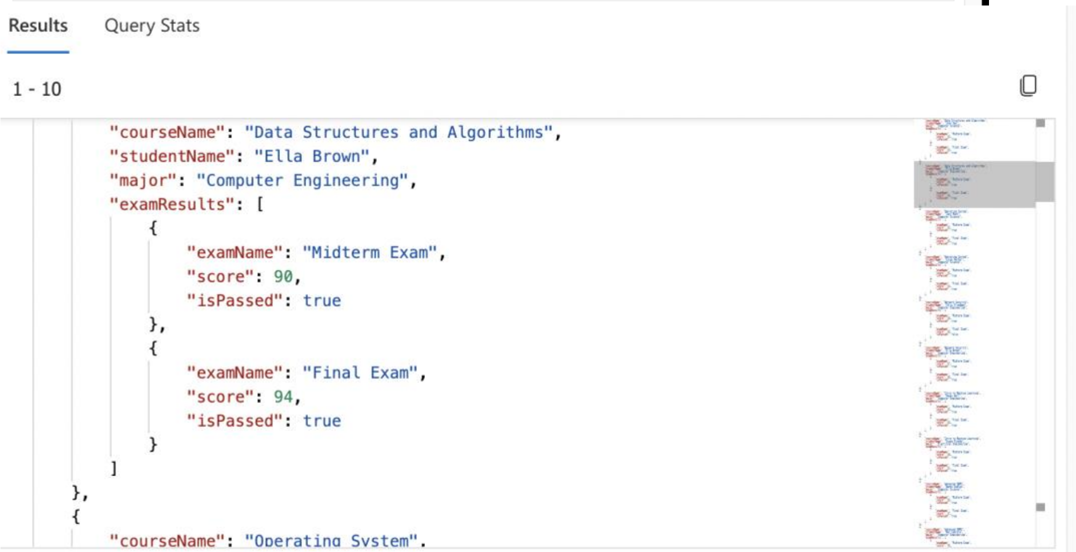


```
SELECT
    c.courseName,
    student.studentName,
    student.major,
    ARRAY(
        SELECT
            exam.examName,
            exam.score,
            (exam.score >= 70) AS isPassed
        FROM
            exam IN student.exams
    ) AS
        examResults
FROM
    Courses c
JOIN
    student IN c.studentsEnrolled
```

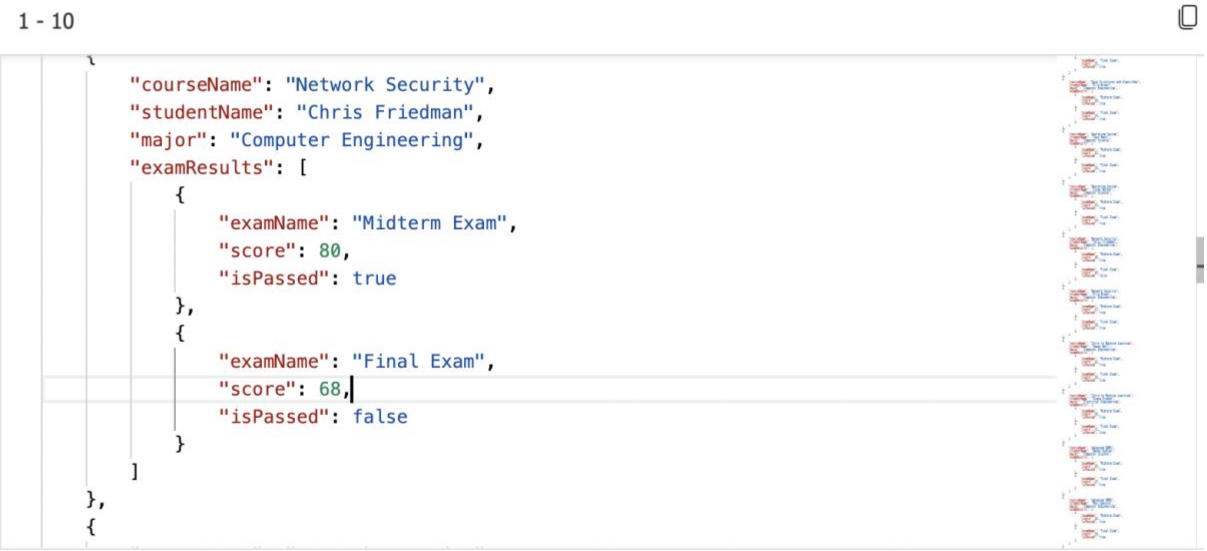
The output of the query:-



```
[
    {
        "courseName": "Data Structures and Algorithms",
        "studentName": "John Doe",
        "major": "Computer Science",
        "examResults": [
            {
                "examName": "Midterm Exam",
                "score": 92,
                "isPassed": true
            },
            {
                "examName": "Final Exam",
                "score": 85,
                "isPassed": true
            }
        ]
    },
```



```
        "courseName": "Data Structures and Algorithms",
        "studentName": "Ella Brown",
        "major": "Computer Engineering",
        "examResults": [
            {
                "examName": "Midterm Exam",
                "score": 90,
                "isPassed": true
            },
            {
                "examName": "Final Exam",
                "score": 94,
                "isPassed": true
            }
        ]
    },
    {
        "courseName": "Operating System",
```



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```
    {
        "courseName": "Network Security",
        "studentName": "Chris Friedman",
        "major": "Computer Engineering",
        "examResults": [
            {
                "examName": "Midterm Exam",
                "score": 80,
                "isPassed": true
            },
            {
                "examName": "Final Exam",
                "score": 68,
                "isPassed": false
            }
        ]
    },
    {
```

Learning Outcomes:-

- Proficiency in running queries in Cosmos DB.
- Competency in creating and managing data items.
- Understanding NoSQL database principles.
- Familiarity with data modelling in a NoSQL context.
- Gained practical experience in working with a real-world NoSQL database system.