

NoSQL Databases – Dr. John Organ

Group Assignment Brief: School Management System Database Conversion

Objective

The objective of this group assignment is to convert a given relational database schema for a school management system into a document-oriented NoSQL database schema. Groups will demonstrate their understanding of NoSQL concepts by designing a schema, providing sample data, writing queries, and presenting their findings.

Relational Database Schema: School Management System

1. Students Table

Column Name	Data Type	Description
-------------	-----------	-------------

StudentID	INT (PK)	Unique identifier for each student
FirstName	VARCHAR	First name of the student
LastName	VARCHAR	Last name of the student
Email	VARCHAR	Email address of the student
PhoneNumber	VARCHAR	Phone number of the student

2. Courses Table

Column Name	Data Type	Description
-------------	-----------	-------------

CourseID	INT (PK)	Unique identifier for each course
CourseName	VARCHAR	Name of the course
Credits	INT	Number of credits for the course

3. Enrollments Table

Column Name	Data Type	Description
-------------	-----------	-------------

EnrollmentID	INT (PK)	Unique identifier for each enrollment
StudentID	INT (FK)	Reference to the student
CourseID	INT (FK)	Reference to the course
EnrollmentDate	DATE	Date of enrollment

4. Grades Table

Column Name Data Type Description

GradeID	INT (PK)	Unique identifier for each grade
EnrollmentID	INT (FK)	Reference to the enrollment
Grade	CHAR(1)	Grade received (A, B, C, etc.)

Tasks

1. **Convert the Relational Schema to NoSQL:** Design a NoSQL schema using MongoDB that effectively represents the same information as the relational database schema. Consider how to best embed related data and minimize redundancy.
2. Provide a written explanation for your schema design, including why certain data is embedded or referenced.
3. **Provide Sample Data:** Insert at least five sample records into the NoSQL schema you have designed, ensuring the data reflects the structure you proposed.
4. **Write Queries:** Create queries demonstrating how to retrieve data from your NoSQL schema, showcasing different aspects of the school management system (e.g., retrieving a student's courses, fetching grades, etc.).
5. **Presentation:** Prepare a presentation (7 to 10 minutes) summarising your NoSQL design, the rationale behind your decisions, and the queries you've written.
6. Each group member must describe their contribution to the assignment.

Submission Requirements

- Submit a document containing the NoSQL schema design, sample data, and written queries.
- Prepare a presentation (PowerPoint or similar format) summarizing your work. Include a recorded video demonstrating queries being executed along with any explanatory notes.

This assignment encourages students to think critically about data relationships, the advantages of NoSQL databases, and how to structure data effectively in a document-oriented model.

If you need more details or adjustments, feel free to ask!

Submission deadlines please see Moodle for specifics.

Some Submission Guidance:

A good project presentation would include but not be limited to the following:

Schema Design: Provide a diagram or textual explanation of your NoSQL schema and how it translates the relational model. Include justifications for embedding vs referencing.

Sample Data: Clear and formatted examples of records entered in collections.

Queries and Results: A clear demonstration of the use of various queries and their associated results.

Rationale: Discuss why your NoSQL design is effective for this use case compared to the relational model.

Presentation: Your group presentation should include: visuals and, recorded demonstration of queries being executed.

Team Contribution: Roles and tasks assigned to each member of the group, work you did together as a team, and finally, challenges faced and steps taken to overcome them.