

CSE464
Take-Home Assessment (Class Test 03)
Fragmentation in Distributed Databases

Relational Schema:

You are given the following relational schema for a University Course Registration System:

STUDENT(SID, Name, Program, DeptID)
COURSE(CID, CName, DeptID, Credits)
ENROLLMENT(SID, CID, Grade)
DEPARTMENT(DeptID, DeptName, Location)

This university operates on three campuses located in Dhaka, Chittagong, and Khulna. Each campus offers a subset of programs and courses.

The STUDENT and ENROLLMENT data are to be horizontally fragmented based on the campus location, while the COURSE is to be vertically fragmented.

Task A: (3 Marks)

Explain the differences between primary horizontal, derived horizontal, and vertical fragmentation, providing examples based on the schema provided above.

Task B: (6 Marks)

1. Propose a horizontal fragmentation strategy for the STUDENT and ENROLLMENT relations based on the student's program location.
2. Propose a vertical fragmentation strategy for the COURSE relation that ensures course metadata is separated from offering details.

Task C: (6 Marks)

Design the fragmentation schema and write the SQL expressions to define each fragment of the STUDENT and COURSE relations.

- Define STUDENT_DHAKA, STUDENT_CHITTAGONG, and STUDENT_KHULNA based on an attribute (you may assume a Campus attribute exists or infer from DeptID).
- Define COURSE_BASIC and COURSE_DETAIL using vertical fragmentation.

Use SQL CREATE VIEW or SELECT statements to illustrate the fragments.

Submission Instructions:

- Submit a single PDF file with your handwritten responses.
- Clearly label each part (A, B, C) of your answer.

I have already generated the solution to this assessment using all popular LLM engines. Therefore, please be cautious when submitting an AI-generated answer.