Database and its Applications

Data Models and Mathematical Foundations

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Computer Applications

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Experiential Learning IV: Application-based Task

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Application-Based Practice Task

- **Scenario: Hogwarts School of Witchcraft and Wizardry**
  - The Ministry of Magic maintains Hogwarts academic records.
  - The database includes relations for **Students**, **Subjects**, **Enrollment**, and **Professors**.
  - Students will perform all queries using **Relational Algebra only**.
  - Focus: Understanding data relationships through **real-world problem-solving**.

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Relation 1 – STUDENT

StudentID	Name	House	Year	Marks
S1	Harry Potter	Gryffindor	3	85
S2	Hermione Granger	Gryffindor	3	95
S3	Ron Weasley	Gryffindor	3	78
S4	Draco Malfoy	Slytherin	3	82
S5	Luna Lovegood	Ravenclaw	3	88

- This relation stores basic student information.

Relation 2 – SUBJECT

SubID	SubjectName	Professor
SB1	Defence Against the Dark Arts	Lupin
SB2	Potions	Snape
SB3	Transfiguration	McGonagall
SB4	Charms	Flitwick

- Each subject is taught by one professor.

Relation 3 – ENROLLMENT

StudentID	SubID	Grade
S1	SB1	A
S1	SB3	B
S2	SB1	A
S2	SB2	A
S3	SB4	B
S4	SB2	B
S5	SB3	A

- Represents which student is enrolled in which subject and their grade.

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Relation 4 – PROFESSOR

ProfID	Name	House
P1	McGonagall	Gryffindor
P2	Snape	Slytherin
P3	Flitwick	Ravenclaw
P4	Lupin	Gryffindor

- Professors belong to houses and teach specific subjects.

- Perform the following using Relational Algebra:
  - List the names and houses of all students.
  - Retrieve details of students whose marks exceed 85.
  - Display SubjectName and Professor only.
  - Identify all student–subject combinations.
  - Find all unique Houses that have at least one student.

Section B – Combined Operations

- Intermediate Operations:
  - Find the subjects each student is enrolled in.
  - List students enrolled in subjects taught by Gryffindor professors.
  - Retrieve students who are not enrolled in Potions. (**Difference**)
  - Find Gryffindor students with marks above 80.
  - Determine professors who teach subjects taken by Hermione.

- Application-based reasoning:
  - Retrieve students who take **Transfiguration** or **Charms**.
  - Determine houses with students taught by professors from the same house.
  - Find students enrolled in all subjects offered by Gryffindor professors.
  - Retrieve students not enrolled in any subject.
  - Find the average marks per house.

Thank You

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