HABIB UNIVERSITY

Database Systems

CS/CE 355/373 Fall 2023

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Relational Algebra

Assume we have the following schemas for the university database:

classroom(*building*, *room_number*, *capacity*)
department(*dept_name*, *building*, *budget*)
course(*course_id*, *title*, *dept_name*, *credits*)
instructor(*ID*, *name*, *dept_name*, *salary*)
section(*course_id*, *sec_id*, *semester*, *year*, *building*, *room_number*, *time_slot_id*)
teaches(*ID*, *course_id*, *sec_id*, *semester*, *year*)
student(*ID*, *name*, *dept_name*, *tot_cred*)
takes(*ID*, *course_id*, *sec_id*, *semester*, *year*, *grade*)
advisor(*s_ID*, *i_ID*)
time_slot(*time_slot_id*, *day*, *start_time*, *end_time*)
prereq(*course_id*, *prereq_id*)

Figure 2.8 Schema of the university database.

Write down the queries for the given Select relational operations:

1. Find all the courses in "CS" Department that have 3 credits
2. Find enrollment of each section that was offered in Fall 2022
3. Find all students who have taken a course in Spring 2023 with one section only – Assume for a one section course, course ID is the same as section ID

1	
2	
3	

Write down the queries for the given Project relational operations:

1. List down all department names and their buildings
2. List down all course IDs and their titles
3. List down all instructor IDs advising students

1	
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Write down the queries for the Composite relational operations:

1. Find out names of all students in CS and EE departments
2. Find all the course IDs that have prerequisite as CS-101
3. List down all the instructor IDs and the sections they are teaching for the course CS-355 in Fall 2023

1	
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Write down the queries for the Union relational operations:

1. Get the names of all instructors and students at the university
    - When will this operation be misleading?
2. Get the IDs of all students enrolled in CS-355 and IDs of all instructors teaching it in Fall 2023
3. List all the buildings of the university

1	
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