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 Intersection relational operations:

1. Find complete student details that are enrolled in both CS-355 and CS-224 this semester
2. Find building names which have both department offices as well as classrooms
3. Find the IDs of instructors that were advisors, as well as taught courses in both semesters of the year 2020

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Write down the queries for the Join relational operations:

1. Find all course titles that were not offered in Summer 2023
2. Find all course IDs being offered in Fall 2023 on Mondays, as well as their start and end timings
3. Find names and grades of all students of CE department enrolled in the current semester whose student IDs lie in the range of 301 to 399 (both inclusive)
4. List all the courses with their details that have some prerequisites
5. Find room number and their capacities of all the buildings of ECE department, without removing any attributes
6. Find student names and their advisor names, and remove the repeated attributes

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Write down the queries for the Assignment relational operations:

1. List of all course IDs not being taught any instructor in academic year, 2022-2023. Assign all selections to relation variables and then use them in the query
2. Find building names which have both department offices as well as classrooms. Assign all projections to relation variables before using them in the query
3. Find all course titles that were not offered in Summer 2023. Assign every part of the query including the final result to relation variables before defining the query

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