

**CP363: Assignment 3 – Winter 2024**  
**Due on March 22, 2024 (Before 11:55 PM)**

**General Instructions**

This is an individual assignment. The solutions should be uploaded to MyLS (Dropbox). The assignment should be submitted in PDF format.

**Important Notes:**

- Please note that the submitted files will be checked for plagiarism and structural similarity. By submitting these files, you would confirm that you have not received any unauthorized assistance in preparing the assignment. You also confirm that you are aware of course policies for submitted work.
- Multiple attempts will be allowed, but only your last submission before the deadline will be graded. We reserve the right to take off points for not following directions.
- Late policy: If you have a compelling reason for not being able to submit the assignment on time and would like to make a special arrangement, you must send me an email at least a week before the due date (an individual basis will handle any genuine emergencies).

**Questions:**

**Q1 (8 Marks). Consider the following relational schema describing the data for a particular instructor's grade book.**

COURSE\_CATALOG (Cno, Ctitle)

STUDENT (Sid, Fname, Lname, Minit)

COURSE (Term, Sec\_no, Cno, A, B, C, D)

ENROLLS (Sid, Term, Sec\_no)

Specify the following queries using relational algebra.

1. Find a specific student's enrollment details (Term and Sec\_no) (You can assume any student ID).
2. List students enrolled in any class during the fall 2009 term.
3. Retrieve the Sid values of students enrolled in CP363 or CP164.
4. Retrieve the names of students who have not enrolled in any class.

**Q2 (8 Marks) Let's consider a generic schema with two tables:**

EMPLOYEES (EmpID, EmpName, Department, Salary, ManagerID)

PROJECTS (ProjectID, ProjectName, Department, Budget)

ASSIGNMENTS (EmpID, ProjectID, HoursWorked)

What will be the result of the following queries written in relational algebra?

1.  $\pi_{\text{ProjectID, ProjectName, Budget}} (\sigma_{\text{Budget} > (\pi_{\text{AVG}}(\text{Budget})) (\text{PROJECTS}))}$
2.  $\pi_{\text{EmpID, EmpName}} ((\sigma_{\text{Department}='IT'} (\text{ASSIGNMENTS} \bowtie \text{PROJECTS})) \cap (\sigma_{\text{Department}='Finance'} (\text{ASSIGNMENTS} \bowtie \text{PROJECTS})))$
3.  $\text{Department, AVG}(\text{HoursWorked}) (\text{ASSIGNMENTS} \bowtie \text{PROJECTS}) \mid (\text{Group by Department})$
4.  $\pi_{\text{ManagerID, EmpName}} (\text{EMPLOYEES} \bowtie \rho_{\text{EmpID}=\text{ManagerID}} (\text{EMPLOYEES}))$

**Q3 (6 Marks) Based on the given data, you have to answer the following questions:**

- a. Determine whether the table is in 1NF or not. You must check whether the table follows the first normal form rules to do this. If it does, it is in 1NF; otherwise, it is not.
- b. Convert the table to 3NF. This means analyzing the table and ensuring its data is organized to satisfy the third normal form rules. This includes ensuring that each attribute in the table depends on the primary key and that there are no transitive dependencies between non-key attributes.

StudentID	StudentAddress	Contactno
S001	8 Jefferson Way, Portland, OR 97201	503-555-3618, 503-555-2727, 503-555-6534
S002	City Center Plaza, Seattle, WA 98122	206-555-6756, 206-555-8836
S003	14 – 8th Avenue, New York, NY 10012	212-371-3000
S004	16 – 14th Avenue, Seattle, WA 98128	206-555-3131, 206-555-4112
S005	14 – 8th Avenue, New York, NY 10012, 16 – 14th Avenue, Seattle, WA 98128	503-444-123, 219-564-890

**Q4 (8 Marks) The table in the figure below presents data on scheduled appointments between physicians and patients. Each patient is given an appointment with a specific physician on a specific date and time. Each day, a physician is assigned to a specific illness for patient appointments. However, this table is vulnerable to anomalies. To illustrate this, provide examples of insertion, deletion, and update anomalies.**

AppointmentId	PhysicianID	PatientID	Patient_name	Appointment_Date_Time	Duration
1	D001	P001	Chris Smith	2024-03-15 09:00 AM	30
2	D002	P002	David	2024-03-16 02:30 PM	35
3	D003	P003	Will Smith	2024-03-17 11:15 AM	40
4	D004	P004	Jackson	2024-03-18 03:45 PM	30
5	D005	P005	Carter	2024-03-18 03:45 PM	35
6	D006	P006	Jill H. Martin	2024-03-19 10:30 AM	40

##### Best of luck for the assignment #####