

CSE 4701 Spring 2020

Homework 1: Due 11:59 pm, February 7 (Fri), 2020 at HuskyCT

In 6th Edition

1. Problem 6.16 (pg. 187-188): a, b, f, and h. (There is a typo; “Schema shown in Figure 5.5” should be read “Schema shown in Figure 3.5”). Write (i) the corresponding relational algebraic expression and (ii) the result of evaluating your query with the given database instance.
2. Problem 6.17 (pg. 188): a, b, and c. Hint is given in the last page of this document. Write only the corresponding relational algebraic expression. No need for the result of your query since the database instance is not given.

In 7th Edition

1. Problem 8.16 (pg. 281-282): a, b, f, and h.
2. Problem 8.17 (pg. 282): a, b, and c. Hint is given in the last page of this document.

You are answering total only 7 sub-problems.

As you notice, depending on which edition you use, problem numbers may differ but they are same problems. **See subsequent pages.**

Total 70 points (10 points per sub-problem)

Please submit your homework answer in CSE 4701 WebCT.

Related materials are given in the subsequent pages.

Note: HWs and Projects, 5% penalty for one day late submission. No acceptance after 48 hours.

Exercises

- 6.15. Show the result of each of the sample queries in Section 6.5 as it would apply to the database state in Figure 3.6.
- 6.16. Specify the following queries on the COMPANY relational database schema shown in Figure 5.5, using the relational operators discussed in this chapter. Also show the result of each query as it would apply to the database state in Figure 3.6.
- Retrieve the names of all employees in department 5 who work more than 10 hours per week on the ProductX project.
 - List the names of all employees who have a dependent with the same first name as themselves.
 - Find the names of all employees who are directly supervised by 'Franklin Wong'.
 - For each project, list the project name and the total hours per week (by all employees) spent on that project.
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- Retrieve the names of all employees who work on every project.
 - Retrieve the names of all employees who do not work on any project.
 - For each department, retrieve the department name and the average salary of all employees working in that department.
 - Retrieve the average salary of all female employees.
 - Find the names and addresses of all employees who work on at least one project located in Houston but whose department has no location in Houston.
 - List the last names of all department managers who have no dependents.
- 6.17. Consider the AIRLINE relational database schema shown in Figure 3.8, which was described in Exercise 3.12. Specify the following queries in relational algebra:
- For each flight, list the flight number, the departure airport for the first leg of the flight, and the arrival airport for the last leg of the flight.
 - List the flight numbers and weekdays of all flights or flight legs that depart from Houston Intercontinental Airport (airport code 'IAH') and arrive in Los Angeles International Airport (airport code 'LAX').
 - List the flight number, departure airport code, scheduled departure time, arrival airport code, scheduled arrival time, and weekdays of all flights or flight legs that depart from some airport in the city of Houston and arrive at some airport in the city of Los Angeles.
 - List all fare information for flight number 'CO197'.
 - Retrieve the number of available seats for flight number 'CO197' on '2009-10-09'.

Figure 3.6

One possible database state for the COMPANY relational database schema.

EMPLOYEE

Fname	Minit	Lname	<u>Ssn</u>	Bdate	Address	Sex	Salary	Super_ssn	Dno
John	B	Smith	123456789	1965-01-09	731 Fondren, Houston, TX	M	30000	333445555	5
Franklin	T	Wong	333445555	1955-12-08	638 Voss, Houston, TX	M	40000	888665555	5
Alicia	J	Zelaya	999887777	1968-01-19	3321 Castle, Spring, TX	F	25000	987654321	4
Jennifer	S	Wallace	987654321	1941-06-20	291 Berry, Bellaire, TX	F	43000	888665555	4
Ramesh	K	Narayan	666884444	1962-09-15	975 Fire Oak, Humble, TX	M	38000	333445555	5
Joyce	A	English	453453453	1972-07-31	5631 Rice, Houston, TX	F	25000	333445555	5
Ahmad	V	Jabbar	987987987	1969-03-29	980 Dallas, Houston, TX	M	25000	987654321	4
James	E	Borg	888665555	1937-11-10	450 Stone, Houston, TX	M	55000	NULL	1

DEPARTMENT

Dname	<u>Dnumber</u>	Mgr_ssn	Mgr_start_date
Research	5	333445555	1988-05-22
Administration	4	987654321	1995-01-01
Headquarters	1	888665555	1981-06-19

DEPT_LOCATIONS

<u>Dnumber</u>	<u>Dlocation</u>
1	Houston
4	Stafford
5	Bellaire
5	Sugarland
5	Houston

WORKS_ON

<u>Essn</u>	<u>Pno</u>	Hours
123456789	1	32.5
123456789	2	7.5
666884444	3	40.0
453453453	1	20.0
453453453	2	20.0
333445555	2	10.0
333445555	3	10.0
333445555	10	10.0
333445555	20	10.0
999887777	30	30.0
999887777	10	10.0
987987987	10	35.0
987987987	30	5.0
987654321	30	20.0
987654321	20	15.0
888665555	20	NULL

PROJECT

Pname	<u>Pnumber</u>	Plocation	Dnum
ProductX	1	Bellaire	5
ProductY	2	Sugarland	5
ProductZ	3	Houston	5
Computerization	10	Stafford	4
Reorganization	20	Houston	1
Newbenefits	30	Stafford	4

DEPENDENT

<u>Essn</u>	<u>Dependent_name</u>	Sex	Bdate	Relationship
333445555	Alice	F	1986-04-05	Daughter
333445555	Theodore	M	1983-10-25	Son
333445555	Joy	F	1958-05-03	Spouse
987654321	Abner	M	1942-02-28	Spouse
123456789	Michael	M	1988-01-04	Son
123456789	Alice	F	1988-12-30	Daughter
123456789	Elizabeth	F	1967-05-05	Spouse

AIRPORT

<u>Airport_code</u>	Name	City	State
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FLIGHT

<u>Flight_number</u>	Airline	Weekdays
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FLIGHT_LEG

<u>Flight_number</u>	<u>Leg_number</u>	Departure_airport_code	Scheduled_departure_time
		Arrival_airport_code	Scheduled_arrival_time

LEG_INSTANCE

<u>Flight_number</u>	<u>Leg_number</u>	<u>Date</u>	Number_of_available_seats	Airplane_id
		Departure_airport_code	Departure_time	Arrival_airport_code
				Arrival_time

FARE

<u>Flight_number</u>	<u>Fare_code</u>	Amount	Restrictions
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AIRPLANE_TYPE

<u>Airplane_type_name</u>	Max_seats	Company
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CAN_LAND

<u>Airplane_type_name</u>	<u>Airport_code</u>
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AIRPLANE

<u>Airplane_id</u>	Total_number_of_seats	Airplane_type
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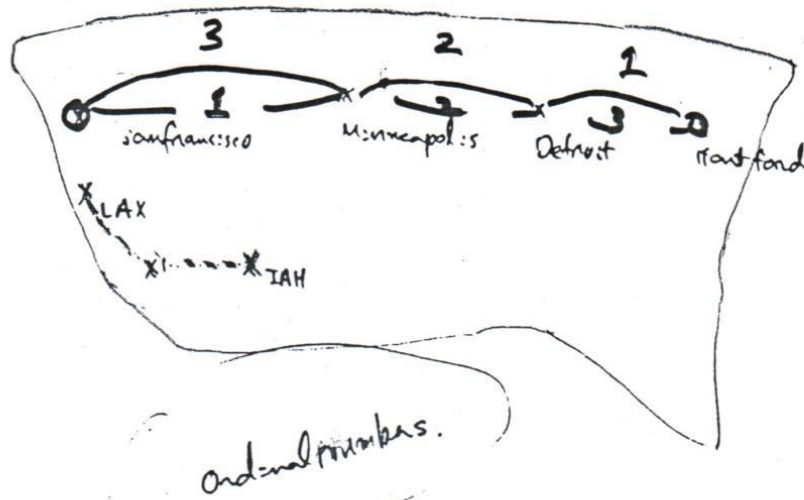
SEAT_RESERVATION

<u>Flight_number</u>	<u>Leg_number</u>	<u>Date</u>	<u>Seat_number</u>	Customer_name	Customer_phone
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Figure 3.8

The AIRLINE relational database schema.

AA250

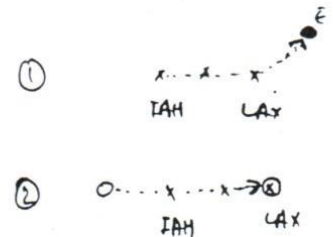


FLIGHT_LEG

down

Flt#	Leg#	DAC	D-Time	AAC	A-Time
AA201	1	HAT		DET	
"	2	DET		MIN	
"	3	MIN		SAN	
TWA 03	1	IAH		X1	type1
"	2	X1		LAX	
	1	IAH		LAX	type2
	1	TEN		IAH	
	2	IAH		X1	type3
	3	X1		LAX	
	4	LAX		SAN	

two other variations



In Exercise 6.17 (8.17), both in FLIGHT_LEG and LEG_INSTANCE, Leg_number will have ordinal numbers, always starting from 1 to indicate the first leg of the flight.