Database Management system

Assignment #1

Chapter #1 & Chapter #2

Instructions:

- ✓ Deadline: Friday 07-10-2022 11:59 pm
- ✓ You must solve all the questions
- ✓ Put the answers in one pdf file name it with 120201234-FirstName-LastName.pdf
- ✓ Cheating will give a zero grade for both students.
- ✓ You must solve this assignment with handwriting and put your name and student id on the top of every single page.

Chapter #1

1. List four significant differences between a file-processing system and a DBMS.
2. Explain the concept of physical data independence and its importance in database systems.
3. Explain the difference between two-tier and three-tier application architectures. Which is better suited for web applications? Why?
4. What are the responsibilities of database administrator? (In Arabic)
5. What is data abstraction? what are the differences between its levels?

Chapter #2

1. Depending on the following schema answer the following questions:

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employee (<u>*ID*</u>, *person_name*, *street*, *city*)
works (<u>*ID*</u>, *company_name*, *salary*)
company (<u>*company_name*</u>, *city*)
manages (<u>*ID*</u>, *manager_id*)

- What are the appropriate primary keys?
- List the foreign keys in the database?
- Find the name of each employee who lives in city “Miami”.
- Find the name of each employee whose salary is greater than $100000.
- Find the name of each employee who lives in “Miami” and whose salary is greater than $100000.
- Find the ID and name of each employee who works for “BigBank”.
- Find the ID, name, and city of residence of each employee who works for “BigBank”.
- Find the ID, name, street address, and city of residence of each employee who works for “BigBank” and earns more than $10000.
- Find the ID and name of each employee in this database who lives in the same city as the company for which she or he works.

- Find ID and name of each employee who lives in the same city and on the same street as does her or his manager.
- Find the name of the employee and the name of his/her manager
- Find ID and name of each employee who earns more than the salary of her or his manager.

2. List two reasons why null values might be introduced into a database.

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branch(*branch_name*, *branch_city, assets*)
customer (*ID*, *customer_name*, *customer_street, customer_city*)
loan (*loan_number*, *branch_name, amount*)
borrower (*ID*, *loan_number*)
account (*account_number*, *branch_name, balance*)
depositor (*ID*, *account_number*)

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3. According to the bank database write the appropriate relational algebra expression to get the following:

- Find each loan number with a loan amount greater than $10000.
- Find the ID of each depositor who has an account with a balance greater than $6000.
- Find the ID of each depositor who has an account with a balance greater than $6000 at the “Uptown” branch.

4. Given the following schema R1(c1, c2, c3) are the following relational algebra expressions equivalents? explain?

C1	c2	c3
5	16	11
4	10	11
4	10	12

$$\sigma_{C1=4}(\sigma_{C2=10}(\sigma_{C3=11}(R1)))$$
$$\sigma_{C3=11}(\sigma_{C1=4}(\sigma_{C2=10}(R1)))$$

5. Give the result of the following operation if possible. If not explain why?

$$\Pi_{course\_id}\,(\sigma_{semester=\text{“Fall”}\ \wedge\ year=2017}\,(section)) \cap \Pi_{course\_id,\ year}\,(\sigma_{semester=\text{“Spring”}\ \wedge\ year=2018}\,(section))$$

course_id	sec_id	semester	year	building	room_number	time_slot_id
BIO-101	1	Summer	2017	Painter	514	B
BIO-301	1	Summer	2018	Painter	514	A
CS-101	1	Fall	2017	Packard	101	H
CS-101	1	Spring	2018	Packard	101	F
CS-190	1	Spring	2017	Taylor	3128	E
CS-190	2	Spring	2017	Taylor	3128	A
CS-315	1	Spring	2018	Watson	120	D
CS-319	1	Spring	2018	Watson	100	B
CS-319	2	Spring	2018	Taylor	3128	C
CS-347	1	Fall	2017	Taylor	3128	A
EE-181	1	Spring	2017	Taylor	3128	C
FIN-201	1	Spring	2018	Packard	101	B
HIS-351	1	Spring	2018	Painter	514	C
MU-199	1	Spring	2018	Packard	101	D
PHY-101	1	Fall	2017	Watson	100	A

6. depending on the following database find the result of the following relational algebra expressions:

loan-number	branch-name	amount
L-170	Downtown	3000
L-230	Redwood	4000
L-260	Perryridge	1700

loan

customer-name	loan-number
Jones	L-170
Smith	L-230
Hayes	L-155

borrower

- Loan ⋈ borrower
- Loan X Borrower
- Write an operation to list the names of the borrowers who have a loan greater than or equal to 3000
- Solve the previous question using assignment criteria.