



LAST NAME: _____

First NAME: _____

Student ID: _____

CSCI 4140 Advanced Database Systems

Impromptu Quiz 3 (Sample Test 1 questions)

TIME ALLOWED: ? hour and ? minutes

NO REFERENCE MATERIAL ALLOWED except a one-page cheat sheet (double-sided)

Use of PDAs, phones, or other electronic devices is not permitted.

Write your answers directly on this examination paper in the provided space!

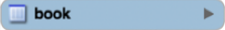
Question	1	2	3	4	5	6	Bonus	Total
Time	10	20	10	10	10	10	0	70 min
Marks	ZZ (W, X), Y							99
Marks Obtained								



1. Consider the DBs shown in figures 1 and 2 on the last page. For convenience and ease of reference, you may remove the last page from this paper. Find the supplier number and name for any supplier who is located in London and who supplies any blue part. Also included with the supplier number and name should be the number and name of any blue part supplied. The constraint is that you may use only the basic relational operators (*select, project, cartesian product, union, and difference*). In other words, the resulting relation should have attributes sNo, sName, pNo, and pName, wherein the values in (sNo and sName) should be repeated for each blue part supplied by the supplier. In addition, to join any two tables, you may use a specific type of a join, as specified below, to join tables.

a. Use a natural join only

b. Use inner join

2. Create an EER diagram, using the Crow's Foot notation, from the following description. If you feel that some information is missing in the question spec, then make a reasonable assumption, but state it clearly. When showing entities in your EER diagram, your entities should not show attributes, but rather should appear as shown here for an entity called book: 

We need to keep the following information about faculties, their departments, professors, and students.

- Faculty: id (unique), name
- Department: id (unique), name
- Professor: id (unique), name, salary
- Student: id (unique), name

Additional information that needs to be represented by the EER diagram:

- A faculty has one or more departments and a department belongs to one faculty.
- Each professor works for one or more departments. A department has zero, one or more professors.
- Each department has a department-chair who is professor. A professor can chair zero or one department.
- Each faculty has a dean who is a professor. Of course, not every professor is a dean and a professor can serve as a dean for at most one faculty.
- A professor may have a mentor (at most one), who is a professor. Not every professor is a mentor and a professor may mentor more than one professor.
- A student may be supervised by zero, one or more professors and a professor may supervise many students. Not every student has a supervisor and not every professor supervises students.

SOLUTIONS FOLLOW



Solutions

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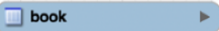
- a. Use a natural join only

$$\pi_{(S.sNo, sName, p.pNo, pName)} \left(\left(\sigma_{(S.sCity = 'London')} S \right) \bowtie SP \bowtie \left(\sigma_{(pColor = 'blue')} P \right) \right)$$

- b. Use inner join

$$\pi_{(S.sNo, sName, p.pNo, pName)} \left(\left(\sigma_{(S.sCity = 'London')} S \right) \bowtie_{(S.sNo = SP.sNo)} SP \bowtie_{(SP.pNo = P.pNo)} \left(\sigma_{(pColor = 'blue')} P \right) \right)$$

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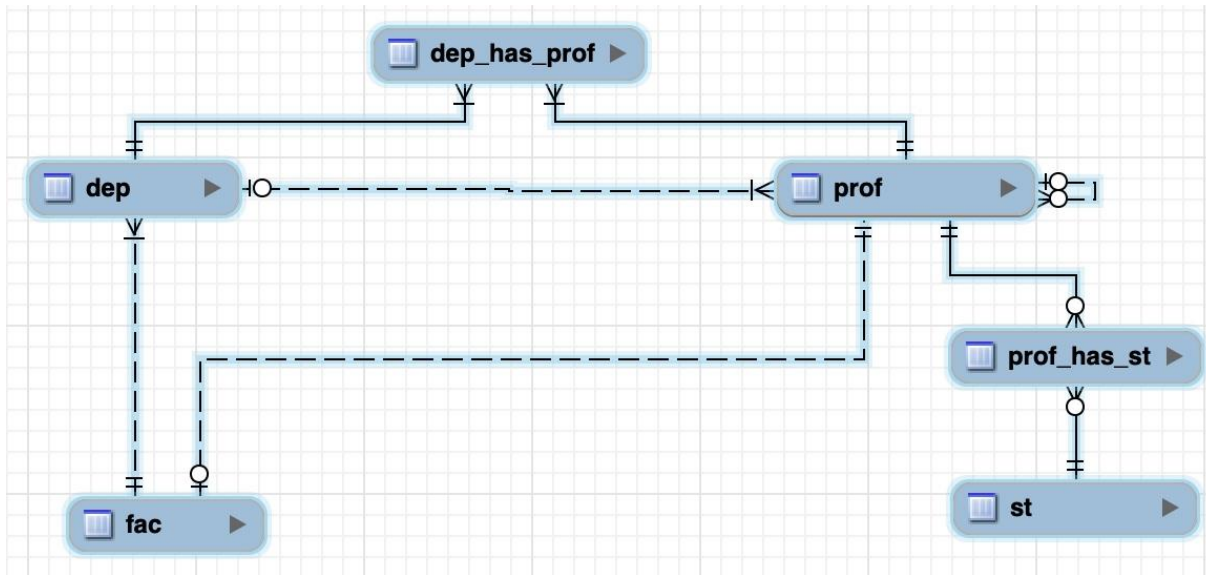


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- A student may be supervised by zero, one or more professors and a professor may supervise many students. Not every student has a supervisor and not every professor supervises students.





For ease of reference, you may detach this page from your test paper !

S

<u>sNo (PK)</u>	sName	sStatus	sCity
...

P

<u>pNo (PK)</u>	pName	pColor	pWeight
...

SP

<u>sNo (PK) (FK)</u>	<u>pNo (PK) (FK)</u>	qty
...

Figure 1. Supplier-Parts DB Tables

S

<u>sNo (PK)</u>	sName	sStatus	sCity
S1	Smith	20	London
S2	Jones	10	London
S3	Blake	30	Paris
S4	Clark	20	London
S5	Adams	30	Athens

P

<u>pNo (PK)</u>	<u>pName</u>	<u>pColor</u>	<u>pWeight</u>
P1	Nut	Red	12
P2	Bolt	Blue	17
P3	Screw	Green	17
P4	Screw	Red	14
P5	Cam	Blue	12

SP

<u>sNo (PK) (FK)</u>	<u>pNo (PK) (FK)</u>	qty
S1	P1	300
S1	P2	200
S1	P3	400
S1	P4	200
S1	P5	100
S2	P1	300
S2	P2	400
S3	P1	100
S3	P2	200
S3	P3	200
S4	P2	200
S4	P3	400
S5	P4	200

Figure 2. Content of the Supplier-Parts DB Tables

EMP

ENO	ENAME	TITLE
-----	-------	-------

ASG

ENO	PNO	RESP	DUR
-----	-----	------	-----

PROJ

PNO	PNAME	BUDGET	LOC
-----	-------	--------	-----

PAY

TITLE	SAL
-------	-----

The above tables contain information about *employees* with their titles (**table EMP** with the primary key being ENO and attributes containing employee name and title), *projects* and their information (**table PROJ** with the primary key being PNO and attributes containing project name, budget, and location), *pay scale* for particular titles (**table PAY** with the primary key being TITLE and an attribute SAL containing the salary amount for an employee holding that title), and *duration of work and responsibilities* as performed by employees on projects (table ASG with the primary key being the composite attribute/column (ENO, PNO) denoting which employee (ENO) working on which project (PNO) holds which responsibility (RESP) and for which duration (DUR)).

Figure 3. Employee-Projects Tables