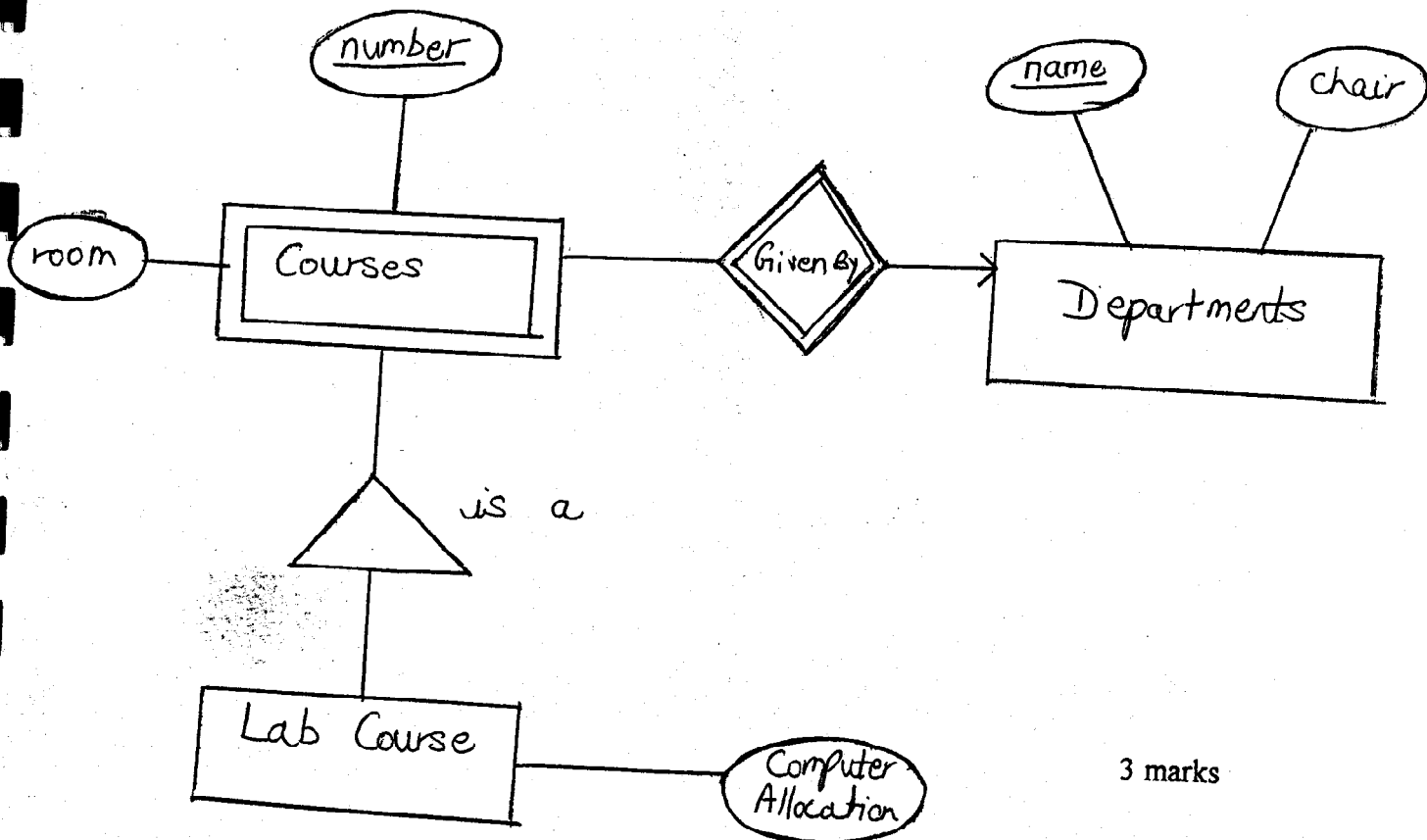Course Name : DATABASE MANAGEMENT SYSTEMS
Course No   :   CSUC352

Comprehensive Exam

Date : 9-6-04   Duration : 3 Hrs   Max marks : 40   Weightage : 40%

Note : Answer **all** questions

1. Convert the given ER Diagram to a relational database schema.

3 marks

2. What is a trigger? Explain the working of a trigger with an example and the SQ
syntax.

<div align="right">– (2 +2+1) marks</div>

3.

    i)   When are voting and elections used in a distributed database

    ii)   What is meant by data allocation in a distributed database design, wha
            typical units of data are distributed over sites

<div align="right">(3 + 3) marks</div>

4. What is meant by thrashing. Explain with a figure   - 3 mar

5. Consider the given relational schema. The underlined attributes indicate the primary
key. For the given schema give what each of the queries give as results.

Suppliers (sid:integer, sname:string, address:string)
Parts(pid:integer, pname:string, color:string)
Catalog(sid:integer,pid :integer, cost :real)

i)   1. $\pi_{sname}(\pi_{sid}((\sigma_{color='red'} Parts) \bowtie (\sigma_{cost<100} Catalog)) \bowtie Suppliers)$

ii). $(\pi_{sid}((\sigma_{color='red'} Parts) \bowtie (\sigma_{cost<100} Catalog) \bowtie Suppliers)) \cap$
$(\pi_{sid}((\sigma_{color='green'} Parts) \bowtie (\sigma_{cost<100} Catalog) \bowtie Suppliers))$

<div align="right">(1.5 X 2 = 3 marks)</div>

   6. i) Consider the relation for published books Books(Book Title, Author
       name, Book Type, List price, Author Affiliation, Publisher)

Suppose the following dependencies hold

    Book Title -> { Publisher,Book Type}
    Book Type -> List Price
    Author Name -> Author Affiliation

    a. What normal form is the relation in
    b. Apply normalization until you cannot decompose the relation further, state the
        reason behind each decomposition

<div align="right">- 6 marks</div>

ii) Explain the significance of the PJNF   - 2 marks

7. What are objects, security classes and clearances in mandatory access control. Discuss the Bell-LaPadula restrictions in terms of these concepts. Specifically define simple security prospects and the *- property

- 3 marks

8. What are covert channels, how can they arise when both discretionary and mandatory access control are in place.   – 3 marks

9. Write short notes on each of the following

   a. List the important features of any two of the recent database systems
   b. Explain what is meant be DML and DDL
   c. Discuss some important aspects of object oriented databases and explain the reason for their success.

   - 2X 3 =6

************************** GOOD LUCK ****************************

(3

DATABASE MANAGEMENT SYSTEMS   CSUC352   Test 2(open Book)

Duration : 50 Mins   Max marks : 20   Weightage : 20%   Date : 9-5-04

Note : 1. **Only reference text book allowed**
      2. Answer **all** questions

1. Consider a database with objects X and Y and assume that there are two transactions T1 and T2.Transaction T1 reads objects X and Y and then writes object X.Transaction T2 reads objects X and Y and then writes objects X and Y .

    a. Give an example schedule with actions of transactions T1 and T2 on objects X and Y that results in a write-read conflict.
    b. Give an example schedule with actions of transactions T1 and T2 on objects X and Y that results in a read-write conflict.
    c. Give an example schedule with actions of transactions T1 and T2 on objects X and Y that results in a write-write conflict.
    d. For each of the three schedules, show that Strict 2PL disallows the schedule.   **(6 marks)**

2. You are a painter and have an internet store where you sell paintings directly to the public. You would like customers to pay for their purchase with credit cards, and wish to ensure that these transactions are secure.

Assume that Mary wants to purchase the recent painting of Cornell Uris library. Answer the following questions.

    a. How can you ensure the user who is really purchasing the paintings is Mary ?
    b. Explain how SSL ensures that the communication of the credit card number is secure, what is the role of the certification authority in this case ?
    c. Assume that you would like Mary to authenticate whether all email messages are really from you, without actually encrypting the actual text ?

d. Assume Mary would be negotiating on the price of the pa[...]
I would like to keep all the discussions on the mail confiden[...]
Explain all the advantages and disadvantages of different [...]
of encrypting the message.   **(6 marks)**

3. Consider the following relation CAR SALE (car no, date sold, sales[...]
no, commission, percentage, discount amount) Assume that a car [...]
sold by multiple salesman hence car no, salesman no is the primary[...]
additional dependencies are date sold -> discount amount , salesma[...]
→ commission %

Based on the given PK, is the relation in 1NF,2NF or 3NF.Why or why not, h[...]
do you successively normalize it completely.   **(4 marks)**

4. Consider the following relation

Emp (eid: integer,sal: integer,age:real,did:integer)

There is a clustered index on eid and an unclustered index on age.
   a. How would you use indexes to enforce the constraint that e[...]
      is a key ?
   b. Give an example of an update that is definitely speeded up[...]
      because of the available indexes (English description is [...]
      enough)
   c. Give an example of an update that is definitely slowed dow[...]
      because of the available indexes (English description is [...]
      enough)
   d. Give an example of an update that is neither slowed up or [...]
      speeded up because of the available indexes   **- 4 marks**

d. Assume Mary would be negotiating on the price of the painting. So I would like to keep all the discussions on the mail confidential. Explain all the advantages and disadvantages of different methods of encrypting the message. **(6 marks)**

3. Consider the following relation CAR SALE (car no, date sold, salesman no, commission, percentage, discount amount) Assume that a car may be sold by multiple salesman hence car no, salesman no is the primary key, additional dependencies are date sold -> discount amount , salesman no -→ commission %

Based on the given PK, is the relation in 1NF,2NF or 3NF.Why or why not, how do you successively normalize it completely. **(4 marks)**

4. Consider the following relation

Emp (eid: integer,sal: integer,age:real,did:integer)

There is a clustered index on eid and an unclustered index on age.
   a. How would you use indexes to enforce the constraint that eid is a key ?
   b. Give an example of an update that is definitely speeded up because of the available indexes (English description is enough)
   c. Give an example of an update that is definitely slowed down because of the available indexes (English description is enough)
   d. Give an example of an update that is neither slowed up or speeded up because of the available indexes - **4 marks**

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DATABASE MANAGEMENT SYSTEMS   CSUC352   Test 2(open &

Duration : 50 Mins   Max marks : 20   Weightage : 20% Date : 9-5-0

Note : 1. **Only reference text book allowed**
         2. Answer **all** questions

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   writes object X. Transaction T2 reads objects X and Y and then writes
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      on objects X and Y that results in a write-read conflict.
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      on objects X and Y that results in a read-write conflict.
   c. Give an example schedule with actions of transactions T1 and T2
      on objects X and Y that results in a write-write conflict.
   d. For each of the three schedules, show that Strict 2PL disallows the
      schedule.   **(6 marks)**

2. You are a painter and have an internet store where you sell paintings
   directly to the public. You would like customers to pay for their purchase
   with credit cards, and wish to ensure that these transactions are secure.

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      is Mary ?
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      messages are really from you, without actually encrypting the
      actual text ?

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DATA BASE SYSTEMS - CSUC352

Test 1

Date : 28 – 3 – 04   Duration : 50 Mins   Max marks : 20 Weightage : 20

Answer all questions
The schema for the employee database is to be used in all questions

1. Explain how data abstraction is incorporated in the DBMS, explain the different levels of data abstraction.   – 3 marks

2. Explain how constraints are modeled in the ER Diagram   - 3 marks

3. Given the following tables

 Employee (name, ssn, address, salary, superssn, dno)
 Department (dname, dnum, mgrssn)
 Project (pname, pnumber, dnum)
 Works_on (essn, pno, hours)

Write the SQL queries for the following

a. For each project retrieve the project number, project name and the number of employees from the department who work on the project   -3 marks

b. For each department that has more than five employees, retrieve the department number and the number of its employees who are making more than $40,000

                                                                                        - 3 marks

4. Explain the significance of an assertion. For the tables given above in question 3 write a constraint which specifies that the salary of an employee must not be greater than the salary of the manager of the department in which he works
                                                                                        - 4 marks

5. Give the solution for the following queries in relational algebra

    a. Find the names of employees who work on all projects controlled by department no 5.   - 2 marks

    b. Retrieve the names and the address of all employees who work for research department   - 2 marks

*************************** ALL THE BEST ***************************