

Q4) Consider the following database schema :

Library (BranchId, BranchName, Address)

Book (BookID, title, publisherName)

Publisher (Name, address, phone)

Book_copies (BookID, branchId, NoOfCopies)

Book_authors (BookId, AuthorName)

Book_loans (Book_id, BranchId, CardNo, DateOut, DueDate)

Borrower (CardNo, Name, Address, phone)

Write SQL statements to find the following :

- a) How many copies of book titled "The Lost Tribe" are owned by the library branch whose name is "Al-manara"

b) How many copies of the book titled "The lost Tribe" owned by each library branch.

c) Retrieve the names of all borrowers who do not have any books checked out.

d) For each book that is loaned out from "Al-Manara" branch and whose due date is today, retrieve the book title, the borrower's name and the borrower's address

Q3) b) Draw ER diagram.

e) For each branch, retrieve the branch name and the total number of books loaned out from that branch.

f) Delay the due date of all books in "Al-Manara" branch by 5 days.

g) Assume that we would like to create a new relation Late_Borrowers to hold information about borrowers who have not yet returned due books.

Late_Borrowers (CardNo, Name, address, phone, DueDate)

Write an SQL statement to copy these information into the above relation.

11. Find the derivative of $y = \sin^{-1}(x)$ with respect to x .

12. Find the derivative of $y = \cos^{-1}(x)$ with respect to x .

13. Find the derivative of $y = \tan^{-1}(x)$ with respect to x .

14. Find the derivative of $y = \cot^{-1}(x)$ with respect to x .

15. Find the derivative of $y = \sec^{-1}(x)$ with respect to x .

Birzeit University
Department of Computer Science
DataBase Systems, Comp 333

Final Exam

Date : Thur 22-Feb

Student ID:

Name:

Sec:

Q1) Briefly explain the following concepts with a clear example for each.

- a) Views
- b) Transactions
- c) Triggers

Q2) Consider the relation R which has attributes that hold schedules of courses and sections at the university

$R = (\text{CourseNo}, \text{SecNo}, \text{OfferingDept}, \text{CreditHours}, \text{CourseLevel}, \text{instructorSSN}, \text{Semester}, \text{Year}, \text{Days_hours}, \text{RoomNo}, \text{No Of students})$

Suppose the following FDs hold on R :

$\text{CourseNo} \rightarrow \text{OfferingDept}, \text{CreditHours}, \text{CourseLevel}$

$\text{CourseNo}, \text{SecNo}, \text{Year} \rightarrow \text{Days_hours}, \text{RoomNo}, \text{No Of Students}, \text{InstructorSSN}$

$\text{RoomNo}, \text{Days_hours}, \text{semester}, \text{Year} \rightarrow \text{InstructorSSN}, \text{CourseNo}, \text{SecNo}$

Try to normalize R so that resulting relations are in 3NF

Q3) Assume you are doing a database application for a medical laboratory. The system has the following specifications:

- 1- The Lab consists of different sections each with a list of tests such as Hematology, Microbiology etc.
- 1- Examples of tests (Blood tests, Urine tests, etc). Each test has a charge price and should belong to a section.
- 2- When a patient visits the Lab, a sample is taken and tests to be made are identified. The sample could be used for more than one test, but for each visit a new sample is required.
- 3- The patient visit should be recorded in the database.

a) Identify entities and relationships

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Try to normalize R so that resulting relations are in 3NF

Q3) b) Draw ER diagram.

g) Assume that we would like to create a new relation Late_Borrowers to hold information about borrowers who have not yet returned due books.

Late_Borrowers (CardNo, Name, address.phone, DueDate)

Write an SQL statement to copy these information into the above relation.

branch.

The lost Tribe" owned by each library

c) Retrieve the names of all borrowers who do not have any books checked out.

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a) Identify entities and relationships

b) How many copies of the book titled "The lost Tribe" owned by each library branch.

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8) If you want to delete rows from one relation using Delete command in SQL. If you do not specify any condition in the where clause, this will cause:

A) Command will not execute

B) You will delete all rows in relation

C) Command will execute, but no rows will be deleted

D) None of Above.

9) Can a query result be saved in a special relation in database?

A) Never, it is just a copy of data from database and only resides in memory

B) Yes, but this new relation will be read only

C) Yes, and relation will be read and write just like any other relation

D) None of above.

10) A weak entity will always be related to parent entity in one-to-many relationship?

A) Yes

B) No.

Question 1. Select one best answer from the following. (30 marks)

- 1) Using files as data storage in large information systems is impractical because:
- A) We need to load files into memory, and this will consume lot of memory space for large files
 - B) You have to write program code for every task and query, this in turn becomes a separate project in its own means.
 - C) Files do not allow for multiple or concurrent access
 - B) All of above
- 2) One of the advantages of DBMS is:
- A) Concurrency
 - B) Security
 - C) Integrity
 - D) All of above
- 3) The ability provided by DBMS to change the physical schema without affecting the conceptual schema is known as:
- A) Logical Data Independence
 - B) Physical Data Independence
 - C) External Data Independence
 - D) None of above
- 4) If there is a field in a relation that can uniquely identify all rows, but has not been chosen as primary key, it is called:
- A) Super key
 - B) Candidate key
 - C) Constraint
 - D) Security Control
- 5) A none minimal set of attributes that can uniquely identify each row in a relation is known as:
- A) Primary Key
 - B) Foreign Key
 - C) Key
 - D) Super Key
- 6) Two relation instances are said to be union-compatible if
- A) Both instances have same number of attributes
 - B) Both instances have same domain for each attribute from left to right
 - C) Both instances have same attributes names from left to right
 - D) All of above
 - E) A and B
- 7) Given two relations R1 and R2, where R1 contains N_1 tuples, R2 contains N_2 tuples, and $N_2 < N_1$ and $N_1 > 0$. What is the maximum number of rows resulting from $R_1 \cap R_2$ is:
- A) N_2
 - B) N_1
 - C) $N_1 + N_2$
 - D) $N_1 - N_2$



Question Number 2, consider the following schema, 44 marks)

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

A) Write relational algebra to find the names of suppliers who do not supply red parts? (5 marks)

$$\pi_{sname} \text{ suppliers} - \pi_{sname} (\pi_{parts} \text{ (parts color = 'red')} \bowtie \text{Catalog} \bowtie \text{suppliers})$$

B) Write relational algebra to find the parts ids that are not supplied by supplier id = 120? (5 marks)

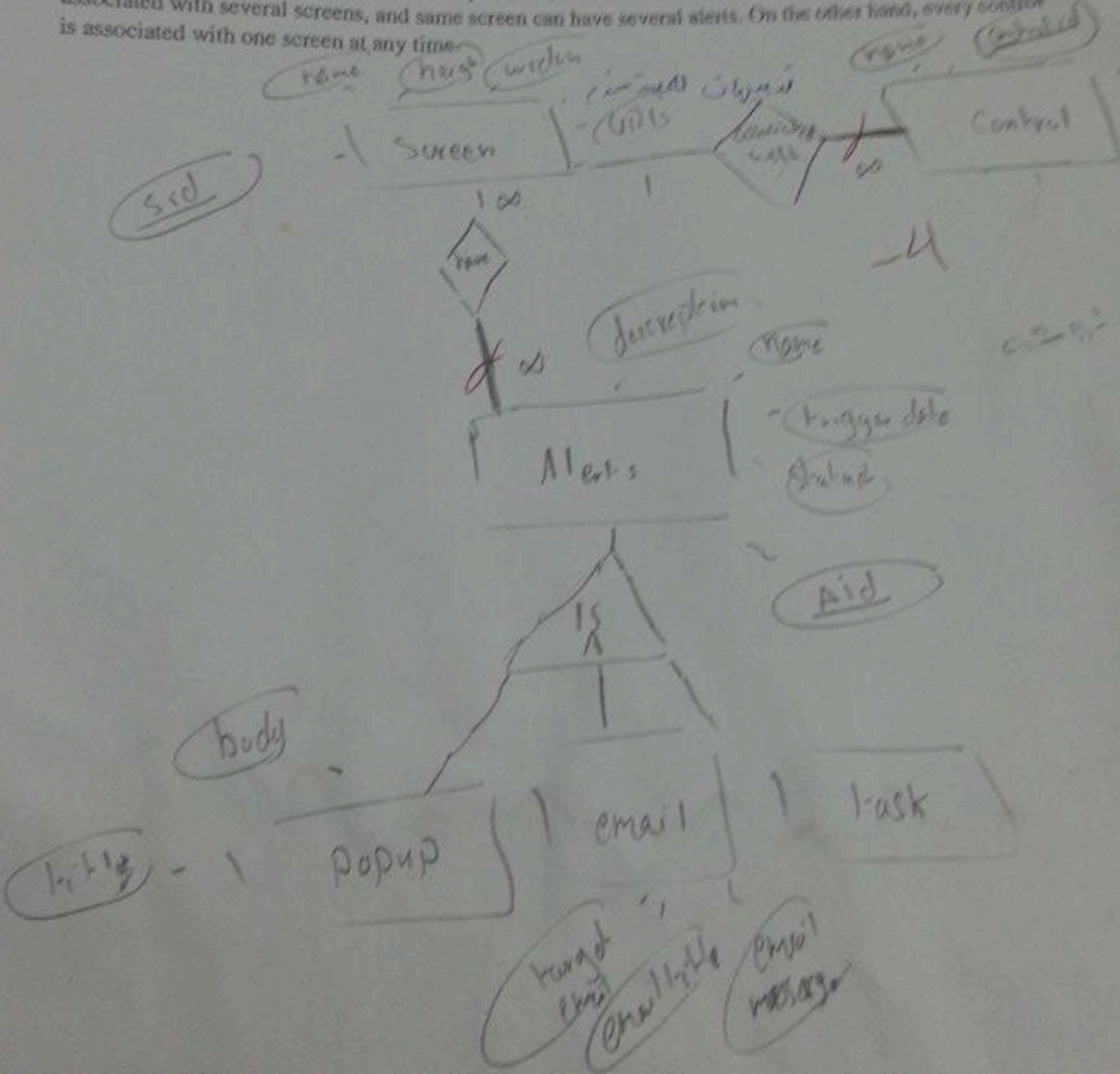
$$\pi_{pid} \text{ (Parts)} - \pi_{pid} (\text{Catalog} \bowtie \text{Parts} \text{ (sid = 120)})$$

C) Write SQL query to find the names and ids of suppliers that supply red and green products? (5 marks)

Select s.sname, s.sid
 From suppliers s, Catalog c, Parts p
 where s.sid = c.sid and c.pid = p.pid
 and p.color = 'red'
~~INTERSECT (OR s.sid IN)~~
 Select s₂.sname, s₂.sid
 From suppliers s₂, Catalog c₂, Parts p₂
 where s₂.sid = c₂.sid and c₂.pid = p₂.pid
 and p₂.color = 'green'

Question number 3, consider the following problem, then build ER diagram. (26 marks)

Alerts are of three types: popup alerts, email alerts and task alerts. All alerts share the following information: name, trigger date, status and description. Popup alerts has body and title information, while email alerts has target email, email title and email message. All alerts are associated with screen. For every screen we store screen name, height, width and URL. Every screen is associated with controls (text box, combo box, check box, etc). For every control, we store control id, name and type. An alert can be associated with several screens, and same screen can have several alerts. On the other hand, every control is associated with one screen at any time.



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3) Write DDL SQL to build the above schema. (14 marks)

Create table Supplier (sid int primary key,
sname char(20),
address varchar(30));

Create table Parts (pid int primary key
pname char(20)
color char(10));

Catalog

Create table Catalog (sid int,
pid int,
cost real,
primary key (sid, pid),
foreign key (sid) References Supplier
(sid),
foreign key (pid) References Parts
(pid));