

Birzeit University

COMP333-Database Systems

Midterm Exam - FALL 2016/2017

Time: 90 minutes

Date: Sunday 05/11/2017

Student Name: _____

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Question #1: [20 points] choose the correct answer.

1- The SQL "WHERE" clause:

- A. Limits the column data that are returned.
- B. Limits the row data that are returned.
- C. Both A and B are correct.
- D. Neither A nor B are correct.

2- The wildcard (*) in a WHERE clause is useful when?

- A. An exact match is necessary in a CREATE statement.
- B. An exact match is not possible in a CREATE statement.
- C. An exact match is necessary in a SELECT statement.
- D. An exact match is not possible in a SELECT statement.

3- Given two relations R1 and R2, where R1 contains N1 tuples, R2 contains N2 tuples, and $N2 > N1 > 0$, what is the maximum possible size (in tuples) for the resulting relation produced by $R1 \times R2$ relational algebra expression.

- A. $N1 * N2$.
- B. $N1 + N2$.
- C. N2.
- D. $2 * N1$.

4- 'AS' clause is used in SQL for

- A. Selection operation.
- B. Projection operation.
- C. Join operation.
- D. Rename operation.

5- In Relational Algebra, which of the following operation is used if we are interested in only certain columns of a table?

- A. JOIN \bowtie
- B. SELECTION σ
- C. PROJECTION π
- D. UNION \cup

6- In a relational database management system, a rule that ensures that every record in a table is unique is called a ...

- A. Candidate key constraint
- B. Key constraint
- C. Referential integrity constraint
- D. Participation constraint

7- Which of the following would find the pilots names with names starting with 'B'? Pilot (pno, pname, address, salary)

- A. SELECT pname FROM Pilot WHERE pname LIKE 'B%';
- B. SELECT FROM Pilot.WHERE pname LIKE 'B*';
- C. SELECT pno FROM Pilot WHERE pname LIKE 'B*';

D. SELECT pno FROM Pilot WHERE pname = 'B%';

8 – All of the following are advantages of using a database, EXCEPT:

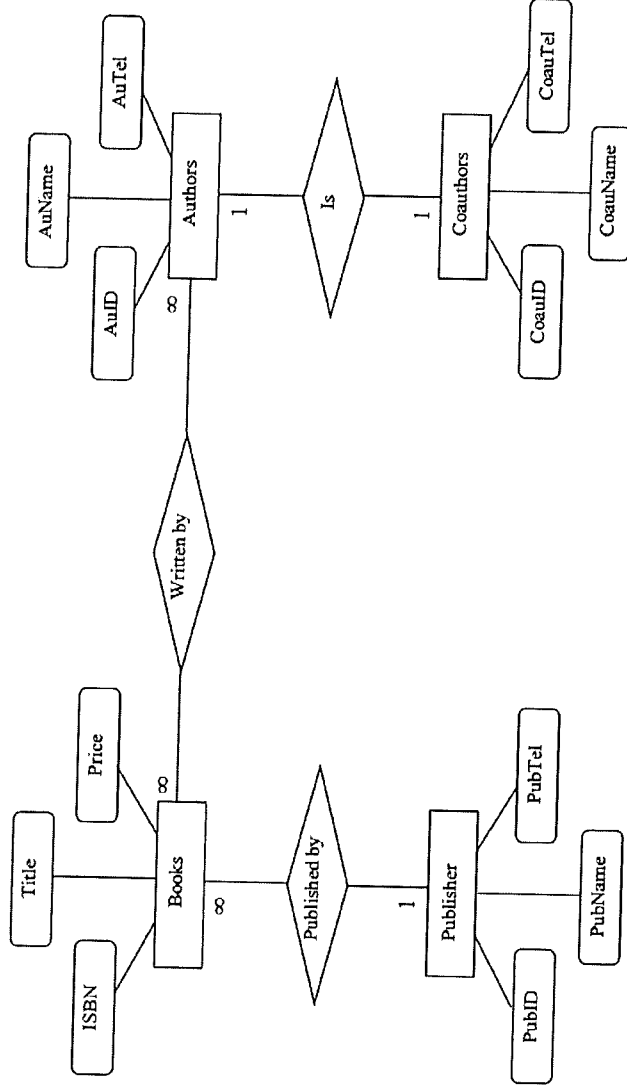
- A. Data Integrity
- B. Data Independence
- C. Data Redundancy
- D. Data Administration

Answers Table

Question#	Answer	Question#	Answer
1-	C	5-	C
2-	D	6-	B
3-	A	7-	A
4-	A	8-	C

Question#2) [20 points]

- A) Write the schema for the ERD below.
 B) Write SQL statements to create all tables required for the system represented by the ERD below.



Schema:

Books (ISBN: string, Title: string, Price: float, PubID: string)
 Publisher (PubID: string, PubName: string, PubTel: string)
 Authors (AuID: string, AuName: string, AuTel: string, CoauID: string)
 Coauthors (CoauID: string, CoauTel: string, CoauTel: string)
 Book-Author (ISBN: string, AuID: string)

Create Tables

create table Books (ISBN varchar(30), Title varchar(40),
 Price float, PubID varchar(10),
 primary key (ISBN),
 foreign key (PubID) references Publisher)

create table Publisher (PubID varchar(10), PubName varchar(40),
 PubTel varchar(15), primary key (PubID),
 PubTel varchar(15), primary key (AuID),
 AuID varchar(10), AuName varchar(40),
 AuTel varchar(15), primary key (AuID),
 CoauID varchar(10),
 CoauTel varchar(10),
 foreign key (CoauID) references Coauthors)

create table Authors (AuID varchar(10), AuName varchar(40),
 AuTel varchar(15), primary key (AuID),
 CoauID varchar(10),
 CoauTel varchar(10),
 foreign key (CoauID) references Coauthors)

create table Coauthors (CoauID varchar(10), CoauName varchar(40),
 CoauTel varchar(15), primary key (CoauID),
 ISBN varchar(30), AuID varchar(10),
 primary key (ISBN, AuID),
 foreign key (ISBN) references Books, foreign key (AuID) references Authors)

Question #3: [18 points] Consider the following schema, which is described by the following two SQL statements, then indicate whether each of the following statement is true (T) or false (F):

CREATE TABLE employees (ssn char (8), name varchar (30),

PRIMARY KEY (ssn));

CREATE TABLE department (dno char(8), dname varchar(30), essn CHAR(11),

PRIMARY KEY (dno),

FOREIGN KEY (eSSN) REFERENCES engineer (ssn)

ON UPDATE NO ACTION ON DELETE SET NULL);

→ True (T) or False (F)

(T) Every department is managed by an employee.

(F) A department may manage by two or more employees.

(T) An employee may manage two or more department.

(F) Changing an employee *ssn* may directly result in department records being updated.

(F) Deleting an employee may directly result in department records being deleted.

(T) A department may have a NULL value for *eSSN*.

Question#4) [18 points] Using the following schema to answer the following questions:

Students (Sid: integer, Sname: string, dob: Date, tawjeehiGrade: real, cityId: integer)

Courses(Cid:integer, CourseName:string, NoOfGredit:integer, level:integer, department:integer)

Grades(Sid: integer, Cid:integer, semester: integer, year: integer)

Cities (cityId: integer, Name: string)

Answer these Questions Using Relational Algebra operators.

- Find the names of the students who have taken course no(Cid)=333 in semester one in year 2017.
- Find the names of students from Ramallah who have taken course no(333).
- Find the list of courses taken by "Khalil"

a) Π (Students \bowtie Grades)
students.Sid = Grades.Sid
end
Grades.Semester = 1
and
Grades.year = 2017

b) Π (Cities \bowtie Students \bowtie Grades)
Students.CityID = students.Sid = Grades.Sid
and
cities.CityID = Grades.Cid = 333
and
cities.Name = 'Ramallah'

c) Π (Students \bowtie Grades)
students.Sid = Grades.Sid
and
Students.Sname = 'Khalil'

Question#5) [24 points] Using the schema in Q#4, write SQL statement to find out what required in the following Questions:

- Find the names of the students who have taken course no(Cid)=333 in semester one in year 2017 and his tawjeehi Grade greater than >80 and less than 90.
- Find the names of students from Ramallah who have taken the highest grade in course 333 and their names start with 'A'.
- Find the names of students who have taken all courses.
- Find the names of students who have taken course# 333 and course# 433.

a) Select S.Sname
 $\text{from Students S, Grades G}$
 $\text{where S.Sid = G.Sid}$
 and

$\text{G.Semester} = 1$ and $\text{G.year} = 2017$ and
 $\text{G.tawjeehiGrade} > 80$ and $\text{G.tawjeehiGrade} < 90$

b) $\text{select S.Sname from Students S, Grades G, Cities C}$
 $\text{where S.Sid = G.Sid and C.cityID = S.cityID and}$
 $\text{S.Sname like 'A%' and C.name = 'Ramallah' and}$

~~c) $\text{G.grade} > = (\text{Select G.grade}$~~

$\text{from Students S, Grades G, Cities C}$
 $\text{where S.Sid = G.Sid and C.cityID = S.cityID}$
 $\text{and S.Sname like 'A%' and C.name = 'Ramallah'}$

OR Can be solved using the aggregate function Max.

c) $\text{select S.Sname from Students S}$
 $\text{where not Exist (Select C.Cid from Courses C}$

except
 $\text{select Cid from Grades G}$
 $\text{where (G.Sid = S.Sid))}$

d) $\text{select S.Sname from Students S}$
 $\text{where S.Sid in (Select G.Sid from Grades G}$
 $\text{where G.Sid = S.Sid and G.Cid = 333}$

Intersect

$\text{Select G.Sid from Grades G}$
 $\text{where G.Sid = S.Sid}$

and
 G.Cid = 433)