**CSE 5330/7330** Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
**Homework #3 -- Due 10/09/2019**  
Points (5330/7330)

1. ( 15/10 points) Given two relations R1(a,b) with N1 tuples, and R2(c,d) with N2 tuples, and N2 > N1 > 0. Determine the minimum and maximum number of tuples returned for each expression. If needed, you can specify assumptions to clarify your results.

a. R1 ∪ R2 : min = N1+N2; max = N1+N2;   
b. R1 ∩ R2 : min = 0; max = N1+N2;  
c. R1 × R2 : min = N1\*N2; max = N1\*N2;  
d. σ a= 5 (R1) : min = 0; max = N1;  
e. π a ( R1) : min = N1; max = N1;

2. (15/15 points) Consider the entity sets and attributes shown in the following table. Place an X in one column (A,B,C,D) in each row to indicate the relationship between the leftmost and rightmost columns.

A: the left side has a relationship with the right side  
B. the right side is an attribute of the left side  
C. the left side is a specialization of the right side  
D. the left side is a generalization of the right side

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Entity set | A | B | C | D | Entity Set or Attribute |
| MOTHER |  |  |  | X | PERSON |
| DAUGHTER |  |  | X |  | MOTHER |
| STUDENT |  |  |  | X | PERSON |
| STUDENT |  | X |  |  | STUDENT\_ID |
| SCHOOL | X |  |  |  | STUDENT |
| SCHOOL |  |  |  | X | CLASS\_ROOM |
| ANIMAL |  |  | X |  | HORSE |
| HORSE |  | X |  |  | BREED |
| HORSE |  | X |  |  | AGE |
| EMPLOYEE |  | X |  |  | SSN |
| FURNITURE |  |  | X |  | CHAIR |
| CHAIR |  | X |  |  | WEIGHT |
| HUMAN |  |  | X |  | WOMAN |
| FURNITURE |  | X |  |  | MAKER\_ID |
| STUDENT | X |  |  |  | FULL\_TIME |

*The following two problems require that you write and implement SQL commands. You need to identify the system used, provide a listing of the commands, and the resulting output. Screen shots are acceptable. Make sure your results are organized and easy to find.*

3. (30/30 points) Implement the student and course system from figure 1.2 (also included in homework assignment #2) to answer the following questions.

a. What DBMS are you using?

SQL Server  
b. create tables and populate using additional data provided in Canvas.

done  
c. write and execute SQL statement(s) to list the name of each course taken by each student.

SELECT Student.Name, Course.Course\_name From Student, Course, Section, Grade\_report Where

Student.Student\_Number = Grade\_report.Student\_number And

Grade\_report.Section\_identifier = Section.Section\_identifier And Section.Course\_Number = Course.Course\_Number

d. write and execute SQL statement(s) to determine what courses do not have prerequisites.

SELECT Course\_name FROM Course WHERE Course\_Number NOT IN (SELECT Course\_Number From Prerequisite)

e. write and execute SQL statement(s) to determine what course has been taken by the most students.

SELECT Course.Course\_name, count(\*) From Student, Course, Section, Grade\_report Where

Student.Student\_Number = Grade\_report.Student\_number And

Grade\_report.Section\_identifier = Section.Section\_identifier And Section.Course\_Number = Course.Course\_Number GROUP BY Course.Course\_name

f. write and execute SQL statement(s) to determine how credit hours have been completed by student 17.

SELECT Course.Course\_name, Student.Name, Course.Credit\_hours, Grade\_report.Grade From Student, Course, Section, Grade\_report Where

Student.Student\_Number = Grade\_report.Student\_number And

Grade\_report.Section\_identifier = Section.Section\_identifier And Section.Course\_Number = Course.Course\_Number

Show and explain what happens when you:   
g. insert values (‘CS5330’, ‘CS5330’) into the prerequisites table

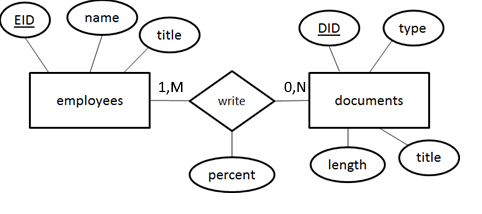
Error: The INSERT statement conflicted with the FOREIGN KEY constraint "FK\_Prerequisite\_Course". The conflict occurred in database "studentsDB", table "dbo.Course", column 'Course\_Number'.

The statement has been terminated.

h. insert values (17, 135, “X”) into the grade\_report table

Just inserts (17, 135, “X”) to Grade\_report, no errors, because no conflicts with foreign keys.

4. (40/35 points) **Implement** a solution (create tables and insert data) for the following ER diagram and data.



An employee can write more than one type of document (memo, internal-report, external-report, presentation) in this business. The percent of the Writes relation shows the percentage that the employee contributed to a given document.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| EID | Name | title |  | percent |  | DID | type | Length | title |
| 100 | John Doe | CEO |  | 100 |  | 1 | external-report | 60 | 2018 Annual Report |
| 100 | John Doe | CEO |  | 50 |  | 2 | memo | 1 | 2018 Goals |
| 111 | Sally Financial | CFO |  | 25 |  | 2 | memo | 1 | 2018 Goals |
| 122 | HR Office | HR |  | 25 |  | 2 | memo | 1 | 2018 Goals |
| 100 | John Doe | CEO |  | 50 |  | 3 | external-report | 2 | 2018 OSHA Report |
| 133 | T Produce | Mgr |  | 50 |  | 3 | external-report | 2 | 2018 OSHA Report |
| 133 | T Produce | Mgr |  | 100 |  | 4 | internal-report | 5 | preliminary OSHA response |
| 133 | T Produce | Mgr |  | 100 |  | 5 | external-report | 10 | Gov OSHA response |
| 111 | Sally Financial | CFO |  | 100 |  | 6 | internal-report | 25 | Draft financial report |
| 111 | Sally Financial | CFO |  | 100 |  | 7 | external-report | 10 | Gov Req CFO report |
| 144 | Sam Shipper | Mgr |  | 100 |  | 8 | memo | 2 | Shipping requirements |

a. Print the name of the longest report. You can assume there is only one longest report.

SELECT title, length FROM documents WHERE length = (SELECT MAX(length) FROM documents)  
b. Print the names and titles of all employees who have written part of at least one internal-report **and** at least one external report

SELECT employees.name, employees.title FROM employees, write, documents WHERE

employees.EID = write.EID AND

write.DID = documents.DID AND

documents.type = 'external-report' AND

employees.EID IN (SELECT e.EID FROM employees e, write w, documents d WHERE

e.EID = w.EID AND

w.DID = d.DID AND

d.type = 'internal-report')

c. List the document title of the document that had the most authors.

SELECT TOP 1 documents.title, count(\*) c FROM employees, write, documents WHERE

employees.EID = write.EID AND

write.DID = documents.DID GROUP BY documents.title ORDER BY c desc

d. Which job title of employee is associated with the most documents by quantity?

SELECT TOP 1 employees.title, count(\*) c FROM employees, write, documents WHERE

employees.EID = write.EID AND

write.DID = documents.DID GROUP BY employees.title ORDER BY c desc

e. Find the names of all employees who did not contribute to “2018 Goals”

SELECT employees.Name FROM employees WHERE employees.Name NOT IN

(SELECT employees.Name FROM employees, write, documents WHERE

employees.EID = write.EID AND

write.DID = documents.DID AND

documents.title = '2018 Goals')

f. Create the view “thisdata” which returns the data as shown above.

CREATE VIEW [dbo].[View]

AS SELECT employees.EID, employees.Name, employees.title e\_title, write."percent", documents.DID,

documents.type, documents.length, documents.title d\_title FROM employees, write, documents WHERE

employees.EID = write.EID AND

write.DID = documents.DID

INSERT INTO employees VALUES

(100, 'John Doe', 'CEO'),

(111, 'Sally Financial', 'CFO'),

(122, 'HR Office', 'HR'),

(133, 'T Produce', 'Mgr'),

(144, 'Sam Shipper', 'Mgr')

INSERT INTO documents VALUES

(1, 'external-report', 60, '2018 Annual Report'),

(2, 'memo', 1, '2018 Goals'),

(3, 'external-report', 2, '2018 OSHA Report'),

(4, 'internal-report', 5, 'preliminary OSHA response'),

(5, 'external-report', 10, 'Gov OSHA response'),

(6, 'internal-report', 25, 'Draft financial report'),

(7, 'external-report', 10, 'Gov Req CFO report'),

(8, 'memo', 2, 'Shipping requirements')

INSERT INTO write VALUES

(100, 1, 100),

(100,2,50),

(111,2,25),

(122,2,25),

(100,3,50),

(133,3,50),

(133,4,100),

(133,5,100),

(111,6,100),

(111,7,100),

(144,8,100)