Instructor: Li-Shiang Tsay, Ph.D.

Deadline: April 25, 2015 at 12:00 PM

This exam must be pledged by the student; otherwise I will not grade it.

**I, Nandheni Ravikumar have not received or given help on this exam.**

Answer the following questions to the best of your knowledge. Be precise and be careful. The exam is **open-book** and **open notes**. Write any assumptions you need to make along with your answers, whenever necessary. **Show all of your work, otherwise I will not grade the exam**.

There are two major questions. Points for each question are as indicated. In total, the exam is out of 100 points.

Please answer all questions on the exam paper in the space provided. Put your name and Banner ID on every page. **Save your exam paper as a word document and submit it to the optional final exam link by April 25, 2015 at 12:00 pm (EST)**. **Late submission of test will result in a 5-point penalty per extra minute**. Please make sure to turn it in on time to avoid any penalty.

Good Luck☺

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| --- | --- |
| Grading Box | |
| 1. | / 60 |
| 2. | / 40 |
| Total | /100 |

Q1: (60 pts) E-R model to relational data model:

Map the following ER diagram to relations by writing SQL statements to capture as many of the constraints as possible. If you cannot capture some constraints, explain why.

Drugs

Make

pharmaceuticalComp

Phamacy



Contracts

Sells

CREATE DATABASE finalexam;

USE finalexam;

CREATE table pharmaceuticalComp (

pcname VARCHAR(20),

address VARCHAR(50),

state VARCHAR(20),

zipcode INT(11),

phone INT(15),

PRIMARY KEY (pcname));

CREATE table Phamacy (

name VARCHAR(20),

address VARCHAR(50),

state VARCHAR(20),

zipcode INT(8),

phone INT(15),

PRIMARY KEY (name));

CREATE table drugMakes(

tradeName VARCHAR(20),

Formula VARCHAR(50),

pcname VARCHAR(20),

PRIMARY KEY(tradeName,pcname),

FOREIGN KEY (pcname) references pharmaceuticalComp (pcname));

CREATE table Sells(

name VARCHAR(20),

tradeName VARCHAR(20),

pcname VARCHAR(20),

startDate date,

price float(10,2),

PRIMARY KEY (name,tradeName,pcname),

FOREIGN KEY (name) References Phamacy(name),

FOREIGN KEY (tradeName,pcname) References drugMakes(tradeName,pcname) ON DELETE CASCADE);

CREATE table Duration(

DstartDate date,

DendDate date,

PRIMARY KEY (DstartDate,DendDate));

CREATE table Contracts(

pcname VARCHAR(20),

name VARCHAR(20),

startdate date,

enddate date,

Dstartdate date,

Denddate date,

PRIMARY KEY (Dstartdate,Denddate,pcname,name),

FOREIGN KEY (Dstartdate,Denddate) references Duration(Dstartdate,Denddate) ON UPDATE CASCADE ON DELETE CASCADE,

FOREIGN KEY (pcname) references pharmaceuticalComp(pcname),

FOREIGN KEY (name) references Phamacy(name));

Q2. (40 pts) (Query languages) Consider the following relational schema:

Departments(***dNo*** char(3), *dName* varchar(20), *mgrSSN* char(9), *mgrStartedDate* date)

Employees(***eNo*** char(9), *fName* varchar(30), *mInit* char(2), *lName* varchar(30), *ssn* char(9), *bDate* date, *address* varchar(50), *gender* char(1), *salary* float(10,2), *supervisorSSN* char(9), *dNo* char(3))

DeptLocations(***dNo*** char(3), ***dLocation*** varchar(20))

Projects(***pNo*** char(5), *pName* varchar(50), *pLocation* varchar(50), *dNo* char(3))

WorksOn(***eNo*** char(9), ***pNo*** char(5), *hours* smallint)

Dependent(***eNo*** char(9), ***dependentName*** varchar(50), *gender* char(2), *bDate* date, *relationship* varchar(20))

The domain of each attribute is listed after the attribute name. The primary key attributes are underlined. The employment information of pilots, flight attendants, and others are stored in the table Employees. Note that a pilot must be certified to operate some aircraft.

**Query:** Find the name(s) of the second oldest employees.

**Task 1:** write the above query in one SQL statement.

**-select fName, lName from Employees where bDate=(SELECT MIN(bDate) FROM Employees WHERE bDate NOT IN (SELECT MIN(bDate) FROM Employees));**

**Task 2:** write the above query in Relational Algebra. If this query cannot be expressed in relational algebra, explain why.

**-** *ρ***Info(fName,lName,bDate) ((**π**bDateEmployees - (**π**bDate (**σ**Min(bDate)Employees))**

π**fName,lName (**σ**Min(bDate)Info)**