**Mason Shepherd**

**Homework 5: due March 26th 11:59PM.**

**6.5** - Consider the database shown in Figure 1.2, whose schema is shown in Figure 2.1.

What are the referential integrity constraints that should hold on the schema?

Write appropriate SQL DDL statements to define the two relations, COURSE and SECTION, of the database - you don’t need to give SQL for all 5 relations **[8 points]**.

Ans:

Referential Integrity Constraints:

In **SECTION**, Course\_number *references* **COURSE**’s primary key;

In **GRADE\_REPORT**, Student\_number *references* **STUDENT**’s primary key,

and Section\_identifier *references* **SECTION**’s primary key;

In **PREREQUISITE**, Course\_number *references* **COURSE**’s PK,

And Prerequisite\_number also *references* **COURSE**’s PK.

SQL DDL statements:

**CREATE TABLE** COURSE

(Course\_name VARCHAR(30) **NOT NULL**,

Course\_number VARACHAR(8) **NOT NULL**,

Credit\_hours SMALLINT **NOT NULL**,

Department VARCHAR(4) **NOT NULL**,

**PRIMARY KEY** (Course\_number),

**UNIQUE** (Course\_name) );

**CREATE TABLE** SECTION

(Section\_identifier SMALLINT **NOT NULL**,

Course\_number VARCHAR(8) **NOT NULL**,

Semester VARCHAR(6),

Year SMALLINT,

Instructor VARCHAR(15),

**PRIMARY KEY** (Section\_identifier, Course\_number),

**FOREIGN KEY** (Course\_number) **REFERENCES** COURSE(Course\_number) );

**6.12** - Specify the following queries in SQL on the database schema of Figure 1.2 **[12 points]**.

(a) Retrieve the names of all senior students majoring in 'cs (computer science).

Ans:

**SELECT** Name

**FROM** STUDENT

**WHERE** Major = ‘CS’

(b) Retrieve the names of all courses taught by professor King in 2007 and 2008.

Ans:

**SELECT** Course\_name

**FROM** COURSE, SECTION

**WHERE** Year = ‘07’ **OR** Year = ‘08’ **AND** Instructor = ‘King’ **AND** SECTION.Course\_number = COURSE.Course\_number

(c) For each section taught by professor King, retrieve the course number, semester, year, and number of students who took the section.

Ans:

**SELECT** S.Course\_number, S.Semester, S.Year, G.**COUNT**(Student\_number)

**FROM** SECTION **AS** S, GRADE\_REPORT **AS** G

**WHERE** S.Instructor = ‘King’ **AND**

G.Section\_identifier **EXISTS** (**SELECT** Section\_identifier

**FROM** SECTION

**WHERE** Instructor = ‘King’)

(d) Retrieve the name and transcript of each senior student (Class=4) majoring in CS. A transcript includes course name, course number, credit hours, semester, year, and grade for each course completed by the student.

Ans:

**SELECT** Name, Course\_name, C.Course\_number, Credit\_hours, Semester, Year, Grade

**FROM** STUDENT **AS** ST, COURSE **AS** C, SECTION **AS** SE, GRADE\_REPORT **AS** G

**WHERE**

Name **EXISTS**

(**SELECT** \*

**FROM** STUDENT

**WHERE** Class = 4 **AND** Major = ‘CS’) **AND**

Course\_name, C.Course\_number **EXISTS**

(**SELECT** \*

**FROM** COURSE, SECTION

**WHERE** C.Course\_number = S.Course\_number