Assignment 1

This assignment is due on Wednesday March 26. Answers to the first part are to be typed and printed out, the second part could be answered directly on the figure, and ER-Diagrams in the third part could be drawn by hand except for exercise B which you are required to model using Smart Draw. *Reminder: No late submissions will be accepted.*

Part I: Database System Concepts

1- Define and provide examples for the following terms: Data, database, database management system (DBMS), mini-world, database administrator (DBA), redundancy, controlled redundancy, universe of discourse (UOD), meta-data, system analysis, general purpose software, and integrity constraint.

2- List five different examples on database oriented applications, which you might encounter in every day life, and give a brief explanation of each one.

3- Write a paragraph on the three-schema architecture and data independence explaining both of these concepts and the manner in which they are related.

4- Write a brief comparison and contrast between a database schema and a database state. Give examples in order to support your comparison.

5- Briefly explain the different phases of database design specifying which ones are technology independent and which ones are not.

6- Briefly explain the difference between an entity and an entity set. Provide several examples to support your explanation.

7- Explain the difference between system analysts and database designers, by comparing and contrasting their jobs.

8- What is the difference between DBMS designers and implementers and database designers and implementers?

Part II: Database Logic

Display the different relationships between the tables in the figure below by drawing arrows between these tables' common fields.

STUDENT

Name	Student_number	Class	Major
Smith	17	1	CS
Brown	8	2	CS

COURSE

Course_name	Course_number	Credit_hours	Department
Intro to Computer Science	CS1310	4	CS
Data Structures	CS3320	4	CS
Discrete Mathematics	MATH2410	3	MATH
Database	CS3380	3	CS

SECTION

Section_identifier	Course_number	Semester	Year	Instructor
85	MATH2410	Fall	04	King
92	CS1310	Fall	04	Anderson
102	CS3320	Spring	05	Knuth
112	MATH2410	Fall	05	Chang
119	CS1310	Fall	05	Anderson
135	CS3380	Fall	05	Stone

GRADE_REPORT

Student_number	Section_identifier	Grade
17	112	B
17	119	C
8	85	A
8	92	A
8	102	B
8	135	A

PREREQUISITE

Course_number	Prerequisite_number
CS3380	CS3320
CS3380	MATH2410
CS3320	CS1310

Figure 1.2
A database that stores student and course information.

Part III: Database Design Exercises

Exercise A: History Museum

We want to build a database for a community of paleontologists, storing information about the fossils kept in different museums.

Each fossil is described by the year and place of discovery, the name of the paleontologist who discovered it, the room where it is exposed, and the presumed species. Each fossil may be assigned to different species with different degrees of probability.

Museums are characterized by their rooms, their paleontologists and the director, who may be a paleontologist or another kind of researcher.

Exercise B: Hotel Reservations (To be modeled using Smart Draw)

Each hotel is characterized by its name, address, city, the price for each kind of room, and the number of rooms for each kind.

Customers are identified by name, surname, address, and telephone number. They can book one or more rooms for one or more consecutive days. For each reservation it is necessary to store the name of the customer, the date of reservation as well as the arrival date and departure date.

We also want to store information about the actual stay of the customers: the actual arrival and departure dates (that might be different from the ones specified during the reservation), the advance paid at the booking time, the balance (i.e. the amount of money still to be paid) and the status of payment (paid / to be paid). For the customers who actually stay in the hotel we want to store a picture of their passport if they are first time guests.

Exercise C: Soccer Tournament

For each match we store the series and the day on which it takes place, which match it is (e.g. first match, second match, etc.), the date with day, month, year, the teams involved in the match with the name of the city and the trainer, and finally for each team whether played at home.

We store the name and the surname of each player in each team with his date of birth and main position.

We store, for each day, how many points each team has and we also store, for each match, the players of each team who played and in which position each player played (the position can change from one game to another).

For each match, we store the referee, with first name, surname, city and region of birth.

The matches are as scheduled must be distinguished from those postponed. For a postponed match, we store the date in which it is actually played.

We also identify the matches played in a city other than that of the home team; for each of these, we store the city in which it took place, as we as the reason for the variation venue.

For each player we are interested in the city of birth.

Exercise D: Mail Order

Consider a Mail_Order database in which employees take orders for parts from customers. The data requirements are summarized as follows:

- The mail order company has employees, each identified by a unique customer number, first and last name, and ZIP code.
- Each customer of the company is identified by a unique customer number, first and last name, and ZIP code.
- Each part sold by the company is identified by a unique part number, a part name, price, and quantity in stock.
- Each order placed by a customer is taken by an employee and is given a unique order number. Each order contains specified quantities of one or more parts. Each order has a date of receipt as well as an expected ship date. The actual ship date is also recorded.

Exercise E: Mail Order

Consider a MOVIE database in which data is recorded about the movie industry. The data requirements are summarized as follows:

- Each movie is identified by title and year of release. Each movie has a length in minutes. Each has a production company, and each is classified under one or more genres (such as horror, action, drama, and so forth). Each movie has one or more directors and one or more actors appear in it. Each movie also has a plot outline. Finally, each movie has zero or more quotes, each of which is spoken by a particular actor appearing in the movie.
- Actors are also identified by name and date of birth and direct one or more movies. It is possible for a director to act in a movie (including one that he or she may also direct).
- Production companies are identified by name and each has an address. A production company produces on or more movies.