

Please read Sections 1 – 1.3.4 and Chapter 3 of the textbook and then answer the following, trying not to look at your notes or at the textbook. Quiz #1, on Wednesday 6th September, will consist exclusively of questions taken from the Part 1 of this homework.

Part I — Short Questions

Question 1

Is a pile of trash a Database? Why, or why not?

Question 2

Which one comes first, the physical design, the conceptual design, or the logical design?

Question 3

What is the difference between a database and the meta-data of the database?

Question 4

In a DBMS environment, do I have to change my program if I want to change the structure of my data?

Question 5

What is a virtual data? How can I access it?

Question 6

Why do DBMS include concurrency control?

Question 7

Row •	• Attribute
Connect the dots: Column Header •	• Tuple
Table •	• Relation

Question 8

How do we call the number of attributes in a relation?

Question 9

At the logical level, does the order of the tuples in a relation matter?

Question 10

What should we put in an attribute if its value is unknown?

Question 11

What, if any, is the difference between a superkey, a key, and a primary key?

Question 12

Are we violating an integrity constraint if we try to set the value of a primary key to NULL? If yes, which one?

Question 13

Give three examples of operations.

Question 14

Define what is the domain constraint?

Question 15

Consider the following three relations:

AUTHOR(AuthorRef, AuthorName, Address)

BOOK(ISSN, AuthorRef, Title)

GAINED_AWARD(AwardReference, ISSN, AWARD_TITLE)

For each relation, answer the following:

- (a) What is the primary key?
- (b) Are there, presumably, any foreign key?

Question 16

Consider the following three relations

TRAIN(TrainRef, Model, Year)

CONDUCTOR(CompanyID, Name, ExperienceLevel)

ASSIGNED_TO(TrainRef, CompanyID, date)

- (a) What are the foreign keys in the ASSIGNED_TO relation?
- (b) Assuming the database is empty, are the following instructions valid? If not, what integrity constraint are they violating?

Insert <'AM-356', 'Surfliner', 2012> into TRAIN

Insert <NULL, 'Graham Palmer', 'Senior'> into CONDUCTOR

Insert <'XB-124', 'GPalmer', '02/04/2018'> into ASSIGNED_TO

Insert <'BTed', 'Bobby Ted', 'Senior'> and <'BTed', 'Bobby Ted Jr.', 'Junior'> into CONDUCTOR



Part II — Problems

This part will help you in assessing your level of understanding of this lecture, and give you an idea of the kind of problems you will be asked to solve during the exams. Problem 2 requires a computer, an Internet connection, and some time. I'll assume that you will have successfully completed it by the time Homework #2 is released (Wednesday 6th September), so don't wait and let me know if you had any trouble doing it.

Problem 1

We want to define a CAMPUS database organized into three files as follows:

- A BUILDING file storing the name and GPS coordinates of each building.
- A ROOM file storing the building, number and floor of each room.
- A PROF file storing the name, phone number, email and room number where the office is located for each professor.

(a) Complete the following database catalog corresponding to the CAMPUS database:

RELATIONS

Relation_name	No_of_columns
BUILDING	2
.....
PROF

COLUMNS

Column_name	Data_type	Belongs_to_relation
Building_Name	Character(30)	Building
GPS	Double (1)
Building_Name	Character(30)	ROOM
Room_Number	Integer(1)	ROOM
Floor
Prof_Name
.....
.....
Room_Number	PROF

- (b) Invent a database with 2 buildings, 3 rooms and 2 professors.
- (c) Answer the following, assuming all the knowledge you have of the situation comes from the CAMPUS database, which is an up-to-date and accurate representation of its miniworld:
- Is it possible to list all the professors?

- ii. Is it possible to tell in which department is a professor?
- iii. Is it possible to get the office hours of a professor?
- iv. Is it possible to list all the professors whose offices are in the same building?
- v. Is it possible to list all the rooms?
- vi. If a new professor arrive, and has to share his office with another professor, do you have to revise your database catalog?
- vii. Can you list which professors are at the same floor?
- viii. Can you tell which professor has the highest evaluations?

Problem 2

In this problem, you will install the MySQL DataBase Managment System and set it up. On top of being open source and free, it is one of the most widespread and used DBMS, as well as one of the most well-documented. It is very important that you follow the steps detailed below carefully. Read the messages printed on your screen, make sure a step was correctly executed before moving to the next one. And, remember: 1) Don't wait, set your system early. 2) I'm willing to help you, but there's nothing I can do with an email like "It doesn't work": if you look for help, be detailed and clear about what you think went wrong. The following links could be useful:

- <https://dev.mysql.com/doc/refman/5.7/en/windows-installation.html>,
- <https://dev.mysql.com/doc/refman/5.7/en/linux-installation-native.html>,
- <https://dev.mysql.com/doc/refman/5.7/en/connecting-disconnecting.html> and

1. The first step depends on your operating system (once this step is completed, go to step 2):

For Windows 10 (a) Visit <https://dev.mysql.com/downloads/installer/>, click on "Download" next to "Windows (x86, 32-bit), MSI Installer 5.7.19 18.5M". On the next page, click on the (somewhat hidden) "No thanks, just start my download." button.

(b) Save the file, and open it. Accept the license term, leave the first option on "Developer Default" and click on "Next", click on "Next" on the next step even if you don't meet all the requirements, and then click on "Execute". The system will download and install several softwares (this may take some time).

(c) Click on "Next" twice, leave "Type and Networking" on "Standalone MySQL Server / Classic MySQL Replication" and click "Next", and leave the next options as they are and click on "Next".

(d) Next, choose a password for the MySQL root account and click "Next". On the "Windows Service" page, leave everything as it is and click on next. On the "Plugins and Extensions" page, leave everything as it is and click on "Next".

(e) Finally, click "Execute" on the "Apply Configuration" page, and then on "Finish". Click on "Cancel" on the "Product Configuration" page and confirm that you don't want to add products.

(f) Make sure that MySQL is running: click on Windows' "Control Panel", then on "Administrative Tools", and on "Services". Look for "MySQL57", its status should be "Running". If it is not, right-click on it and click on "Start".

(g) Open a command prompt (search for "cmd") and type

```
cd "C:\Program Files\MySQL\MySQL Server 5.7\bin"
```

and then

```
mysql -u root -p
```

and enter the password you picked at step 1d.

For Linux (a) Install, through your standard package management system (apt or aptitude for debian-based systems, pacman for Arch Linux, etc.), the packages `mysql-client` and `mysql-server` as well as their dependencies.

- (b) Open a terminal and type

```
/etc/init.d/mysql status
```

to see if MySQL is running: if you can read

```
Active: active (running)
```

then you can move on to the next step, otherwise run (as root)

```
service mysqld start
```

- (c) As root, type in your terminal

```
mysql_secure_installation
```

You'll be asked to provide the current password for the root MySQL user (which should not be defined, so just hit "Enter"), to set a new password (that you can freely pick), and then, answer "n" to the question "Remove anonymous users?", "Y" to "Disallow root login remotely?", "n" to "Remove test database and access to it?" and finally "Y" to "Reload privilege tables now?".

- (d) Still as root, type in your terminal

```
mysql -u root -p
```

and enter the password you picked at the previous step.

You are now logged as root in your database management system.

2. Type the following four commands, one by one (that is, type the first one, hit "enter", type the second, hit "enter", etc. The colors are here to ease the reading, you can ignore them safely.):

```
create database testdb;
create user 'testuser'@'localhost' identified by 'password';
grant all privileges on testdb.* to 'testuser'@'localhost';
exit;
```

The message prompted after the three first commands should starts with

```
Query OK
```

and the message after the last command should be

```
Bye
```

3. Now, Linux users should type *as a normal user, i.e., not as root*, in their terminal the following, and Windows users should type in their command prompt the following:

```
mysql -u testuser -p
```

and enter password as your password.

4. Now, type the following commands one by one:

```
use testdb;
create table t(i integer, n integer);
insert into t values (1,1),(2,2),(3,3);
select * from t;
```

After that last command, you should see

```
+-----+-----+
| i     | n     |
+-----+-----+
| 1     | 1     |
| 2     | 2     |
| 3     | 3     |
+-----+-----+
```

You're all set! All you have to do is to quit, using the command

```
exit;
```