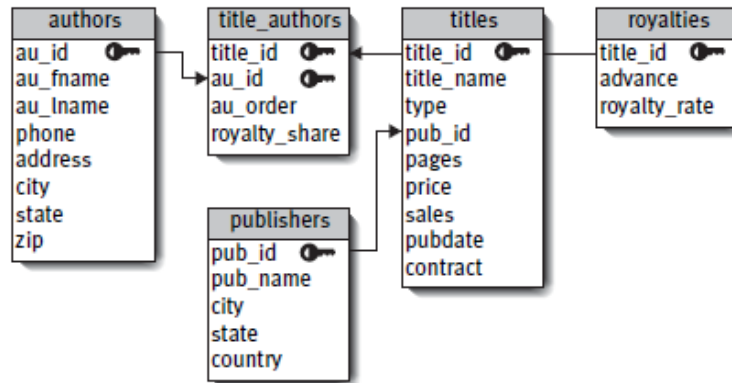**Databases**

Module Title: Databases

Assignment Type: Practical & Research

Thiago Petcov / 2016206

College of Computing Technology

(CCT)

Question 1 (no screenshots required for Question 1):

The above image shows the Book Database that you will be accessing:

In Reference to the **authors** Table: ()

1a. What is the primary key ?
Answer: Au_id

1b. What is the foreign key?
Answer: none

1c. What is its degree?
Answer: 8

1d. What is the domain of zip? What command did you use to help you find out the domain.
Answer: The zip store only CHAR(5)
Answer: DESCRIBE authors;

1e. What is its cardinality of the authors table?

Answer: One to many

Question 2: List all details for authors (all columns) who live at an address that starts with the number 3800.

```
 Thiago Petcov 2016206 - mysql  -u root -p
| wdtest              |
+--------------------+
12 rows in set (0.00 sec)

MariaDB [(none)]> USE books;
Database changed
MariaDB [books]> SELECT * FROM authors;
+--------+-----------+------------+--------------+----------------------+---------------+-------+-------+
| au_id  | au_fname  | au_lname   | phone        | address              | city          | state | zip   |
+--------+-----------+------------+--------------+----------------------+---------------+-------+-------+
| A01    | Sarah     | Buchman    | 718-496-7223 | 75 West 205 St       | Bronx         | NY    | 10468 |
| A02    | Wendy     | Heydemark  | 303-986-7020 | 2922 Baseline Rd     | Boulder       | CO    | 80303 |
| A03    | Hallie    | Hull       | 415-549-4278 | 3800 Waldo Ave, #14F | San Francisco | CA    | 94123 |
| A04    | Klee      | Hull       | 415-549-4278 | 3800 Waldo Ave, #14F | San Francisco | CA    | 94123 |
| A05    | Christian | Kells      | 212-771-4680 | 114 Horatio St       | New York      | NY    | 10014 |
| A06    |           | Kellsey    | 650-836-7128 | 390 Serra Mall       | Palo Alto     | CA    | 94305 |
| A07    | Paddy     | O'Furniture| 941-925-0752 | 1442 Main St         | Sarasota      | FL    | 34236 |
+--------+-----------+------------+--------------+----------------------+---------------+-------+-------+
7 rows in set (0.00 sec)

MariaDB [books]> SELECT * FROM authors WHERE address LIKE '3800%';
+--------+-----------+----------+--------------+----------------------+---------------+-------+-------+
| au_id  | au_fname  | au_lname | phone        | address              | city          | state | zip   |
+--------+-----------+----------+--------------+----------------------+---------------+-------+-------+
| A03    | Hallie    | Hull     | 415-549-4278 | 3800 Waldo Ave, #14F | San Francisco | CA    | 94123 |
| A04    | Klee      | Hull     | 415-549-4278 | 3800 Waldo Ave, #14F | San Francisco | CA    | 94123 |
+--------+-----------+----------+--------------+----------------------+---------------+-------+-------+
2 rows in set (0.00 sec)

MariaDB [books]>
```

Question 3: How many authors are in the database whose lastname begins with the letter H? Use an relevant **alias** to output your results.

```
 Thiago Petcov 2016206 - mysql  -u root -p
12 rows in set (0.09 sec)

MariaDB [(none)]> USE books;
Database changed
MariaDB [books]> SELECT au_lname AS BEGINING_H FROM authors WHERE au_lname LIKE 'H%';
+------------+
| BEGINING_H |
+------------+
| Heydemark  |
| Hull       |
| Hull       |
+------------+
3 rows in set (0.11 sec)

MariaDB [books]>
```

Question 4: Display output, for each author_id (who has wrote more than 3 books), showing the number of books they have wrote.

```
Thiago Petcov 2016206 - mysql  -u root -p                                    —    □    X

MariaDB [books]> SELECT au_id, COUNT(title_id)FROM title_authors GROUP BY au_id HAVING COUNT(title
_id)>3;
+--------+------------------+
| au_id  | COUNT(title_id)  |
+--------+------------------+
| A02    |                4 |
| A04    |                4 |
+--------+------------------+
2 rows in set (0.04 sec)

MariaDB [books]>
```

Question 5: Provide the firstname and lastname, for each author displaying the total count of books (title_id), **grouping** by firstname, lastname.
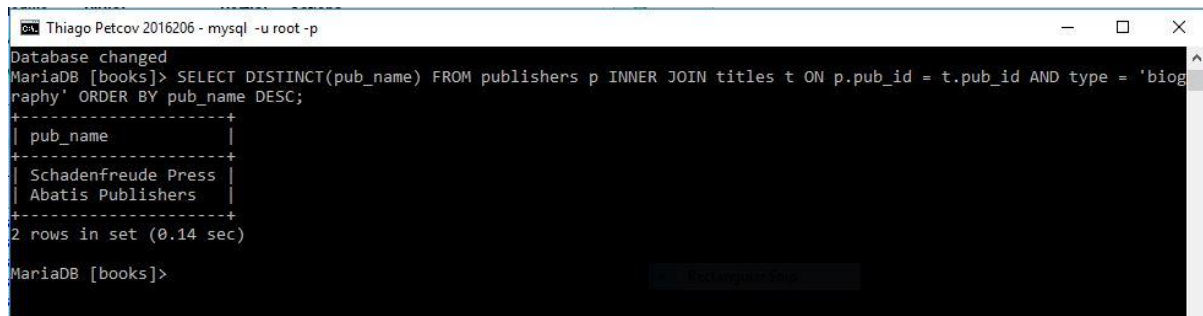
```
Select Thiago Petcov 2016206 - mysql  -u root -p                             —    □    X

Empty set, 238 warnings (0.00 sec)

MariaDB [books]> SELECT au_fname, au_lname, COUNT(title_id) FROM authors a, title_authors t WHERE
a.au_id - t.au_id GROUP BY au_fname, au_lname;
Empty set, 238 warnings (0.00 sec)

MariaDB [books]> SELECT au_fname, au_lname, COUNT(title_id) FROM authors a, title_authors t WHERE
a.au_id = t.au_id GROUP BY au_fname, au_lname;
+-----------+-----------+------------------+
| au_fname  | au_lname  | COUNT(title_id)  |
+-----------+-----------+------------------+
|           | Kellsey   |                3 |
| Christian | Kells     |                1 |
| Hallie    | Hull      |                2 |
| Klee      | Hull      |                4 |
| Sarah     | Buchman   |                3 |
| Wendy     | Heydemark |                4 |
+-----------+-----------+------------------+
6 rows in set (0.06 sec)

MariaDB [books]>
```

Question 6: Using the NEW ANSI (inner) join method, list only unique publishers names who have published biography books, ordered by publisher name alphabetically in descending order.
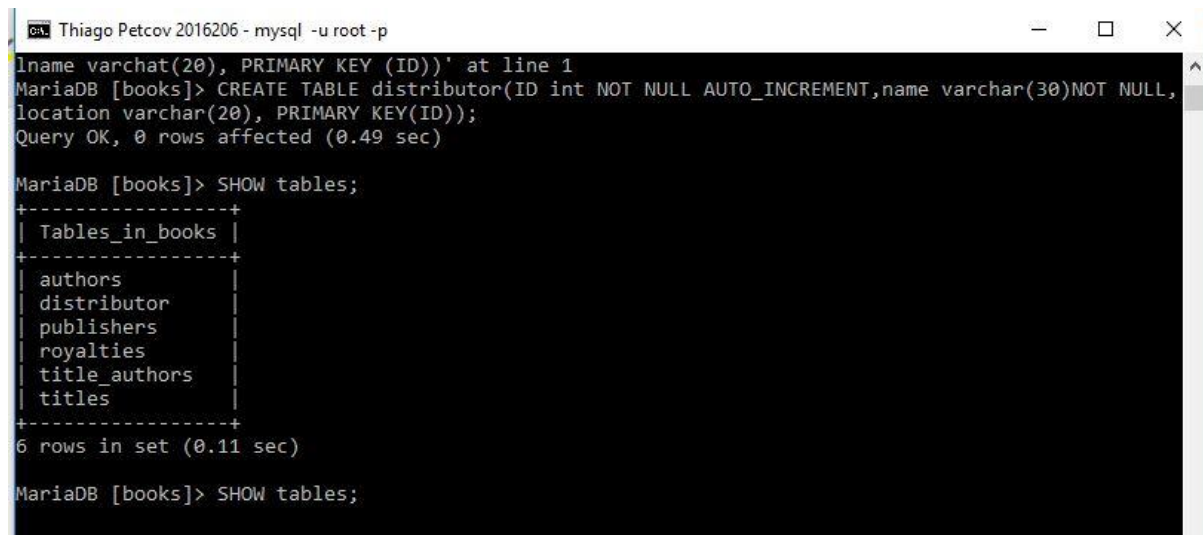

Question 7: Create a new table called distributor with 3 columns: order_ID, name and location. The order_ID is of type integer and primary key and needs to implemented as an Autonumber. The data type for name is varchar(30) (and which should not be NULL) and location is also varchar(20). Paste screenshot of the SQL statement and also the following screenshots:

show tables; and

DESCRIBE the distributor table; to show the data types (Hint: use DESCRIBE tablename SQL

Command).

```
Thiago Petcov 2016206 - mysql  -u root -p

MariaDB [books]> DESCRIBE distributor;
+----------+-------------+------+-----+---------+----------------+
| Field    | Type        | Null | Key | Default | Extra          |
+----------+-------------+------+-----+---------+----------------+
| ID       | int(11)     | NO   | PRI | NULL    | auto_increment |
| name     | varchar(30) | NO   |     | NULL    |                |
| location | varchar(20) | YES  |     | NULL    |                |
+----------+-------------+------+-----+---------+----------------+
3 rows in set (0.18 sec)

MariaDB [books]>
```

Question 8: Insert two new rows into the distributor table.

Record 1 - Name: ROI_Book Distributors Ltd - Location: Cork

Record 2 - Northern Books-r-us Distributors Ltd – Location: Fermanagh


```
Thiago Petcov 2016206 - mysql  -u root -p                                    —

3 rows in set (0.13 sec)

MariaDB [books]> INSERT INTO distributor VALUE ('ROI_BOOK', 'Distributor', 'Location cork');
Query OK, 1 row affected, 1 warning (0.16 sec)

MariaDB [books]> INSERT INTO distributor VALUE ('Northern Books-r-us', 'Distributor', 'Location cork');
Query OK, 1 row affected, 1 warning (0.08 sec)
```



```
Thiago Petcov 2016206 - mysql  -u root -p                          —    □    ×

MariaDB [books]> select * from distributor;
+----+----------------------------------+---------------+
| ID | name                             | location      |
+----+----------------------------------+---------------+
|  1 | Distributor                      | Location cork |
|  2 | Northern Books-r-us Distributo   | fermanagh     |
+----+----------------------------------+---------------+
2 rows in set (0.00 sec)
```

Question 9: The organization no longer wishes to record the distributors of the books within the database. Drop the newly created distributor table.

```
Thiago Petcov 2016206 - mysql  -u root -p                                        —    □    X

MariaDB [books]> DROP table distributor;
Query OK, 0 rows affected (0.47 sec)

MariaDB [books]> SHOW tables;
+-----------------+
| Tables_in_books |
+-----------------+
| authors         |
| publishers      |
| royalties       |
| title_authors   |
| titles          |
+-----------------+
5 rows in set (0.00 sec)

MariaDB [books]>
```

Question 10: Alter the authors table to include an email address field with a data type of varchar (20).

```
Thiago Petcov 2016206 - mysql  -u root -p                                        —    □    X

MariaDB [books]> ALTER table authors ADD (email varchar(20));
Query OK, 0 rows affected (0.61 sec)
Records: 0  Duplicates: 0  Warnings: 0

MariaDB [books]> SELECT * FROM authors;
+-------+-----------+------------+--------------+----------------------+---------------+-------+-------+-------+
| au_id | au_fname  | au_lname   | phone        | address              | city          | state | zip   | email |
+-------+-----------+------------+--------------+----------------------+---------------+-------+-------+-------+
| A01   | Sarah     | Buchman    | 718-496-7223 | 75 West 205 St       | Bronx         | NY    | 10468 | NULL  |
| A02   | Wendy     | Heydemark  | 303-986-7020 | 2922 Baseline Rd     | Boulder       | CO    | 80303 | NULL  |
| A03   | Hallie    | Hull       | 415-549-4278 | 3800 Waldo Ave, #14F | San Francisco | CA    | 94123 | NULL  |
| A04   | Klee      | Hull       | 415-549-4278 | 3800 Waldo Ave, #14F | San Francisco | CA    | 94123 | NULL  |
| A05   | Christian | Kells      | 212-771-4680 | 114 Horatio St       | New York      | NY    | 10014 | NULL  |
| A06   |           | Kellsey    | 650-836-7128 | 390 Serra Mall       | Palo Alto     | CA    | 94305 | NULL  |
| A07   | Paddy     | O'Furniture| 941-925-0752 | 1442 Main St         | Sarasota      | FL    | 34236 | NULL  |
+-------+-----------+------------+--------------+----------------------+---------------+-------+-------+-------+
7 rows in set (0.00 sec)

MariaDB [books]>
```

Question 11:

Update the email address of the author Sarah Buchman to sbuchman@gmail.com.

```
Thiago Petcov 2016206 - mysql  -u root -p                                                    —   □   ×
MariaDB [books]> update authors set email = 'sbuchman@gmail.com'  where au_id ='A01';
Query OK, 1 row affected (0.10 sec)
Rows matched: 1  Changed: 1  Warnings: 0

MariaDB [books]> select * from authors;
+-------+-----------+------------+--------------+--------------------+---------------+-------+-------+--------------------+
| au_id | au_fname  | au_lname   | phone        | address            | city          | state | zip   | email              |
+-------+-----------+------------+--------------+--------------------+---------------+-------+-------+--------------------+
| A01   | Sarah     | Buchman    | 718-496-7223 | 75 West 205 St     | Bronx         | NY    | 10468 | sbuchman@gmail.com |
| A02   | Wendy     | Heydemark  | 303-986-7020 | 2922 Baseline Rd   | Boulder       | CO    | 80303 | NULL               |
| A03   | Hallie    | Hull       | 415-549-4278 | 3800 Waldo Ave, #14F | San Francisco | CA    | 94123 | NULL             |
| A04   | Klee      | Hull       | 415-549-4278 | 3800 Waldo Ave, #14F | San Francisco | CA    | 94123 | NULL             |
| A05   | Christian | Kells      | 212-771-4680 | 114 Horatio St     | New York      | NY    | 10014 | NULL               |
| A06   |           | Kellsey    | 650-836-7128 | 390 Serra Mall     | Palo Alto     | CA    | 94305 | NULL               |
| A07   | Paddy     | O'Furniture | 941-925-0752 | 1442 Main St      | Sarasota      | FL    | 34236 | NULL               |
+-------+-----------+------------+--------------+--------------------+---------------+-------+-------+--------------------+
7 rows in set (0.00 sec)

MariaDB [books]>
```
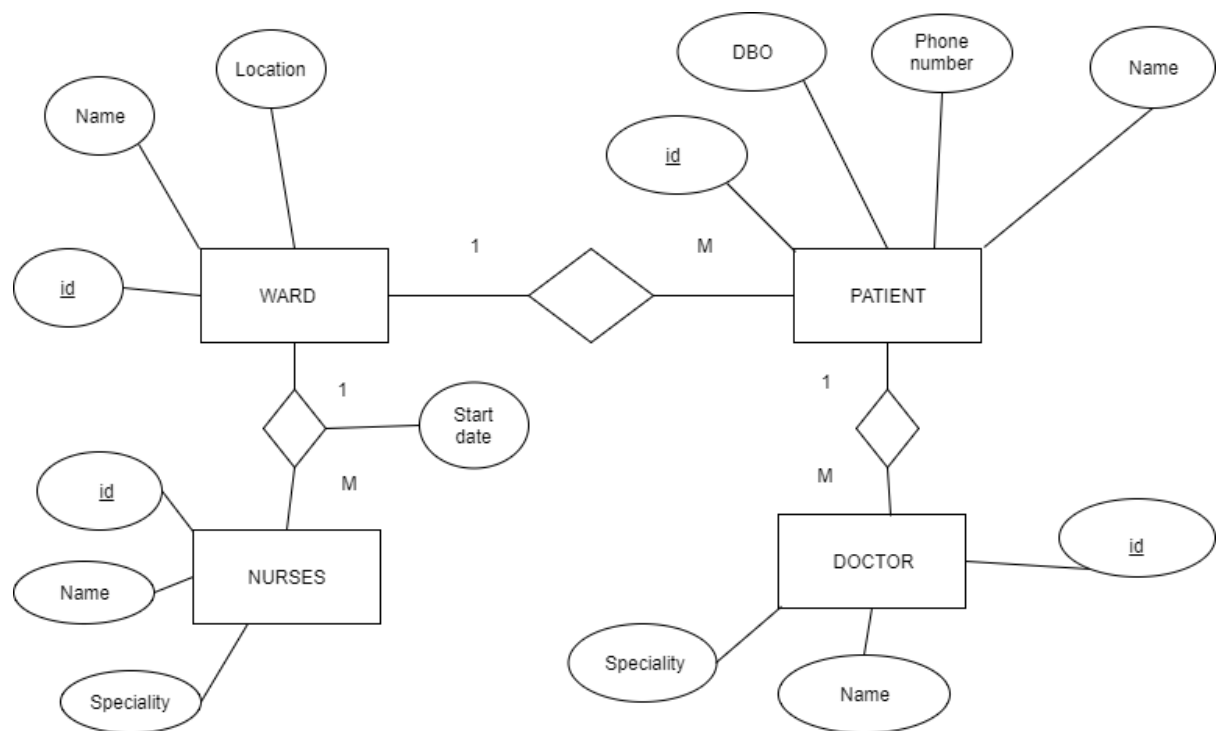
Question 12: ER Design Question
Any diagrams must be created using www.draw.io and the CHEN notation must be used. The diagrams (show cardinalities between tables) must be included in this word document for submission. When you have your diagram drawn using draw.io, this can be downloaded as a .png image and inserted into this document.

ER Design Question

Question 13: Research question:

In no more than 300 words, explain the concept of transactions and concurrency control within a database management system. In your answer outline the four properties to qualify as a transaction.

A classic example for transaction is transferring money from one bank account to another, transaction supports what is known as the ACID properties;

- **Atomic** (if the change is committed, it happens in one fell swoop; you can never see "half a change").

- **Consistent** (the change can only happen if the new state of the system will be valid; any attempt to commit an invalid change will fail, leaving the system in its previous valid state).

- **Isolated** (no-one else sees any part of the transaction until it's committed).

- **Durable** (once the change has happened - if the system says the transaction has been committed, the client doesn't need to worry about "flushing" the system to make the change "stick").

If you need to transfer 100 bucks from account A to account B. You can either do:

Account A -= 100;

Account B += 100;

Or

Account B += 100;

Account A -= 100;

If something goes wrong between the first and the second operation in the pair you have a problem - either 100 bucks have disappeared, or they have appeared out of nowhere.

A transaction is a mechanism that allows you to mark a group of operations and execute them in such a way that either they all execute (commit), or the system state will be as if they have not started to execute at all (rollback).

Begin Transaction;

Account B += 100;

Account A -= 100;

Commit Transaction;

Will either transfer 100 bucks or leave both accounts in the initial state

References

https://stackoverflow.com/questions/974596/what-is-a-database-transaction

https://www.lynda.com/search?q=ER+DATABASE%3B

I hereby declare that all of the work shown here is my own work.

Student's Name: Thiago Petcov

Student Number: 2016206

Date:

Marking Scheme Summary

Description	Weighting
1 Student correctly identifies relational database terminology applied to a given database (question 1)	0 to 3 Marks
2 Student identifies and queries using the appropriate DML (Data Manipulation Language) and DDL (Data Definition Language) statements for given example (question 2-11)	0 to 10 marks
3 Student produces an Entity–relationship (ER) model (using appropriate CHEN notation) using a standard tool e.g. draw.io to produce a high-level conceptual data model that is applicable for the hospital database. (question 12)	0 to 4 Marks
4 Student demonstrates the ability to research and to explain concepts related to transactions and concurrency within a database management system including a use case and diagrams (including references) (question 13)	0 to 3 Marks
TOTAL	**20**