Business Data Management [BDM]
Spring 2020
Homework Assignment #5: Final Assignment (180 points in total)

Based on the following business rules ((a), (b), (c) and (d)), complete the tasks below:

[Business Rules]

a) *An art museum owns a large volume of works of art. Each work of art is described by an item code, title, type, and size. At any point in time, a work of art is either on display at the museum, held in storage, away from the museum as part of a traveling show, or on loan to another gallery. If on display at the museum, a work of art is also described by its location within the museum.*

b) *A work of art is developed by an artist, but the artist for some works in unknown. An artist is described by an artist ID, name, date of birth, and date of death (which is null for still living artists).*

c) *A traveling show is described by a show ID, the city in which the show is currently appearing, and the start and end dates of the show. Many of the museum works may be part of a given show, and only active shows with at least one museum work of art need to be represented in the database.*

d) *Finally, another gallery is described by a gallery ID, name, and city. The museum want to retain a complete history of loaning a work of art to other galleries, and each time a work is loaned, the museum wants to know the date the work was loaned and the date it was retuned.*

Part 1.: (60 points) Identify key components of the data model.

- Provide answers to the following tasks:

1) Identify entities and attributes of each entity. Assign an identifier(s) to each entity.(30 points)

   i) Identify entities and attributes based on the business rules above.
   ii) Add ONE extra attribute on your own to each entity in addition to the attributes stated in the business rules above. (5 points) *(Note: The additional attribute should be one of those meaningful properties or characteristics of each entity.)*
   iii) Add ONE extra entity on your own that you think is meaningful in addition to the entities created based on the business rules above. (10 points)
   (Note: Assign at least 3 attributes on your own to the additional entity. Also, provide a brief description about the business rules regarding the extra entity you added.)

2) Identify relationships including the degree and cardinality of each relationship. (30 points)

   i) Identify relationships based on the business rules provided above.
   ii) Add a relationship that exists between the extra entity that you added in 1) above and any one of entities identified from the business rules provided above. (10 points)

Note: [Extra explanations/assumptions on your own] While working on the questions, you may find some parts of business rules, especially related to cardinalities of relationships, incomplete or unclear. In that case, feel free to come up with extra explanations or assumptions on your own and state them explicitly in your answers. However, you should note that your extra explanations and/or assumptions must not be inconsistent with the business rules provided above.

Part 2.: (40 points) Create a [logical] database schema based on your answers in Part 1. using MySQL Workbench.

  - Provide a copy of the database schema.

Part 3.: (50 points) Develop a [physical] database on your MySQL server based on the database schema created in Part 2, and then insert data into each table.
  (Note: Insert at least 10 rows (or records) into each table. Also, try to make the data look as meaningful and real as possible. For example, Model 1, Model 2, etc. for model names are not acceptable.)

  - Provide copies of all tables with data. (20 points)
  - Export your database and save it as **'db_yourID.sql'**, *and then submit the .sql file. (30 points)*
  (Note: Make sure to submit the final version of your tables. If you need to insert new data or update table to complete the queries in Part 4. below, provide copies and export your database after you complete all the revisions.)

Part 4.: Prepare and run SELECT statements for the following queries (30 points)
  (Note: Make sure that the select statements produce at least one row (or record) in the result table. In this regard, you may need to insert new data into or update tables.)

  - Provide the SELECT statement and the result table of each query.
  - Save the query file as **'query_yourID.sql'** *and submit.*

  1) List titles and types of artworks that were developed by 'John Smith'.

  2) List titles and types of artworks that were developed by 'John Smith' and participated in a show held in 'Seoul'.

  3) List artwork names and names of galleries where artworks developed by 'John Smith' are loaned.

  4) Count the number of artworks developed by 'John Smith'. *(Note: use COUNT() to count rows.)*

  5) List artist names and the number of artworks developed by each artist.

  6) Create your own query that involves the table(s) transformed from the entity or entities that you added in Part 1 and other table(s).

[Submission guidelines]
  First, prepare your answers in a word file according the template provided below. Next, save it as **'ans_yourID.pdf'**, and then submit the pdf file along with TWO .sql files from Part 3. and 4. Only these THREE files will be graded, and all other files will be simply disregarded.

  Also, you need to submit the files through the Blackboard course website ONLY. Submissions through other ways, for example, via email, will be simply disregarded.

  In summary, you need to prepare and submit the following 3 files only and submit through the Blackboard course website:
        - ans_yourID.pdf
        - db_yourID.sql
        - query_yourID.sql.

  Note that you are allowed to submit each file TWICE ONLY, not unlimited times.

[Template]

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Homework Assignment #5: Final Assignment

Your name/Your ID

Part 1: Identify key components of the data model (60 points).

1) Entities and attributes

(e.g.)

BOOK: <u>**ISBN**</u>, Title, Price, Publish Date
PUBLISHER: <u>**Publisher ID**</u>, Name
AUTHOR: <u>**Author Number**</u>, Name, Date of Birth
…..

2) Identify relationships including the degree and cardinality of each relationship.

(e.g.)

a. BOOK & PUBLISHER: this relationship is a degree of 2 (binary). The cardinality is (Mandatory)One-to-(Optional)Many from Publisher to Book. It's (Optional)Many because it is assumed that we wish to track a Publisher even if it does not yet have a Book published.

b.

c.
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.
.
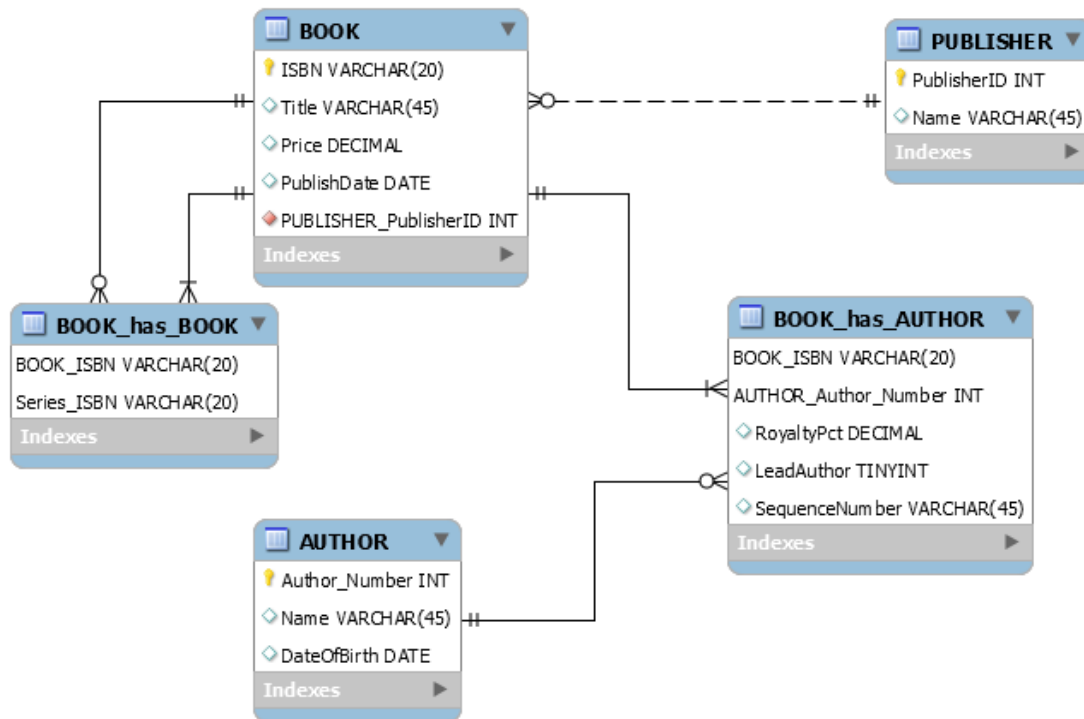

[Extra explanations/assumptions]

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Part 2: Create a [logical] database schema based on your answers in Part 1 using MySQL Workbench (40 points).

(e.g.)

Part 3: Develop a [physical] database on your MySQL server based on the database schema created in Part 2, and then insert data into each table. (50%)

(e.g.)

BOOK

ISBN	Title	Price	PublishDate	PUBLISHER_PublisherID
978-0143039433	The Grapes of Wrath	16	1939-04-14	1114
978-0241905265	The Plague	20	2014-01-01	1112
978-0375508325	Cosmos	17	2013-01-03	1111
978-0553380163	A Briefer History of Time	13	1988-01-01	1115
978-0600000000	Series1	100	2018-01-01	1111
978-0700000000	Series2	150	2019-01-01	1112
978-0714847030	The Story of Art	25	2015-01-01	1113
978-0800000000	Series3	200	2020-01-01	1113

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Part 4: Prepare and run SELECT statements for the following queries (30%)

(e.g.)

1) ISBN number, book title and price of books for books whose prices are greater than $19.99 and less than $50.00.

```
SELECT isbn, title, price
FROM book
WHERE price > 19.99 and price < 50;
```

isbn	title	price
978-0241905265	The Plague	20
978-0300143324	A Little History of the World	24
978-0714847030	The Story of Art	25

2) ISBN number, book title and price of books for books whose title include 'Science'.

```
SELECT isbn, title, price
FROM book
WHERE title LIKE '%science%';
```

isbn	title	price
978-1402060984	The Joy of Science	67

3)

4)
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[Extra question, 10 point]

Explain how referential integrities are enforced in MySQL Database Server using specific examples from your own database.