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COS 221 Practical Assignment 2

- Date Issued: **26th February 2020**
- Date Due: **11th March 2020** before **11:00am**
- Submission Procedure: **Upload to the web server (`wheatley`) and CS web**
- This assignment consists of **7 tasks** for a total of **65 marks**.

1 Introduction

In this assignment, you are required to create a database for a Video rental store.This system includes a *Customer* table (which contains each customer's personal information), a table for *Movies* and another for *Series*. Customers can borrow multiple DVDs.Two other tables keep record of the movies and series that each user has borrowed. Once a user returns a DVD their record is removed from the table. An ER diagram for the system is given in Figure 1. You are required to use the given schema and database state(Figure 2) to specify and execute queries in SQL and Relational Algebra (RA). For RA, a RA [1] interpreter will be used.

After successful completion of this assignment you should be able to:

- implement various referential integrity constraints on any database schema,
- create and accurately populate referenced tables in a given relation schema,
- specify and execute basic retrieval requests as relational algebra expressions,
- apply the basic SQL constructs for specifying retrieval queries.

2 Constraints

1. You must complete this assignment individually.
2. The SQL scripts will be marked
   (a) Scripts which run and perform what they are supposed to do get full marks
   (b) Scripts which run but do not perform as required, will receive partial marks
   (c) Scripts which do not run will be allocated partial marks based on the functionality they would have exhibited.
3. You may ask the Teaching Assistants for help but they will not be able to give you the solutions.
4. You may utilise any text editor or IDE, upon an OS of your choice. In the Informatorium, you will use either MySQL Workbench or MariaDB to create the VIDEOSTORE database on `wheatley web server` and install RA interpreter to access and retrieve the information from the database.

[1] RA is a simple relational algebra interpreter written in Java. It is built on top of an SQL-based relational database system. It implements relational algebra queries by translating them into SQL queries and executing them on the underlying database system through JDBC. RA is packaged with SQLiteJDBC, so you can use RA as a standalone relational-algebra database system. Alternatively, you can use RA as a relational-algebra frontend to other database systems.

3 Submission Instructions

You are required to upload all your source files (as a zip file) to the Computer Science web-portal. You also need to make sure that `wheatley` mirrors what you uploaded to CS web and works on the web server before the deadline. No late submissions will be accepted, so make sure you upload in good time. You will be required to download the files you uploaded to CS web and load them onto `wheatley` as part of the assessment of the practical assignment.

4 Online resources

Access a free SQL Tutorial at: `https://www.w3schools.com/sql/sql_create_table.asp`

Download the RA interpreter on your computer, by using the official site: `https://users.cs.duke.edu/~junyang/ra2/`

Get started with the RA interpreter documentation available at: `https://users.cs.duke.edu/~junyang/radb/`

Follow the RA Github project at: `https://github.com/junyang/RA`

There are many other resources online for example Stack overflow – `https://stackoverflow.com/` a platform for developers to learn, share knowledge and build a career.

IMPORTANT NOTE: Bring to the practical session your textbook and/or the lecture notes for Relational Algebra and SQL in which the content was explained.

5 Rubric for marking

Connecting to MySQL on `wheatley`	2
Creating a database	1
Creating tables	
Use of datatypes	6
implementation of constraints	6
Population of tables	
Use of correct clauses	6
correct data entry	6
Installing RA interpreter	5
Queries	
SQL Queries	14
RA Queries	14
Database dump	5
Total	**65**

6 Assignment Instructions

Task 1: Connecting to MySQL on `wheatley` ..... (2 marks)

Use command `mysql -u{username} -p{password} -h{host server ip}` where {`username`} is your student number starting with u, {`password`} is your CS password and {`host server ip`} as `wheatley.cs.up.ac.za` to launch mysql on the `wheatley` web server.

Note: You need to `ftp wheatley.cs.up.ac.za` in cmd, enter your CS login credentials before you connect to MySQL on `wheatley`. Otherwise your access will be denied

Task 2: Creating a database ..... (2 marks)

Create the database and name it `uXXXXXXXX_VIDEOSTORE` where `XXXXXXXX` is your student number.

Task 3: Creating tables ..... (12 marks)

Create the corresponding six Tables as shown in Figure 1 with the appropriate constraints and attributes.

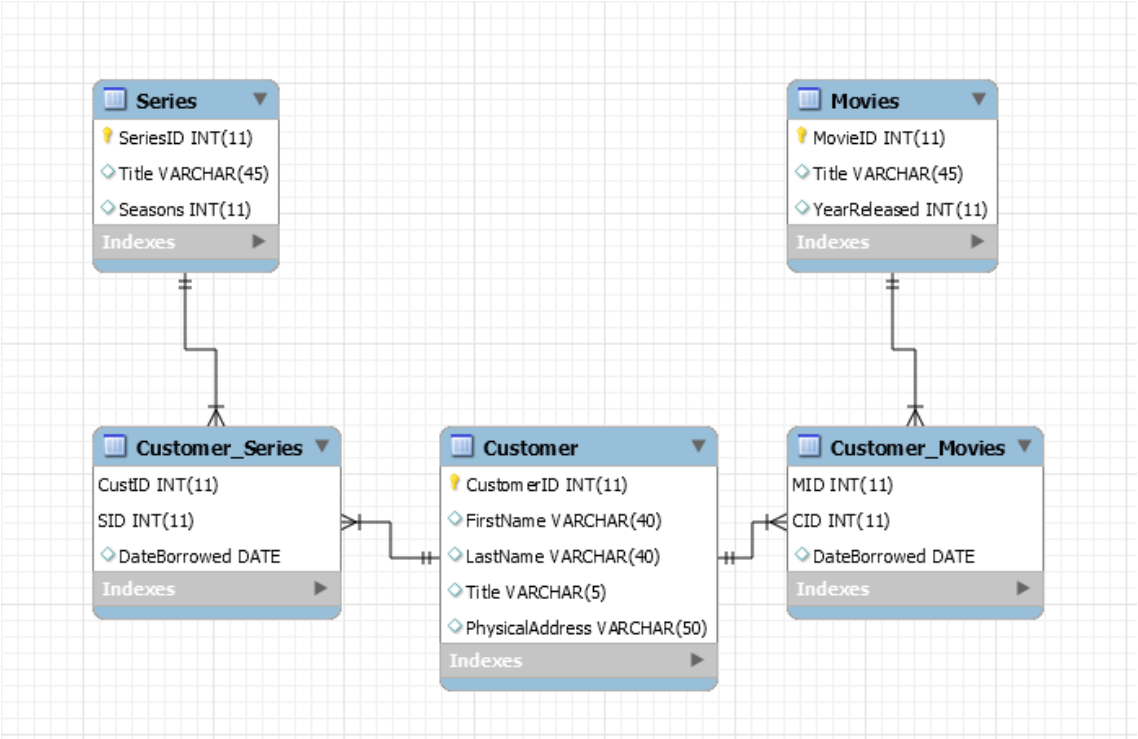

Figure 1: ER diagram

Task 4: Populating tables ..... (18 marks)

Populate the tables with the values given in Figure 2 to ensure that the database is in a valid state

Task 5: Installing and configuring RA interpreter ..... (5 marks)

Download the RA interpreter zip file by using the link: `https://users.cs.duke.edu/~junyang/ra2/ra-2.2b.zip` or `https://users.cs.duke.edu/~junyang/ra2/ra-2.2b.tgz`.

To run the RA do the following:

- check whether java is installed on your computer → Open the command prompt and type `java -version`. If you get the version info, Java is installed correctly and PATH is also set correctly.
- locate the downloaded zip file, extract it,
- create a copy of the `sample.properties file`
- rename the copy file `uXXXXXXXX_VIDEOSTORE.properties` (This is your configuration file) where `XXXXXXXX` is your student number. Ensure that it is part of the `ra-2.2b folder`.

Customer_Series

CustID	SID	DateBorrowed
1	1	2019/12/29
2	6	2020/02/10
3	4	2020/02/15
4	5	2020/02/15
4	7	2020/02/15
5	9	2020/02/16
10	3	2020/02/12

Movies

MovieID	Title	YearReleased
1	Captain Marvel	2019
2	Set it up	2018
3	Crazy Rich Asians	2018
4	Love Actually	2003
5	Clueless	1995
6	Love, Simon	2018
7	The Dark Knight	2008
8	Die Hard	1988
9	Avengers:Endgame	2019
10	Bad Boys	1995
11	Hustlers	2019

Series

SeriesID	Title	Seasons
1	Desparate Housewives	8
2	Modern Family	7
3	Mr Robot	4
4	Law and Order	20
5	30 Rock	7
6	Friends	10
7	Parks and Rdcreation	7
8	The Big Bang Theory	6
9	Gossip Girl	6

Customer

CustomerID	FirstName	LastName	Title	PhysicalAddress
1	Ruben	Silverberg	Dr	5952 Aliquam St
2	Maryam	Mayson	Ms	2311 Eu St
3	Miquel	Couchesne	Mr	5273 Porttitor St
4	Aja	Carlberg	Mr	422 Sit St
5	Katya	Silverberg	Ms	4294 Lorem St
6	Rafaela	Starner	Ms	3631 Mi St
7	Kala	Huff	Mr	140 Lobortis St
8	Hermila	Clara	Dr	158 Laoreet St
9	Miquel	Courchense	Mr	6663 Odio St
10	Jesusa	Tharrington	Mr	120 Donec St
11	Joette	Streater	Ms	327 Praesent St
12	Sanjuanita	Muff	Prof	4224 Duis St
13	Miquel	Courchesne	Mr	175 Donec St
14	Joey	Mysliwiec	Mr	279 Ace St
15	Samantha	Stengel	Ms	232 Quisque St

Customer_Movies

MID	CID	DateBorrowed
1	1	2019/12/29
2	3	2020/02/10
3	2	2020/02/05
4	7	2020/02/10
6	8	2020/02/05
8	1	2019/12/29
9	5	2019/12/29
10	8	2020/02/05
11	5	2019/12/29

Figure 2: Database state

- open your configuration file, under MySQL-specific, set your path details as shown below;
  - `url=jdbc:mysql://wheatley.cs.up.ac.za/uXXXXXXXX_VIDEOSTORE`
  - `user = uXXXXXXXX`
  - `password = your cs password`

  Note: The user configuration file is useful for telling RA how to connect to your own database server. Please make sure other required properties are not active (commented). We are only interested in MySQL settings
- open cmd and navigate to the extracted `ra-2.2b folder` and type
  `java -jar ra.jar uXXXXXXXX_VIDEOSTORE.properties`
  You should be able to get RA running on `wheatley` after successfully executing this command.
- type the command `\list;` in the prompt to see the tables you created.

Task 6: Specifying and executing Queries ..... (28 marks)

You are required to specify and execute the following queries in SQL using the VIDEOSTORE database schema.

1. List the names of all the customers who have rented more than one movie and display the number of movies that they have rented.
2. Display the title and number of seasons of the series with the most seasons.
3. List the names of all the customers who have rented at least one movie but no series.
4. List the names of all the customers who have not rented any series.

You are also required to specify and execute the following queries both in SQL and in relational algebra using the RA interpreter on the VIDEOSTORE database schema.

5. List all the movies released in 2018.
6. List the titles of all the movies released in 2019 that have been rented by the Silverberg family.
7. List the names of all the customers who rented a series on the same day that "Law and Order" was rented.

   Note: Please refer to the RA documentation at `https://users.cs.duke.edu/~junyang/radb/basic.html` and the notes to familiarise yourself with the relevant commands for interacting with your database most appropriately

Task 7: Database dump ..... (5 marks)

Dump your database structure and data into a text file or .sql file from `wheatley`. Your queries should also be extracted and placed in a separate text file, one for your SQL queries and one for the RA queries. If you use the ra_file [2], make sure it is part of the text files that you will submit for marking. Create a single archive (zip file) containing the MySQL dump, a text file containing the SQL queries and a text file containing the RA queries. Upload this archive to the CS website. You will be required to use these files for your demo during the marking session. No extra files will be marked apart from the submitted files.

[2] RA also supports the command `source 'ra_file';`. This command makes RA read statements from the specified file and execute them. Note that ra_file must be enclosed in single quotes. The file should be just a simple text file containing RA statements and comments. This file can be prepared manually with a text editor, or it can be the result of a save command.