MONASH University
Information Technology

FIT9132 Introduction to Databases

Assignment 3 - Database Design

Assignment 3A Due:	Friday 9th October (10PM) - Week 10
	Hurdle requirement for Assignment 3B (ie. **must be submitted to be eligible to submit assignment 3B**)
Assignment 3B Due:	Friday 23rd October (10PM) - Week 12
	Assignment weighting: 20%

Ozflick Video Rental Case Study

Ozflick rents out video to customers in Australia. To be able to rent titles from Ozflick, a customer needs to be a member. Each member will be given a membership number. Membership is paid in advance using a credit card or Paypal. However, Ozflick does not want to keep the member's credit card number in their rental database. The credit card number and billing address are kept in a separate database that has very high-level security protection. For the rental database, the member's delivery address will be recorded so that physical DVD's can be delivered to members. The member's contact number and email address are also recorded in the rental database.

There are three levels of membership Gold (G), Silver (S) and Bronze (B):

- **Gold for $30/month**. For this level, a member can borrow maximum of 8 physical DVDs and 12 video-streaming titles in a month.
- **Silver for $20/month**. For this level, a member can borrow maximum of 4 physical DVDs and 6 video-streaming titles in a month.
- **Bronze for $15/month**. For this level, a member can borrow maximum of 4 physical DVDs and 2 video-streaming titles in a month.

There is no additional postal fee paid by a member to receive the physical DVDs. Ozflick only record, for a given member, their membership level as a single character (G, S or B) – the data about cost and limits is not stored in the database. Ozflick has requested that the database enforce the requirement that the members status must be G, S or B. The date when a member joins Ozflick is used to determine the monthly cycle.

A status of C, S or I for "CURRENT", "SUSPENDED" or "INVALID" is also recorded for each member (only a single character representing the member's status is recorded in the database, again the request is that the database enforce this restriction). A suspended status is applied when the monthly fee was not received 5 days after the due date. Ozflick wishes to log to an audit log the details of any suspension (see Tasks Part B 4 below). A suspended member will not be allowed to borrow any DVDs or streaming video. An invalid status is applied when no payment is received 30 days after the payment due. date To re-join their membership, an invalid member has to pay a rejoining fee.

Ozflick is interested in building a community of its members. It encourages members to review a title that they have viewed. A review rating (out of 5) and the comment made by an individual member are stored for each title. The average review rating and individual comments are displayed in the Ozflick online catalogue.

Members can choose to borrow a physical DVD or to stream the video to their device of choice. They offer a large number of video titles and each title may have several copies of physical DVD or streaming copies. For each title, they need to keep the following information; video title, classification (R,MA,M, PG,G)[1], length in minutes, director, leading role actor and actress, genre and language. Only two leading roles are recorded for each title. Physical DVDs are kept in centralized warehouses in each of the capital cities to speed delivery. The physical DVDs can be in a traditional format or Blu-ray format. Ozflick records the date when the DVD was dispatched from the warehouse and the date on which it was received back.

Ozflick's streaming service is a new service to its members. To be able to deliver good quality streaming video, it has purchased several servers and distributed them across major cities in Australia such as Melbourne, Sydney and Brisbane. A number of copies (files) of a given title are placed on different servers. To ensure quality delivery during the streaming, each of the streaming copies will have information on the intended configuration of the playing device, media player, connection and the video quality (High Definition-HD, Standard Definition-SD and Video CD-VCD). The device configurations include the popular name of the device, the operating systems and the device's memory size. The media player information includes media player software name and its version. The connection is the type of internet connection used to download the copy, such as 3G, 4G, ADSL2+, ADSL, NBN, etc. Each of accepted combinations of device properties, media player, connection type and video quality is identified and is assigned a delivery configuration number. Information about the file size in GB for each title of a given configuration is also kept in the database.

At a minimum, for each title, a single copy or file for each configuration will be created and stored. To ensure availability, it is possible that multiple files of a given configuration copy may be created and stored. When this occurs, each of these files will be located on different servers. For example, the system would not allow multiple copies/files of the "Avengers: Age of Ultron" movie for iPhone to be kept on the same server.

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[1] For the details of the movie classification in Australia, visit http://www.ebroadcast.com.au/movies/censorship_ratings.html.

When a streaming title is requested, members will choose from a list of supported configurations (device, media player, connection and video quality) at the Ozflick website. The website application will determine which copy or copies would be appropriate for the specified configuration and then determines the most appropriate server to fulfill the request. The application will then connect the user device to the server and hands it control of the download of the physical video file (title to be watched) to the player application.

Information on each server configuration is also kept in the database. Information includes server physical address location, IP address, machine type, operating systems, maximum bandwidth supported, disk capacity, and the maximum number of concurrent connections to the server. Each streaming copy will be located in one of these servers.

When a member rents a title through the streaming service, the title needs to be downloaded before it can be viewed by the member. Once the download is completed, the title can be viewed as many times as the member likes to do within 72 hours of the completion of the download. The copy will not be able to be played until the download is completed. Ozflick record the date and time a stream was requested and the date and time the download was completed.

An earlier project to set up the database proposed a streaming copy table as depicted in table 1 (Appendix A). After careful analysis, the senior analyst suggested that the table is not in a normalized form. The table needs to be normalized according to a normalization process.

Tasks

Perform the following tasks to complete this assignment:

Part A

Prepare an initial conceptual model (Entity Relationship Diagram) for Ozflick Videos. For this initial conceptual model, *only include what you see as identifiers for each entity*, do not include other attributes at this stage. *Participation and connectivity for relationships must be shown on the diagram*.

Part B

1. Normalise the data shown in the table design for the streaming copy table in Appendix 1. You may use the case study description to guide you in completing the normalization task. Your submitted normalisation must show all stages, i.e., UNF to 1NF to 2NF to 3NF *along with dependency diagrams*. **(30 marks)**

2. Based on conceptual model that you have prepared in Part A and the normalisation output, prepare a logical level design of the database. The logical model must be drawn using the Oracle Data Modeller. The information engineering or Crow's foot notation must be used in drawing the model. All attributes must be commented in the database. **(60 marks)**

3. Generate the schema (CREATE TABLE statements) for the database in Oracle Data Modeller and use the schema to create the database in your Oracle account. Capture the output of the create table statements. **(5 marks)**

4. Code an Oracle trigger (suspend_log.sql) which would ensure that whenever a member is set to a suspended status, the action is logged to a separate audit table. The audit table should include the membership number of the member who was suspended, the logged in Oracle user who suspended the member, and the date and time at which the suspension took place. This audit table should be created automatically as part of your Oracle schema from 5 above, not as an "extra" script. As part of your submission (see below) you must supply the output from a member update and select of the audit table which clearly demonstrates that your trigger worked correctly. **(5 marks)**

Submission Requirements:

Part A. Due: Friday 9th October (10PM) - Week 10

You need to submit a single zip file in Moodle named a3-<yourauthcateid>PartA.zip, e.g., a3-xyz123PartA.zip. The zip file must contain 2 files:

- An image or pdf file of the initial conceptual ERD. A scanned hand drawn ERD **is acceptable** for Part A.
- A pdf file containing a list of assumptions that you have made in developing the model.

There will no marks given for this part of the assignment. Feedback will be provided by your tutor during your tutorial class scheduled after the due date. The feedback will only be an indication whether you are in the right direction and/or whether your assumptions are acceptable for the design. Your tutor will not tell you what entities/attributes are missing or are not correct.

You will not be able to submit Part B if you do not submit Part A.

Part B. Due: Friday 23rd October (10PM) - Week 12

The following files are to be submitted for Part B:

- A pdf file containing the detailed normalisation process *and dependency diagrams.* Name the file **FIT9132Normalisation.pdf**
- A pdf file containing the final logical Model you created in Oracle Data Modeller. Name the file**FIT9132Logical.pdf**
- A zip file containing your Oracle data modeller project (in zipping these files be sure you include the .dmd file and the folder of the same name). Name the file **FIT9132OracleModel.zip**
- A schema file (CREATE TABLE statements) generated by Oracle Data Modeller Name the file **FIT9132A3.sql.**
- The output from SQL Developer showing the tables have been created. Name the file **FIT9132Output.txt**
- A copy of your Oracle trigger (**suspend_log.sql)** and the output from the testing of the trigger (**suspend_log_output.txt**)
- A pdf document containing any assumptions you have made in developing the model or comments your marker should be aware of. Name the file **FIT9132Assumptions.pdf**

Note that there are ***eight required files***. These files must be zipped into a single zip file in Moodle named a3-<yourauthcateid>PartB.zip e.g., a3-xyz123PartB.zip before the assignment due date/time.

Marking considerations:

Normalisation

- Correct steps in the normalisation have been followed.
- Correct result from the normalisation process.
- Correct dependency diagrams provided.

Logical model

- The model follows the correct notations as prescribed.
- The model captures all the necessary entities, relationships, primary keys and foreign keys that are required for the development of the database.
- Clear explanation of design decision made during the modelling by providing a list of assumptions and short explanation on how those assumptions affect the model.

Schema

- The ability to generate the schema from the submitted logical design in Oracle Data Modeller *without any subsequent editing*.
- The ability to execute the schema script in SQL Developer.

Oracle Trigger

- Trigger compiles and would successfully update the title id.

Late Penalty:

Any submission after the due date will receive a deduction of 5 marks per day, which includes weekends.

APPENDIX A

Table 1 Original design for the Streaming Copy table

Attribute	Explanation	Sample value
titleid	The id of the title to be streamed for rent	
deliveryconfigno	The id of a given configuration of device, media player, connection and video quality.	
filesize	The size of the video file in gigabytes. The size for the same title can vary depending on the configuration of device, media player, connection and video quality.	
serverIPaddress	The IP address of a server where a copy is located	
serverOS	The Operating systems of a server	Window8, Linux, Yosemite
serverlocation	The location where the server is located	Melbourne, Sydney, Brisbane
serverdiskcapacity	The disk capacity of a given server in petabytes	
servermaxbandwith	The maximum band with per connection that can be supported	
mediaplayer	The name of the media player software	Quicktime, Realplayer
mediaplayerversion	Version of the media player	
devicename	The popular name of the device	PS3, Xbox, iPad, iPhone, PC, iMac
devicememorysize	The size of memory in the device	
connectioncode	The code for different connection types	3G, 4G etc
connectiontype	The type of connection used to download	Third generation mobile broadband
videoqualitycode	The code to differentiate different video quality	HD, SD, VCD
videoquality	The video quality of the given copy	High definition, etc