ISEM 3006 Data Management in Business

Semester 1, 2020/2021

Group Assignment

**Deadline: 23:55, 23 December 2020 Submitted to Moodle**

**Objective**: This assignment gives you an opportunity to analyze a business system, design and implement the database for the system.

**Team**: Each team should consist of maximum 4 members. Register your member list in Moodle by 11 Nov 2020. **If I do not have your name in any group, I will assume that you will work on the assignment all by yourself.**

**Requirements**

1. Prepare an entity relationship model to support the operations of the Greta’s Gym. as described. Note that the current way of doing things and storing data may not be the best way. So design a data model that is good and also support the functions. Clearly indicates the attributes of the entities and the relationships. Write a two to three-page explanation of the E-R model. **Explain** the relationships and cardinalities instead of just describing them. Provide entity and attribute definitions, using the table format provided as the basis for your report.

2. The description of the case is unavoidably incomplete. State any necessary and logical assumptions you made in order to model the system. You can include whatever attributes you think necessary to support the operation. However, remember to explain the meaning of them.

3. Based on the entity relationship model, develop a set of relational database tables that minimize data redundancy.

4. Create the relational tables in PostgreSQL. Properly define all the constraints.

5. Insert into each table around 5 to 10 records (more if needed) so that you can show the results of the queries in point 6.

6. Develop the SQL statement for the following queries and include the SELECT statement and the output in your report.

1. List the gymnast number and name of the gymnasts who have competed in the meets that were held in February. Remove any duplication and order the output by the name of the gymnasts.
2. List the meet ID and location of the meets that have level 3 team members BUT NOT level 8 members competed in them.
3. For each gymnast, list out the gymnast number, name, and the average score that he/she got from all meets held within one year (when the SELECT statement is executed). Only include the gymnasts who have competed in at least one meet within one year and the average score is lower than 20.
4. List the employee ID and name of the employees who have provided private lessons to ALL the level 4 team members.

7. You should include the following in a MS Word report (everything should be in one file and should include page number; use 12 point size fonts):

1. A cover page with the names, student number, section of the group members, as well as the Group Number you registered in Moodle.
2. The ER Model. (Make sure it is legible when I zoom in. Use at least 12 point size fonts.)
3. Explanation of the ER Model.
4. Entity Definitions and Data Element Definitions.
5. Listing of the SQL SELECT statements for the queries in point 6 (I should be able to copy it to SQL Query Tool to execute them) with the OUTPUT TABLE (screen capture) for each SELECT statement.
6. Listing of the CREATE TABLE statements.
7. Listing of the INSERT statements.

For (f) and (g), I should be able to copy and paste all the Create Table and Insert statements in one pass to SQL Query Tool, so that I can execute all the statements all at once, just like what I did in Exercise 3.

i. Remember to use straight quotes instead of curly quotes.

ii. Put the comments inside /\* …… \*/ so that the script can run from the beginning to the end without any interruption.

iii. Your script should at least be able to create the tables and insert the data correctly. Otherwise, I have no way to test your SELECT statements.

iv. Test your script, making sure that it runs correctly before handing it in. If I cannot run all the statements from the start to the end in one pass, I will consider it incomplete.

8. Upload a single MS Word file to Moodle before the deadline. One group only needs to upload one file.

# Schedule

The entire report should be uploaded on or before 23:55 on 23 Dec 2020. Ten points (out of 100 points) will be deducted from your mark for every half hour late for handing in the assignment.

**Assessment**

This group assignment accounts for 25% of the course marks.

Intra-group assessment will be conducted after the assignment is submitted and the marks of the assignment will be assigned to individual group members according to this assessment.

**Entity Definition Sheet**

|  |  |  |  |
| --- | --- | --- | --- |
| Entity name | Business Definition | Primary Key | Attributes |
| Customer | A customer is any person who has brought from us repeatedly. | CustomerNumber | CustomerNumber + CustomerName + CustomerGender + CustomerAddress + ….. |
|  |  |  |  |

**Data Element Definition Sheet**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Description | Data Type | Length | Domain |
| CustomerNumber | A unique code which is used to identify customer | Integer | 6 |  |
| CustomerGender | Gender of the customer | Character | 1 | "F" or "M" |
| CustomerAddress | Address of the customer | Character | 100 |  |

**Greta’s Gym Database Project**

Greta's Gym, a local gymnastics facility, was opened by John and Greta Jones. Initially the gym focused on gymnastics classes for girls. The gym has since expanded its programs to include gymnastics classes for boys, a well-respected competitive team program for girls and boys, and cheerleading classes.

Initially, John and Greta were the only employees and every business process was handled manually. New employees have been added and the number of students has grown tremendously, but they have not changed most of their manual procedures.

The Jones' are considering opening another gym, which is 45 km south of the current gym. They know it will be impossible to manually monitor activities if they have two gyms to manage. Automating **competitive team** administrative activities will help greatly in managing the two gyms.

Competitive Teams

When gymnastics students reach a certain skill level in the regular class program, John or Greta may choose to invite them to participate in the competitive team program. If a gymnast accepts the invitation to join the competitive team, the start date of joining particular team level is recorded. There are currently 125 gymnasts involved in Greta's Gym Competitive Team Program. Each gymnast has a unique gymnast number. The name, age, gender, and phone number of the gymnast are also recorded.

There are 10 team levels for boys and girls, some team levels have minimum age requirements, others do not. For example, level 10 is the highest (i.e. most skilled) level and has a minimum age requirement of 14 years. Level l is the lowest skill level and has no minimum age requirement. Level 6 has a minimum age requirement of 8 years. Gymnasts on each team pay a fixed monthly fee for team practices, this team fee varies by level.

|  |  |  |
| --- | --- | --- |
| Team Level | Min Age Requirement | Monthly Fee |
| 1 | n/a | 1300 |
| 2 | n/a | 1500 |
| 3 | n/a | 1500 |
| 4 | 6 | 2000 |
| 5 | 7 | 2300 |
| 6 | 8 | 2300 |
| 7 | 10 | 2600 |
| 8 | 12 | 2750 |
| 9 | 12 | 3250 |
| 10 | 14 | 3250 |

Since gymnasts will progress from one level to a higher level, the joining date and the leaving date of a gymnast for a team level need to be recorded. Moreover, when a student stop participating in competitive team training, the leaving date will also be filled.

Greta's Gym Staff

Greta’s Gym has 15 full-time employees; some of them are coaches and some are responsible for administrative works. For example, Kristin is the girls' levels 8-10 head coach, and Annie serves as the gym's office manager. There is only one head coach per team level. John and Greta only want to know who the current head coach of each team level is. No historical coach assignment needs to be recorded. If there are no boys or girls competing at a given team level, there is no head coach assigned to that team level. Each employee has a unique employee ID. The name, age, gender, phone number, monthly salary and position of the employee are also recorded.

Coaches offer private lessons to competitive team gymnasts, parents pay $200 per hour for these lessons. The data recorded about each private lesson includes the gymnast and the coach involved, the date, the start time, and the duration (in term of hours) of the private lesson. Less than half the gymnasts take private lessons each year, but for those who do, the private lesson costs are added to the bill the gymnast receives each month. Coaches can share 30% of the incomes from private lessons that they taught in addition to their monthly salary.

Gymnastics Meets

Competitive team gymnasts compete in gymnastics meets approximately twice per month. Meets are held in different locations. Not all gymnasts compete at every meet. Gymnasts pay for each meet they compete in. Meet fees vary by meet. Data about meets include a unique meet ID, date, time, location, and the fee.

Coaches would like to be able to enter individual scores and ranking for each gymnast after each meet they compete in. Gymnast scores range from 0.00 to 50.00. Currently, Greta collects all scores and rankings on all the events from the coaches after each meet. She then types them into Excel and posts them on the team bulletin board. Coaches would like to analyze team member scores to see if, for example, scores are generally lower on a particular event, if scores for boys or girls at a particular level are lower than boys and girls at other levels.

Monthly Bill

Bills are sent to team members monthly. The bill lists the total amount due from the gymnast for that month, which includes expenses incurred by the gymnast for that month. Expenses that a gymnast can incur each month include their regular monthly team fee, private lessons taken that month, and/or meet fees for meets the gymnast competed in that month. Each bill has a unique bill number. The issue date and due date of the bill are also recorded.

(Note: A real-life gym information system will be much more complex. I greatly simplified it to contain the scope. For example, in real-life, historical records of head coach of the team needs to be kept, payment processing needs to be included, etc.)

This case is based on Green, G. C. (2005). Greta's Gym: A Teaching Case for Term-Long Database Projects. *Journal of Information Systems Education*, *16*(4).

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| --- | --- | --- | --- |
| **gymnast**  gymnast\_no (PK)  gymnast\_name gymnast\_age  gymnast\_gender  gymnast\_ph\_no | **Staff**  Staff\_id (PK)  Staff\_name  Staff\_age  Staff\_gender  Staff\_ph\_no  Staff\_salary  Staff\_position | **Competitive Teams**  Team Level (PK)  Min Age Requirement  Monthly Fee  Coaches | **gymnast team record**  gymnast\_no  Team Level  joining date  leaving date |
| **private lessons**  Staff\_id  gymnast\_no  date  start time  duration | **Gymnastics Meets**  meet id (PK)  date  time  location  fee | **gymnast meet record**  meet id  gymnast\_no  gymnast\_scores | **Monthly Bill**  bill\_id (PK)  gymnast\_no  issue date  due date |

**Entity Definition Sheet**

**gymnast**

|  |  |  |  |
| --- | --- | --- | --- |
| Entity name | Business Definition | Primary Key | Attributes |
| gymnast | gymnast information | gymnast\_no | gymnast\_no (PK)  gymnast\_name gymnast\_age  gymnast\_gender  gymnast\_ph\_no |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Description | Data Type | Length | Domain |
| gymnast\_no | A unique code which is used to identify gymnast | Integer | 6 |  |
| gymnast\_name | name of gymnast | Character | 30 |  |
| gymnast\_age | age of gymnast | Integer | 3 | 0 ~ 150 |
| gymnast\_gender | Gender of gymnast | Character | 1 | "F" or "M" |
| gymnast\_ph\_no | phone number of gymnast | Integer | 8 |  |

**Staff**

|  |  |  |  |
| --- | --- | --- | --- |
| Entity name | Business Definition | Primary Key | Attributes |
| Staff | Staff information | Staff\_id | Staff\_id  Staff\_name  Staff\_age  Staff\_gender  Staff\_ph\_no  Staff\_salary  Staff\_position |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Description | Data Type | Length | Domain |
| Staff\_id | A unique code which is used to identify Staff | Integer | 6 |  |
| Staff\_name | name of Staff | Character | 30 | 0 ~14 |
| Staff\_age | age of Staff | Integer | 3 | 0 ~ 150 |
| Staff\_gender | Gender of Staff | Character | 1 | "F" or "M" |
| Staff\_ph\_no | phone number of Staff | Integer | 8 |  |
| Staff\_salary | salary of Staff | Integer | 6 |  |
| Staff\_position | position of Staff | Character | 30 |  |

**Competitive Teams**

|  |  |  |  |
| --- | --- | --- | --- |
| Entity name | Business Definition | Primary Key | Attributes |
| **Competitive Teams** | **Competitive Teams** information | Team Level | Team\_Level  Min\_Age\_Requirement  Monthly\_Fee  Staff\_id |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Description | Data Type | Length | Domain |
| Team\_Level | Team Level | Integer | 2 | 1 ~10 |
| Min\_Age\_Requirement | Min Age Requirement for the level | Integer | 2 |  |
| Monthly\_Fee | Monthly Fee | Integer | 4 |  |
| Staff\_id | the Coache (Staff) of the level | Integer | 6 |  |

**gymnast team record**

|  |  |  |  |
| --- | --- | --- | --- |
| Entity name | Business Definition | Primary Key | Attributes |
| **gymnast team record** | **the record of gymnast joining the Competitive Teams** | gymnast\_no +  Team Level | gymnast\_no  Team\_Level  joining\_date  leaving\_date |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Description | Data Type | Length | Domain |
| gymnast\_no | A unique code which is used to identify gymnast | Integer | 6 |  |
| Team\_Level | Team Level | Integer | 2 | 1 ~10 |
| joining\_date | the date of joining this level | date |  |  |
| leaving\_date | the date of leaving this level | date |  |  |

**private lessons**

|  |  |  |  |
| --- | --- | --- | --- |
| Entity name | Business Definition | Primary Key | Attributes |
| **private lessons** | **the private lessons provide by staff** | Staff\_id +  gymnast\_no +  date +  start time | Staff\_id  gymnast\_no  date  start\_time  duration |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Description | Data Type | Length | Domain |
| Staff\_id | who provide the lesson | Integer | 6 |  |
| gymnast\_no | who join the lesson | Integer | 6 |  |
| date | the date of lesson | date |  |  |
| start\_time | the start time of lesson | date |  |  |
| duration | lesson duration | Integer | 1 |  |

**Gymnastics Meets**

|  |  |  |  |
| --- | --- | --- | --- |
| Entity name | Business Definition | Primary Key | Attributes |
| **Gymnastics Meets** | **Competitive team gymnasts compete in gymnastics** | meet\_id | meet\_id  date  start\_time  location  fee |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Description | Data Type | Length | Domain |
| meet\_id | A unique code which is used to identify meet | Integer | 9 |  |
| date | the date of meet | date |  |  |
| start\_time | the start time of meet | date |  |  |
| location | where the meet held | Character | 30 |  |
| fee | the fee of meet | Integer | 3 |  |

**gymnast meet record**

|  |  |  |  |
| --- | --- | --- | --- |
| Entity name | Business Definition | Primary Key | Attributes |
| **gymnast meet record** | **the record of gymnast joining meet** | meet\_id+  gymnast\_no | meet id  gymnast\_no  gymnast\_scores |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Description | Data Type | Length | Domain |
| meet\_id | A unique code which is used to identify meet | Integer | 6 |  |
| gymnast\_no | who join the meet | Integer | 6 |  |
| gymnast\_scores | the scores for gymnast in this meet | Integer | 2 | 0 ~ 50 |

**Monthly Bill**

|  |  |  |  |
| --- | --- | --- | --- |
| Entity name | Business Definition | Primary Key | Attributes |
| **Monthly Bill** | **Monthly Bill** | bill\_id | bill\_id  gymnast\_no  issue\_date  due\_date |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Description | Data Type | Length | Domain |
| bill\_id | A unique code which is used to identify **Monthly Bill** | Integer | 9 |  |
| gymnast\_no | who get the bill | Integer | 6 |  |
| issue\_date | the issue date of the bill | date |  |  |
| due\_date | the due date of the bill | date |  |  |