

AMOD-5450H-A-Introduction to Databases

Lab 5 - Report

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Title of the Application: Rhaegal Fitness Center Database.

Description: Rhaegal Fitness Center is a Fitness Organisation consisting of 4 branches. The application helps in retrieving data from the SQLite database created for this organization, named – Fitness.db. All the information such as the information of the employees, the members, the different branches is stored in this database. Sqlite3 is a package available for Python which enables us to connect to the SQLite database and write queries to retrieve or modify information stored within the database. We use the Jupyter notebook to run the python code. The name of the notebook is DB_Lab5.ipynb.

Now let us look at the bits of code as well as how the entire program runs. We have defined certain questions that can be answered by the application. The first 10 questions are straight forward and return the answer. The 11th question has been designed to be flexible and more robust where the user can work on the Employee table in almost all ways possible such as choose which record, he wants to modify, update or delete. Due to the complexity and time constraint, only the Employee table has been designed to be fully functional. Similarly, the other tables of the database can also be designed.

Let us now trigger the entire program and look at the application's initial prompt.

```
Welcome to the Rhaegal Fitness Center database application:
1. To know the year in which the branch 2 was established, Press 1
2. To see the number of members who have subscribed to half-yearly plans in branch 4, Press 2
3. To find the membership fee for a member with a yearly plan who has opted for the individual package, Press 3
4. To know how many of the trainers have experience of 3 years and above, Press 4
5. To see the count of students/regular citizens/ senior citizens, Press 5
6. To see the total number of male and female members in each branch, Press 6
7. To see the gross income of the organization, Press 7
8. To see the contact details of each branch, Press 8
9. To see the maximum weight of a member among all the members and his calculated BMI, Press 9
10. To see the number of members who have booked a 5:00 pm slot for Zumba on 12/08/2013, Press 10
11. To modify the Employees table, press 11
12 to exit from the application press 12
```

The above 12 tasks are the tasks the application has been designed to perform. Every time the user selects an option, the program displays the desired output and then prompts the main menu where the user can choose to either select another option or choose to exit the application.

Question 1: Which year was the Branch 2 established?

When the user presses 1 in the prompt box shown above, we get the below output:

```
1. The year in which Branch 2 was established is
DateYear
2012
```

We see that the Branch 2 was established in the year 2012.

Question 2: How many members have subscribed to half-yearly plans in Branch 4?

When the user presses 2 in the prompt box shown above, we get the below output:

```
2. The the number of members who have subscribed to half-yearly plans in branch 4
Count
2
```

We see that 2 of the members in Branch 4 have subscribed to half-yearly plans.

Question 3: What is the membership fee for a member with a yearly plan who has opted for the individual package?

When the user presses 3 in the prompt box shown above, we get the below output:

```
3. The membership fee for a member with a yearly plan who has opted for the individual package
MembershipFee
755.9999999999999
```

We see the membership fee in the above scenario is about 756 Dollars.

Question 4: How many of the trainers have experience of 3 years and above?

When the user presses 4 in the prompt box shown above, we get the below output:

```
4. The number of trainers who have experience of 3 years and above
Count
6
```

We see that 6 of the trainers have experience of 3 years and above.

Question 5: What is the count of students/regular citizens/ senior citizens?

When the user presses 5 in the prompt box shown above, we get the below output:

```
5. The count of students/regular citizens/ senior citizens
Status,Count
Citizen 5
Senior Citizen 3
Student 4
```

We see that there are 5 regular citizens, 3 senior citizens, and 4 students.

Question 6: What is the total number of male and female members in each branch?

When the user presses 6 in the prompt box shown above, we get the below output:

```
6. The total number of male and female members in each branch
BranchID, Gender, Count
1 F 2
1 M 1
2 F 2
2 M 1
3 F 1
3 M 3
4 M 2
```

We see that there are 2 females and 1male in branch 1 and Branch 2. There are 1 female and 3 males in Branch 3 and 2 males in Branch 4.

Question 7: What is the gross income of the organization in the year 2013?

When the user presses 7 in the prompt box shown above, we get the below output:

```
7. The gross income of the organization
Gross Income
2027.0
```

We see that the gross income for the organization for the year 2013 is 2027 Dollars.

Question 8: What are the contact details of each Branch?

When the user presses 8 in the prompt box shown above, we get the below output:

```
8. The contact details of each branch
ID, ContactPhone, ContactEmail
1 7059771234 branch1@gmail.com
2 7059771235 branch2@gmail.com
3 7059771236 branch3@gmail.com
4 7059771237 branch4@gmail.com
```

We see that the contact details of each branch are as displayed above.

Question 9: What is the maximum weight of a member among all the members and also calculate his MBI.

When the user presses 9 in the prompt box shown above, we get the below output:

```
9. The maximum weight of a member among all the members and his calculated BMI
Weight, BMI
72.0 23.781212841854934
```

We see that the highest weight is 72 kgs and the calculated BMI is 23.78.

Question 10: How many members have booked a Zumba class at 5 pm on 12/08/2013?

When the user presses 10 in the prompt box shown above, we get the below output:

```
10. The number of members who have booked a 5:00 pm slot for Zumba on 12/08/2013
Count
2
```

We see that 2 users have booked a 5:00 PM slot for Zumba on the mentioned date.

Action 11: To modify the Employees table:

The 3 actions that can be taken to modify the table are insert, delete and update.

First, let us see the options presented to us when we choose to modify the table:

```
11
```

```
Welcome to Employee table modification:
```

- 1.To insert new employee information, press 1
- 2.To update an employee information, press 2
- 3.To delete an employee information, press 3
- 4.To view the entire employee table post modification, press 4
- 5.To go to the main menu, press 5

First, let us look at the employee table without any modifications, we can do that by pressing 4:

```
4
```

```
ID, Name, Specialization, Experience, JoinDateYear, JoinDateMonth, JoinDateDay, ContactEmail, ContactPhone, SalaryID
(1, 'Chandler Bing', 'Manager', 3, 2012, 1, 10, 'ContactEmail', '7037771854', 1)
(2, 'Monica Geller', 'Manager', 4, 2012, 2, 11, 'Bing@gmail.com', '7037771853', 1)
(3, 'Ross Geller', 'Manager', 3, 2013, 3, 12, 'Mon@gmail.com', '7037771852', 1)
(4, 'Rachel Green', 'Manager', 4, 2013, 4, 14, 'Ross@gmail.com', '7037771851', 1)
(5, 'John Snow', 'Trainer', 2, 2012, 5, 9, 'Rach@gmail.com', '7037771850', 2)
(6, 'Joey Tribbiani', 'Trainer', 3, 2012, 6, 21, 'Nothing@gmail.com', '7037771855', 2)
(7, 'Phoebe Buffey', 'Trainer', 4, 2012, 7, 23, 'Doing@gmail.com', '7037771856', 2)
(8, 'Dan Tar', 'Trainer', 3, 2013, 8, 25, 'SmellyCat@gmail.com', '7037771857', 2)
(9, 'Cercy Lan', 'Trainer', 4, 2012, 9, 27, 'Drogon@gmail.com', '7037771858', 2)
(10, 'Jaime Lan', 'Trainer', 4, 2013, 10, 31, 'Wine@gmail.com', '7037771859', 2)
(11, 'Tyrian Lan', 'Trainer', 2, 2012, 11, 30, 'Slayer@gmail.com', '7037771823', 2)
(12, 'Jorah Mor', 'Trainer', 3, 2012, 12, 24, 'Wise@gmail.com', '7037771335', 2)
```

We observe that there are 12 records for 12 employees.

Now, we shall insert a new record with the ID 13. To insert a new record, we press 1.

Once we press 1, we are asked to enter the details of the new employee one by one as shown below:

```
Welcome to Employee table modification:
```

- 1.To insert new employee information, press 1
- 2.To update an employee information, press 2
- 3.To delete an employee information, press 3
- 4.To view the entire employee table post modification, press 4
- 5.To go to the main menu, press 5

```
1
```

```
Enter the Name of the Employee : Edward Cullen
```

```
1
```

```
Enter the Name of the Employee : Edward Cullen
```

```
Enter the Specialization of the Employee : Trainer
```

```
1
Enter the Name of the Employee : Edward Cullen
Enter the Specialization of the Employee : Trainer

Enter the Experience of the Employee : 
```

Similarly, we are prompted to enter the JoinDateYear, JoinDateMonth, JoinDateDay, ContactEmail, ContactPhone, and SalaryID of the new employee. At the point of entering the last attribute details, it looks like this:

```
1
Enter the Name of the Employee : Edward Cullen
Enter the Specialization of the Employee : Trainer
Enter the Experience of the Employee : 2
Enter the JoinDateYear of the Employee : 2013
Enter the JoinDateMonth (Number) of the Employee : 09
Enter the JoinDateDay of the Employee : 23
Enter the ContactEmail of the Employee : EdCullen@gmail.com
Enter the ContactPhone of the Employee : 7059778345
Enter the SalaryID of the Employee : 2
```

Welcome to Employee table modification:

- 1.To insert new employee information, press 1
- 2.To update an employee information, press 2
- 3.To delete an employee information, press 3
- 4.To view the entire employee table post modification, press 4
- 5.To go to the main menu, press 5

Since he is a trainer, his salaryID will be 2. Now, to look at the modified employee table where a new record has been inserted, we press 4.

```
4
ID, Name, Specialization, Experience, JoinDateYear, JoinDateMonth, JoinDateDay, ContactEmail, ContactPhone, SalaryID
(1, 'Chandler Bing', 'Manager', 3, 2012, 1, 10, 'ContactEmail', '7037771854', 1)
(2, 'Monica Geller', 'Manager', 4, 2012, 2, 11, 'Bing@gmail.com', '7037771853', 1)
(3, 'Ross Geller', 'Manager', 3, 2013, 3, 12, 'Mon@gmail.com', '7037771852', 1)
(4, 'Rachel Green', 'Manager', 4, 2013, 4, 14, 'Ross@gmail.com', '7037771851', 1)
(5, 'John Snow', 'Trainer', 2, 2012, 5, 9, 'Rach@gmail.com', '7037771850', 2)
(6, 'Joey Tribbiani', 'Trainer', 3, 2012, 6, 21, 'Nothing@gmail.com', '7037771855', 2)
(7, 'Phoebe Buffey', 'Trainer', 4, 2012, 7, 23, 'Doing@gmail.com', '7037771856', 2)
(8, 'Dan Tar', 'Trainer', 3, 2013, 8, 25, 'SmellyCat@gmail.com', '7037771857', 2)
(9, 'Cercy Lan', 'Trainer', 4, 2012, 9, 27, 'Drogon@gmail.com', '7037771858', 2)
(10, 'Jaime Lan', 'Trainer', 4, 2013, 10, 31, 'Wine@gmail.com', '7037771859', 2)
(11, 'Tyrian Lan', 'Trainer', 2, 2012, 11, 30, 'Slayer@gmail.com', '7037771823', 2)
(12, 'Jorah Mor', 'Trainer', 3, 2012, 12, 24, 'Wise@gmail.com', '7037771335', 2)
(13, 'Edward Cullen', 'Trainer', 2, 2013, 9, 23, 'EdCullen@gmail.com', '7059778345', 2)
```

We notice that the new record with ID = 13 has been inserted into the employee table. Also note that since ID is a surrogate key with auto increment, the database increments the ID by itself and it doesn't need to be provided by the user.

Now, let us look at updating the table. To update the table, we press 2.

Then, we are asked to enter the Employee ID of the Employee whose information we choose to update.

2

Enter the Employee ID of the employee who's details are to be updated (Please ensure to enter the right ID):

13

Once the employee ID has been provided, we are presented with choices to choose which particular attribute of the employee we choose to update.

2

Enter the Employee ID of the employee who's details are to be updated (Please ensure to enter the right ID): 13

Welcome to employee detail updation:

1. To update the Name of the employee, press 1
2. To update the Specialization of the employee, press 2
3. To update the Experience of the employee, press 3
4. To update the JoinDateYear of the employee, press 4
5. To update the JoinDateMonth of the employee, press 5
6. To update the JoinDateDay of the employee, press 6
7. To update the ContactEmail of the employee, press 7
8. To update the ContactPhone of the employee, press 8
9. To update the SalaryID of the employee, press 9

In this example, let us choose to update the Phone number of the newly inserted employee with ID 13. So, we press 8. At this point, we are asked to enter the new phone number.

2

Enter the Employee ID of the employee who's details are to be updated (Please ensure to enter the right ID): 13

Welcome to employee detail updation:

1. To update the Name of the employee, press 1
2. To update the Specialization of the employee, press 2
3. To update the Experience of the employee, press 3
4. To update the JoinDateYear of the employee, press 4
5. To update the JoinDateMonth of the employee, press 5
6. To update the JoinDateDay of the employee, press 6
7. To update the ContactEmail of the employee, press 7
8. To update the ContactPhone of the employee, press 8
9. To update the SalaryID of the employee, press 9

8

Enter the new ContactPhone of the employee: 9087654321

Once the update has been done, we are taken to the menu as shown below. Here we select 4 to view the entire table post updating.

4

```
ID, Name, Specialization, Experience, JoinDateYear, JoinDateMonth, JoinDateDay, ContactEmail, ContactPhone, SalaryID
(1, 'Chandler Bing', 'Manager', 3, 2012, 1, 10, 'ContactEmail', '7037771854', 1)
(2, 'Monica Geller', 'Manager', 4, 2012, 2, 11, 'Bing@gmail.com', '7037771853', 1)
(3, 'Ross Geller', 'Manager', 3, 2013, 3, 12, 'Mon@gmail.com', '7037771852', 1)
(4, 'Rachel Green', 'Manager', 4, 2013, 4, 14, 'Ross@gmail.com', '7037771851', 1)
(5, 'John Snow', 'Trainer', 2, 2012, 5, 9, 'Rach@gmail.com', '7037771850', 2)
(6, 'Joey Tribiani', 'Trainer', 3, 2012, 6, 21, 'Nothing@gmail.com', '7037771855', 2)
(7, 'Phoebe Buffey', 'Trainer', 4, 2012, 7, 23, 'Doing@gmail.com', '7037771856', 2)
(8, 'Dan Tar', 'Trainer', 3, 2013, 8, 25, 'SmellyCat@gmail.com', '7037771857', 2)
(9, 'Cercy Lan', 'Trainer', 4, 2012, 9, 27, 'Drogon@gmail.com', '7037771858', 2)
(10, 'Jaime Lan', 'Trainer', 4, 2013, 10, 31, 'Wine@gmail.com', '7037771859', 2)
(11, 'Tyrian Lan', 'Trainer', 2, 2012, 11, 30, 'Slayer@gmail.com', '7037771823', 2)
(12, 'Jorah Mor', 'Trainer', 3, 2012, 12, 24, 'Wise@gmail.com', '7037771335', 2)
(13, 'Edward Cullen', 'Trainer', 2, 2013, 9, 23, 'EdCullen@gmail.com', '9087654321', 2)
```

We observe that the contact phone number has been updated from 7059778345 to 9087654321. Similarly, code has been written to enable the user to update every attribute of the Employee table.

Now, let us look at deleting the records. We shall go ahead and delete the record we just added with Employee ID 13.

To delete a record, we press 3 and enter the Employee ID of the employee when prompted as shown:

```
Welcome to Employee table modification:
1.To insert new employee information, press 1
2.To update an employee information, press 2
3.To delete an employee information, press 3
4.To view the entire employee table post modification, press 4
5.To go to the main menu, press 5
```

3

Enter the Employee ID of the employee who's details are to be deleted (Please ensure to enter the right ID) :

13

Once the employee record has been deleted, we get the following response saying the record has been deleted. To verify, we press 4 to view the entire table.

3

Enter the Employee ID of the employee who's details are to be deleted (Please ensure to enter the right ID) : 13

This ID has been deleted.

```
Welcome to Employee table modification:
1.To insert new employee information, press 1
2.To update an employee information, press 2
3.To delete an employee information, press 3
4.To view the entire employee table post modification, press 4
5.To go to the main menu, press 5
```

4

The table after deletion of the record:

```
4
ID, Name, Specialization, Experience, JoinDateYear, JoinDateMonth, JoinDateDay, ContactEmail, ContactPhone, SalaryID
(1, 'Chandler Bing', 'Manager', 3, 2012, 1, 10, 'ContactEmail', '7037771854', 1)
(2, 'Monica Geller', 'Manager', 4, 2012, 2, 11, 'Bing@gmail.com', '7037771853', 1)
(3, 'Ross Geller', 'Manager', 3, 2013, 3, 12, 'Mon@gmail.com', '7037771852', 1)
(4, 'Rachel Green', 'Manager', 4, 2013, 4, 14, 'Ross@gmail.com', '7037771851', 1)
(5, 'John Snow', 'Trainer', 2, 2012, 5, 9, 'Rach@gmail.com', '7037771850', 2)
(6, 'Joey Tribbiani', 'Trainer', 3, 2012, 6, 21, 'Nothing@gmail.com', '7037771855', 2)
(7, 'Phoebe Buffey', 'Trainer', 4, 2012, 7, 23, 'Doing@gmail.com', '7037771856', 2)
(8, 'Dan Tar', 'Trainer', 3, 2013, 8, 25, 'SmellyCat@gmail.com', '7037771857', 2)
(9, 'Cercy Lan', 'Trainer', 4, 2012, 9, 27, 'Drogon@gmail.com', '7037771858', 2)
(10, 'Jaime Lan', 'Trainer', 4, 2013, 10, 31, 'Wine@gmail.com', '7037771859', 2)
(11, 'Tyrian Lan', 'Trainer', 2, 2012, 11, 30, 'Slayer@gmail.com', '7037771823', 2)
(12, 'Jorah Mor', 'Trainer', 3, 2012, 12, 24, 'Wise@gmail.com', '7037771335', 2)
```

We see that the information of the employee with ID 13 has been deleted.

In case the user enters an invalid option at a point of time, the application returns a response saying the option is invalid. For example, let us try to delete employee with ID 45, which doesn't exist in the table.

3

Enter the Employee ID of the employee who's details are to be deleted (Please ensure to enter the right ID) : 45

This is not a valid ID of the employee.

Welcome to Employee table modification:

- 1.To insert new employee information, press 1
- 2.To update an employee information, press 2
- 3.To delete an employee information, press 3
- 4.To view the entire employee table post modification, press 4
- 5.To go to the main menu, press 5

We see that it returns a message saying that the entered ID is invalid.

Also, while trying to enter a new record post deletion, since the Employee ID is a primary key with auto incrementation, it was noticed that the next record inserted will follow the original sequence of the ID including the one deleted. For example, if the last ID in the table is 12, if a new record is inserted at 13 and deleted, the SQL sequence will still remember 13 as the last sequence. In case we insert a new record, it will have the ID 14 instead of 13. To prevent this, we must write an extra line of code in python after deleting a record as shown below:

```
cur.execute("""DELETE FROM Employee WHERE ID = ?;""",(ID,))
cur.execute("""DELETE FROM SQLITE_SEQUENCE WHERE NAME = "Employee";""")
```

Here, we are not only deleting the record from the table, but also the sequence SQLite remembers. This way, the next record inserted will be of the right sequence.

In case a record is deleted from in between the table, the ID of the remaining employees remains unchanged.

Once, we are done with all the operations in the modify table window, we can select 5 to go to the main menu as shown:

5

Welcome to the Rhaegal Fitness Center database application:

1. To know the year in which the branch 2 was established, Press 1
2. To see the number of members who have subscribed to half-yearly plans in branch 4, Press 2
3. To find the membership fee for a member with a yearly plan who has opted for the individual package, Press 3
4. To know how many of the trainers have experience of 3 years and above, Press 4
5. To see the count of students/regular citizens/ senior citizens, Press 5
6. To see the total number of male and female members in each branch, Press 6
7. To see the gross income of the organization, Press 7
8. To see the contact details of each branch, Press 8
9. To see the maximum weight of a member among all the members and his calculated BMI, Press 9
10. To see the number of members who have booked a 5:00 pm slot for Zumba on 12/08/2013, Press 10
11. To modify the Employees table, press 11
- 12 to exit from the application press 12

Once we are done with all the options on the main menu, we select 12 to exit the application.

Welcome to the Rhaegal Fitness Center database application:

1. To know the year in which the branch 2 was established, Press 1
2. To see the number of members who have subscribed to half-yearly plans in branch 4, Press 2
3. To find the membership fee for a member with a yearly plan who has opted for the individual package, Press 3
4. To know how many of the trainers have experience of 3 years and above, Press 4
5. To see the count of students/regular citizens/ senior citizens, Press 5
6. To see the total number of male and female members in each branch, Press 6
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