CP5804 Database Systems

Week 5: Lab activities

SQL Practice I:

Writing/Executing SQL queries in MySQL Workbench to extract information from a database

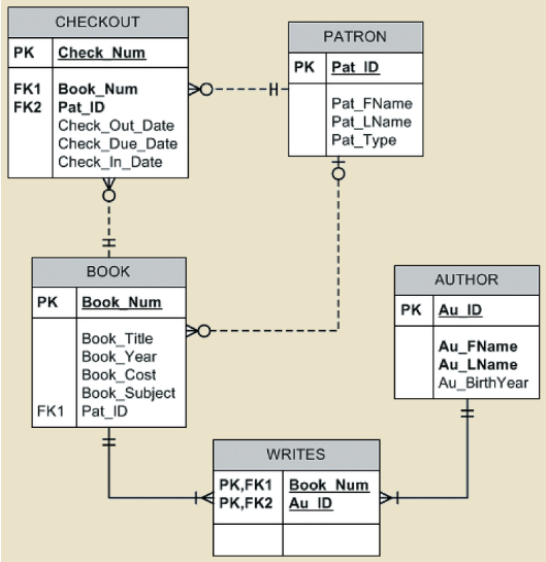
Through a part of the last week lab activity, you learned how to use MySQL Workbench facilities to create SQL queries and run (execute) them mainly for the purpose of data definition (creating table structures) or basic data manipulation (inserting data records to the existing tables etc.). Also, through the Week 4 and Week 5 learning in this subject, you learned how to use various SQL commands to compose a correct query to respond to the various requests to extract useful information from the database.

In this lab, you are going to practice basic SQL queries to extract useful information using MySQL Workbench. You will use the library database you created in previous lab, and add a number SQL queries to extract information from the database.

- **Learning outcomes and objectives**
  Student will be able to
  - compose various SQL queries in particular using SELECT command by adding restrictions to the search criteria.
  - use aggregate functions in SQL queries to carry out useful functions like counting, finding maximum/minimum etc.
  - use special SQL commands to restrict or adjust the way of displaying output of the query

- **Task Overview**
  Open the library database you created in the previous lab on MySQL Workbench. The conceptual model of the database is presented in the ERD as shown here. You will have to refer to this ERD when you compose SQL queries for this lab, to understand further details about this database including table structure, columns included in each table, PKs and FKs, relationships between tables etc.

  You are given a number of exercises to practice to write/run SQL queries.



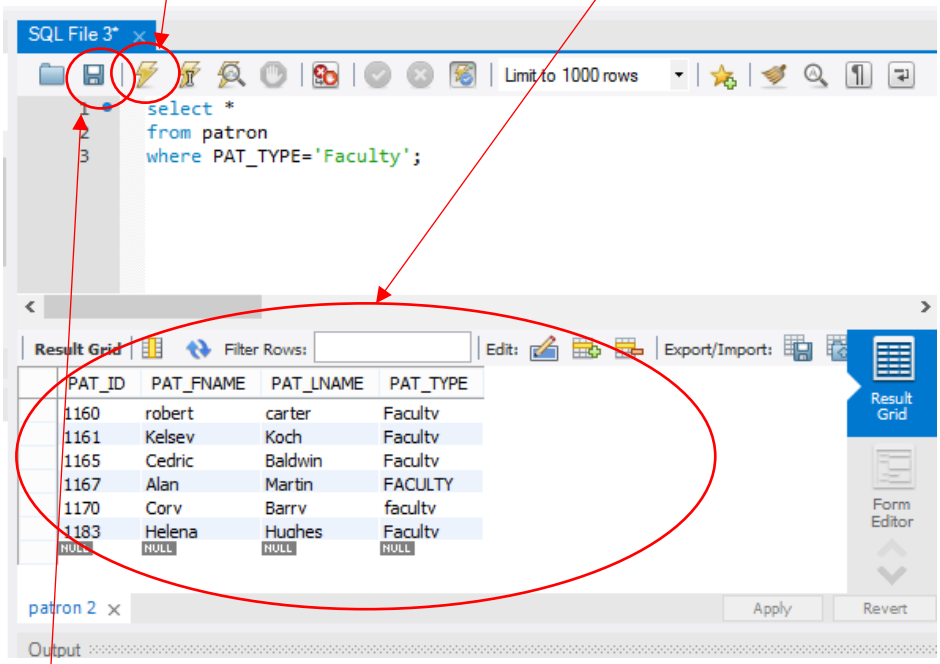
Solutions are provided for you for some exercises. For each of these exercises, you will need to write an SQL query (though some exercises already show solutions, you are always recommended to write and run the code yourself).

Do not forget to save each query as soon as after writing/running it. For example, save the query as 'Q1.sql' for the first question. You are required to submit a zipped directory containing all query files you completed as Q1~Q29 to be marked off for this lab activity.

As a reminder, here are the instructions to get into SQL editor in MySQL Workbench.

1. Open a new SQL query editor by clicking the SQL+ icon on the overhead menu bar.

2. Write a SQL query to complete the task given on the editor. After writing the query, click 'execute' button to run the SQL code. Once you click the execute button, the result of the query will be shown up on the result panel.



If the query is not successful, the corresponding error will be explained in the Output panel instead.

3. Save the query somewhere on your computer or portable disk.

Exercises:

For each of these exercises, a figure of the correct output is provided. If the output of the query is very large, only the first several rows of the output are shown.

Save a query for each question as the name of "Q1.sql", "Q2.sql", … You are required to submit these files (as a zipped folder) to be marked off.

Note that some questions are provided with the accompanied solution to help your learning.

1. Write a query that displays the first and last name of every patron (See the figure below for first part of the output. The actual result will have 50 rows)

PAT_FNAME	PAT_LNAME
robert	carter
Kelsey	Koch
Cedric	Baldwin
Vera	Alvarado
Alan	Martin
Cory	Barry
Peggy	Marsh
Tony	Miles
Betsy	Malone

Answer provided:

```
SELECT PAT_FNAME,
       PAT_LNAME
FROM PATRON;
```

2. Write a query to display the checkout number, check out date, and due date for every book that has been checked out (See the figure below for first part of the output. The actual result will have 68 rows)

CHECK_NUM	CHECK_OUT_DATE	CHECK_DUE_DATE
91001	3/31/2015	4/14/2015
91002	3/31/2015	4/7/2015
91003	3/31/2015	4/14/2015
91004	3/31/2015	4/14/2015
91005	3/31/2015	4/7/2015
91006	4/5/2015	4/12/2015
91007	4/5/2015	4/12/2015
91008	4/5/2015	4/12/2015
91009	4/5/2015	4/19/2015
91010	4/5/2015	4/19/2015
91011	4/5/2015	4/12/2015

3. Write a query to display the book number, book title, and year of publication for every book (See the figure below for the output)

BOOK_NUM	TITLE	Year Published
5235	Beginner's Guide to JAVA	2012
5236	Database in the Cloud	2012
5237	Mastering the database environment	2013
5238	Conceptual Programming	2013
5239	J++ in Mobile Apps	2013
5240	iOS Programming	2013
5241	JAVA First Steps	2013
5242	C# in Middleware Deployment	2013
5243	DATABASES in Theory	2013
5244	Cloud-based Mobile Applications	2013

Answer provided:

```
SELECT BOOK_NUM,
       BOOK_TITLE AS TITLE,
       BOOK_YEAR AS "Year Published"
FROM BOOK;
```

4. Write a query to display the book number, title, and cost of each book (See the figure below for the output).

BOOK_NUM	BOOK_TITLE	Replacement Cost
5235	Beginner's Guide to JAVA	59.95
5236	Database in the Cloud	79.95
5237	Mastering the database environment	89.95
5238	Conceptual Programming	59.95
5239	J++ in Mobile Apps	49.95
5240	iOS Programming	79.95
5241	JAVA First Steps	49.95
5242	C# in Middleware Deployment	59.95
5243	DATABASES in Theory	129.95
5244	Cloud-based Mobile Applications	69.95
5245	The Golden Road to Platform independence	119.95
5246	Capture the Cloud	69.95
5247	Shining Through the Cloud: Sun Programming	109.95
5248	What You Always Wanted to Know About Database, But Were Afraid to Ask	49.95

5. Write a query to display the different years that books have been published in. Include each year only once (See the figure below for the output).

BOOK_YEAR
2012
2013
2014
2015

6. Write a query to display the checkout number, book number, patron ID, checkout date, and due date for every checkout that has ever occurred in the system. Sort the results by checkout date in descending order (See the figure below for first part of the output. The actual result will have 68 rows)

CHECK_NUM	BOOK_NUM	PAT_ID	CHECK_OUT_DATE	CHECK_DUE_DATE
91067	5252	1229	5/24/2015	5/31/2015
91068	5238	1229	5/24/2015	5/31/2015
91066	5242	1228	5/19/2015	5/26/2015
91065	5244	1210	5/17/2015	5/24/2015
91064	5236	1183	5/17/2015	5/31/2015
91060	5235	1209	5/15/2015	5/22/2015
91063	5243	1223	5/15/2015	5/22/2015
91062	5254	1223	5/15/2015	5/22/2015
91061	5246	1172	5/15/2015	5/22/2015
91056	5254	1224	5/10/2015	5/17/2015

Answer provided:

```
SELECT CHECK_NUM,
       BOOK_NUM,
       PAT_ID,
       CHECK_OUT_DATE,
       CHECK_DUE_DATE
FROM CHECKOUT
ORDER BY CHECK_OUT_DATE DESC;
```

7. **Write a query to display the book title, year, and subject for every book. Sort the results by book subject in ascending order, year in descending order, and then title in ascending order (See the figure below for the output).**

BOOK_TITLE	BOOK_YEAR	BOOK_SUBJECT
Capture the Cloud	2014	Cloud
Starlight Applications	2014	Cloud
Cloud-based Mobile Applications	2013	Cloud
Database in the Cloud	2012	Cloud
Beyond the Database Veil	2014	Database
What You Always Wanted to Know About Database, But Were Afraid to Ask	2014	Database
DATABASES in Theory	2013	Database
Mastering the database environment	2013	Database
Reengineering the Middle Tier	2014	Middleware

8. **Write a query to display the book number, title, and year of publication for all books published in 2012 (See the figure below for the output).**

BOOK_NUM	BOOK_TITLE	BOOK_YEAR
5235	Beginner's Guide to JAVA	2012
5236	Database in the Cloud	2012

Answer provided:

```
SELECT BOOK_NUM,
       BOOK_TITLE,
       BOOK_YEAR
FROM BOOK
WHERE BOOK_YEAR = 2012;
```

9. **Write a query to display the book number, title, and year of publication for all books in the "Database" subject (See the figure below for the output).**

BOOK_NUM	BOOK_TITLE	BOOK_YEAR
5237	Mastering the database environment	2013
5243	DATABASES in Theory	2013
5248	What You Always Wanted to Know About Database, But Were Afraid to Ask	2014
5252	Beyond the Database Veil	2014

10. Write a query to display the checkout number, book number, and checkout date of all books checked out before April 5, 2015 (See the figure below for the output).

CHECK_NUM	BOOK_NUM	CHECK_OUT_DATE
91001	5235	3/31/2015
91002	5238	3/31/2015
91003	5240	3/31/2015
91004	5237	3/31/2015
91005	5236	3/31/2015

Answer provided:

```
SELECT CHECK_NUM,
       BOOK_NUM,
       CHECK_OUT_DATE
FROM CHECKOUT
WHERE CHECK_OUT_DATE < '2015-04-05';
```

11. Write a query to display the book number, title, and year of publication of all books published after 2013 and on the "Programming" subject (See the figure below for the output).

BOOK_NUM	BOOK_TITLE	BOOK_YEAR
5247	Shining Through the Cloud: Sun Programming	2014
5251	Thoughts on Revitalizing Ruby	2014
5253	Virtual Programming for Virtual Environments	2014
5254	Coding Style for Maintenance	2015

12. Write a query to display the book number, title, year of publication, subject, and cost for all books that are on the subjects of "Middleware" or "Cloud," and that cost more than $70 (See the figure below for the output).

BOOK_NUM	BOOK_TITLE	BOOK_YEAR	BOOK_SUBJECT	BOOK_COST
5236	Database in the Cloud	2012	Cloud	79.95
5245	The Golden Road to Platform independence	2014	Middleware	119.95
5250	Reengineering the Middle Tier	2014	Middleware	89.95

Answer provided:

```
SELECT BOOK_NUM,
       BOOK_TITLE,
       BOOK_YEAR,
       BOOK_SUBJECT,
       BOOK_COST
FROM BOOK
WHERE (BOOK_SUBJECT = 'Middleware'
       OR BOOK_SUBJECT = 'Cloud')
  AND BOOK_COST > 70;
```

13. **Write a query to display the author ID, first name, last name, and year of birth for all authors born in the decade of the 1980s (See the figure below for the output).**

AU_ID	AU_FNAME	AU_LNAME	AU_BIRTHYEAR
218	Rachel	Beatney	1983
383	Neal	Walsh	1980
394	Robert	Lake	1982
438	Perry	Pearson	1986
460	Connie	Paulsen	1983
581	Manish	Aggerwal	1984
603	Julia	Palca	1988

14. **Write a query to display the book number, title, and year of publication for all books that contain the word "Database" in the title, regardless of how it is capitalized (See the figure below for the output).**

BOOK_NUM	BOOK_TITLE	BOOK_YEAR
5236	Database in the Cloud	2012
5237	Mastering the database environment	2013
5243	DATABASES in Theory	2013
5248	What You Always Wanted to Know About Database, But Were Afraid to Ask	2014
5252	Beyond the Database Veil	2014

Answer provided:

```
SELECT BOOK_NUM,
       BOOK_TITLE AS "Title",
       BOOK_YEAR AS "Year Published"
FROM BOOK
WHERE Upper(BOOK_TITLE) LIKE '%DATABASE%';
```

15. **Write a query to display the patron ID, first and last name of all patrons that are students (See the figure below for first part of the output. The actual result will have 44 rows)**

PAT_ID	PAT_FNAME	PAT_LNAME
1166	Vera	Alvarado
1171	Peggy	Marsh
1172	Tony	Miles
1174	Betsy	Malone
1180	Nadine	Blair
1181	Allen	Horne
1182	Jamal	Melendez
1184	Jimmie	Love
1185	Sandra	Yang
1200	Lorenzo	Torres

16. **Write a query to display the patron ID, first and last name, and patron type for all patrons whose last name begins with the letter "C" (See the figure below for the output).**

PAT_ID	PAT_FNAME	PAT_LNAME	PAT_TYPE
1160	robert	carter	Faculty
1208	Ollie	Cantrell	Student
1210	Keith	Cooley	STUdent

17. Write a query to display the author ID, first and last name of all authors whose year of birth is unknown (See the figure below for the output).

AU_ID	AU_FNAME	AU_LNAME
229	Carmine	Salvadore
262	Xia	Chiang
559	Rachel	McGill

Answer provided:

```
SELECT AU_ID,
       AU_FNAME,
       AU_LNAME
FROM AUTHOR
WHERE AU_BIRTHYEAR IS NULL;
```

18. Write a query to display the author ID, first and last name of all authors whose year of birth is known (See the figure below for the output).

AU_ID	AU_FNAME	AU_LNAME
185	Benson	Reeves
218	Rachel	Beatney
251	Hugo	Bruer
273	Reba	Durante
284	Trina	Tankersly
383	Neal	Walsh
394	Robert	Lake
438	Perry	Pearson
460	Connie	Paulsen
581	Manish	Aggerwal
592	Lawrence	Sheel
603	Julia	Palca

19. Write a query to display the checkout number, book number, patron ID, check out date, and due date for all checkouts that have not yet been returned. Sort the results by book number (See the figure below for the output).

CHECK_NUM	BOOK_NUM	PAT_ID	CHECK_OUT_DATE	CHECK_DUE_DATE
91068	5238	1229	5/24/2015	5/31/2015
91053	5240	1212	5/9/2015	5/16/2015
91066	5242	1228	5/19/2015	5/26/2015
91061	5246	1172	5/15/2015	5/22/2015
91059	5249	1207	5/10/2015	5/17/2015
91067	5252	1229	5/24/2015	5/31/2015

20. Write a query to display the author ID, first name, last name, and year of birth for all authors. Sort the results in descending order by year of birth, and then in ascending order by last name (See the figure below for the output). (Note that some DBMS sort NULLs as being large and some DBMS sort NULLs as being small.)

AU_ID	AU_FNAME	AU_LNAME	AU_BIRTHYEAR
185	Benson	Reeves	1990
603	Julia	Palca	1988
438	Perry	Pearson	1986
581	Manish	Aggerwal	1984
218	Rachel	Beatney	1983
460	Connie	Paulsen	1983
394	Robert	Lake	1982
383	Neal	Walsh	1980
592	Lawrence	Sheel	1976
251	Hugo	Bruer	1972
273	Reba	Durante	1969
284	Trina	Tankersly	1961
262	Xia	Chiang	
559	Rachel	McGill	
229	Carmine	Salvadore	

21. Write a query to display the number of books in the FACT system (See the figure below for the output).

Number of Books
20

Answer provided:

```
SELECT Count(BOOK_NUM) AS "Number of Books"
FROM BOOK;
```

22. Write a query to display the number of different book subjects in the FACT system (See the figure below for the output).

Number of Subjects
4

23. Write a query to display the number of books that are available (not currently checked out) (See the figure below for the output).

Available Books
14

24. Write a query to display the highest book cost in the system (See the figure below for the output).

Most Expensive
129.95

Answer provided:

```
SELECT Max(BOOK_COST) AS "Most Expensive"
FROM BOOK;
```

25. Write a query to display the lowest book cost in the system (See the figure below for the output).

Least Expensive
49.95

26. Write a query to display the number of different patrons who have ever checked out a book (See the figure below for the output).

DIFFERENT PATRONS
33

27. Write a query to display the subject and the number of books in each subject. Sort the results by the number of books in descending order, then by subject name in ascending order (See the figure below for the output).

BOOK_SUBJECT	Books In Subject
Programming	9
Cloud	4
Database	4
Middleware	3

Answer provided:

```
SELECT BOOK_SUBJECT,
       Count(*) AS `Books In Subject`
FROM BOOK
GROUP BY BOOK_SUBJECT
ORDER BY `Books In Subject` DESC, BOOK_SUBJECT;
```

28. Write a query to display the author ID and the number of books written by that author. Sort the results in descending order by number of books, then in ascending order by author ID (See the figure below for the output).

AU_ID	Books Written
262	3
460	3
185	2
229	2
251	2
383	2
394	2
559	2
218	1
273	1
284	1
438	1
581	1
592	1
603	1

29. Write a query to display the total value of all books in the library (See the figure below for the output).

Library Value
1499

This is the end of Week 5 Lab.

You are required to submit a zipped folder containing all SQL query files you created.
