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Database Programming - Assignment: Creating & Manipulating a Database

If you have a Study.com College Saver membership and are seeking college credit for this course, you must submit an assignment and pass the proctored final exam. You must submit your assignment before registering for the final. Below you will find prompts and instructions for submitting your assignment.

About this Assignment

This is a Database Programming course. This course covers advanced topics in databases. It starts by reviewing basic knowledge on databases and ends with advanced database concepts like security.

In this project, you will use the knowledge you acquired throughout the course to build a simple database and query it to extract information from it. You will create tables and relationships among them, in addition to the necessary keys and indexes. The next step will be to populate the database with suitable data. Populating the tables with sufficient and appropriate example data is an important step in testing and validating your design. When your database is ready, you will write SQL queries to retrieve information.

Note: This assignment was created with **MySQL** in mind. Therefore, dates, numbers, etc. have been set up with that tool in mind.

Upon completion of this project, you will be able to:

- Write SQL queries to create tables
- Write SQL queries to create relationships among tables
- Identify indexes and create them in a database
- Write queries to extract important information from a database

Prompt

In this project you will build a database for a public library. This database is aimed to collect and analyze information about the clients' reading interests. The project concentrates only on books and the clients' interests in books. The analyses that will result from this project will be used by the library's management to decide on the future purchasing policy.

A. Write the SQL statements in order to create the tables for the database. Use the Entity Relationship Diagram (ERD) of the database shown in Figure 1. For simplicity, we are assuming in this project that a book cannot be written by more than one author. You need to create the tables as well as the required constraints, including the keys (primary and foreign), and the relationships between tables.

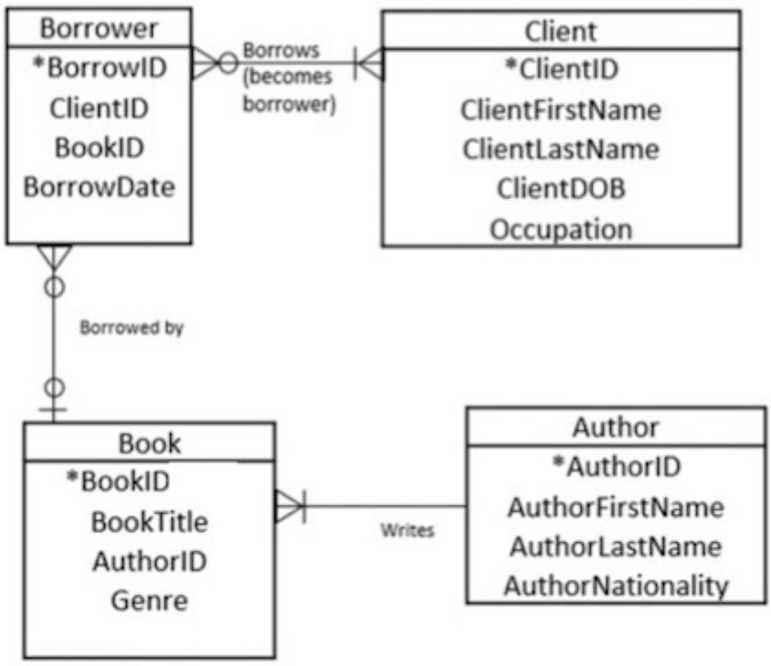

Figure 1: ERD for Library Database

B. Populate your database with the sample set of data given to you in the tables below the assignment prompts.

C. Write the following queries to retrieve the information detailed below.

1. Display all contents of the Clients table
2. First names, last names, ages and occupations of all clients
3. First and last names of clients that borrowed books in March 2018
4. First and last names of the top 5 authors clients borrowed in 2017
5. Nationalities of the least 5 authors that clients borrowed during the years 2015-2017
6. The book that was most borrowed during the years 2015-2017
7. Top borrowed genres for client born in years 1970-1980
8. Top 5 occupations that borrowed the most in 2016
9. Average number of borrowed books by job title
10. Create a VIEW and display the titles that were borrowed by at least 20% of clients
11. The top month of borrows in 2017
12. Average number of borrows by age
13. The oldest and the youngest clients of the library
14. First and last names of authors that wrote books in more than one genre

As you work on these queries, create indexes that will increase your queries' performance.

You must include comments in your code that address the purpose of your query and explains each step. Save your **queries and results** in a plain-text file that you will submit as your assignment.

Author table:

AuthorID	AuthorFirstName	AuthorLastName	AuthorNationality

1	Sofia	Smith	Canada
2	Maria	Brown	Brazil
3	Elena	Martin	Mexico
4	Zoe	Roy	France
5	Sebastian	Lavoie	Canada
6	Dylan	Garcia	Spain
7	Ian	Cruz	Mexico
8	Lucas	Smith	USA
9	Fabian	Wilson	USA
10	Liam	Taylor	Canada
11	William	Thomas	Great Britain
12	Logan	Moore	Canada
13	Oliver	Martin	France
14	Alysha	Thompson	Canada
15	Isabelle	Lee	Canada
16	Emily	Clark	USA
17	John	Young	China
18	David	Wright	Canada
19	Thomas	Scott	Canada
20	Helena	Adams	Canada
21	Sofia	Carter	USA
22	Liam	Parker	Canada
23	Emily	Murphy	USA

Book table:

BookID	BookTitle	BookAuthor	Genre
1	Build your database system	1	Science
2	The red wall	2	Fiction
3	The perfect match	3	Fiction
4	Digital Logic	4	Science
5	How to be a great lawyer	5	Law
6	Manage successful negotiations	6	Society
7	Pollution today	7	Science
8	A gray park	2	Fiction
9	How to be rich in one year	8	Humor
10	Their bright fate	9	Fiction
11	Black lines	10	Fiction
12	History of theater	11	Literature
13	Electrical transformers	12	Science

14	Build your big data system	1	Science
15	Right and left	13	Children
16	Programming using Python	1	Science
17	Computer networks	14	Science
18	Performance evaluation	15	Science
19	Daily exercise	16	Well being
20	The silver uniform	17	Fiction
21	Industrial revolution	18	History
22	Green nature	19	Well being
23	Perfect football	20	Well being
24	The chocolate love	21	Humor
25	Director and leader	22	Society
26	Play football every week	20	well being
27	Maya the bee	13	Children
28	Perfect rugby	20	Well being
29	The end	23	Fiction
30	Computer security	1	Science
31	Participate	22	Society
32	Positive figures	3	Fiction

Client table:

ClientID	ClientFirstName	ClientLastName	ClientDoB	Occupation
1	Kaiden	Hill	2006	Student
2	Alina	Morton	2010	Student
3	Fania	Brooks	1983	Food Scientist
4	Courtney	Jensen	2006	Student
5	Brittany	Hill	1983	Firefighter
6	Max	Rogers	2005	Student
7	Margaret	McCarthy	1981	School Psychologist
8	Julie	McCarthy	1973	Professor
9	Ken	McCarthy	1974	Securities Clerk
10	Britany	O'Quinn	1984	Violinist
11	Conner	Gardner	1998	Licensed Massage Therapist
12	Mya	Austin	1960	Parquet Floor Layer
13	Thierry	Rogers	2004	Student
14	Eloise	Rogers	1984	Computer Security Manager
15	Gerard	Jackson	1979	Oil Exploration Engineer
16	Randy	Day	1986	Aircraft Electrician
17	Jodie	Page	1990	Manufacturing Director

18	Coral	Rice	1996	Window Washer
19	Ayman	Austin	2002	Student
20	Jaxson	Austin	1999	Repair Worker
21	Joel	Austin	1973	Police Officer
22	Alina	Austin	2010	Student
23	Elin	Austin	1962	Payroll Clerk
24	Ophelia	Wolf	2004	Student
25	Eliot	McGuire	1967	Dentist
26	Peter	McKinney	1968	Professor
27	Annabella	Henry	1974	Nurse
28	Anastasia	Baker	2001	Student
29	Tyler	Baker	1984	Police Officer
30	Lilian	Ross	1983	Insurance Agent
31	Thierry	Arnold	1975	Bus Driver
32	Angelina	Rowe	1979	Firefighter
33	Marcia	Rowe	1974	Health Educator
34	Martin	Rowe	1976	Ship Engineer
35	Adeline	Rowe	2005	Student
36	Colette	Rowe	1963	Professor
37	Diane	Clark	1975	Payroll Clerk
38	Caroline	Clark	1960	Dentist
39	Dalton	Clayton	1982	Police Officer
40	Steve	Clayton	1990	Bus Driver
41	Melanie	Clayton	1987	Computer Engineer
42	Alana	Wilson	2007	Student
43	Carson	Byrne	1995	Food Scientist
44	Conrad	Byrne	2007	Student
45	Ryan	Porter	2008	Student
46	Elin	Porter	1978	Computer Programmer
47	Tyler	Harvey	2007	Student
48	Arya	Harvey	2008	Student
49	Serena	Harvey	1978	School Teacher
50	Lilly	Franklin	1976	Doctor
51	Mai	Franklin	1994	Dentist
52	John	Franklin	1999	Firefighter
53	Judy	Franklin	1995	Firefighter
54	Katy	Lloyd	1992	School Teacher
55	Tamara	Allen	1963	Ship Engineer
56	Maxim	Lyons	1985	Police Officer
57	Allan	Lyons	1983	Computer Engineer

58	Marc	Harris	1980	School Teacher
59	Elin	Young	2009	Student
60	Diana	Young	2008	Student
61	Diane	Young	2006	Student
62	Alana	Bird	2003	Student
63	Anna	Becker	1979	Security Agent
64	Katie	Grant	1977	Manager
65	Joan	Grant	2010	Student
66	Bryan	Bell	2001	Student
67	Belle	Miller	1970	Professor
68	Peggy	Stevens	1990	Bus Driver
69	Steve	Williamson	1975	HR Clerk
70	Tyler	Williamson	1999	Doctor
71	Izabelle	Williamson	1990	Systems Analyst
72	Annabel	Williamson	1960	Cashier
73	Mohamed	Waters	1966	Insurance Agent
74	Marion	Newman	1970	Computer Programmer
75	Ada	Williams	1986	Computer Programmer
76	Sean	Scott	1983	Bus Driver
77	Farrah	Scott	1974	Ship Engineer
78	Christine	Lambert	1973	School Teacher
79	Alysha	Lambert	2007	Student
80	Maia	Grant	1984	School Teacher

Borrower table:

BorrowID	ClientID	BookID	BorrowDate
1	35	17	2016-07-20
2	1	3	2017-04-19
3	42	8	2016-10-03
4	62	16	2016-04-05
5	53	13	2017-01-17
6	33	15	2015-11-26
7	40	14	2015-01-21
8	64	2	2017-09-10
9	56	30	2017-08-02
10	23	2	2018-06-28
11	46	19	2015-11-18
12	61	20	2015-11-24
13	58	7	2017-06-17

14	46	16	2017-02-12
15	80	21	2018-03-18
16	51	23	2015-09-01
17	49	18	2015-07-28
18	43	18	2015-11-04
19	30	2	2018-08-10
20	48	24	2015-05-13
21	71	5	2016-09-05
22	35	3	2016-07-03
23	57	1	2015-03-17
24	23	25	2017-08-16
25	20	12	2018-07-24
26	25	7	2015-01-31
27	72	29	2016-04-10
28	74	20	2017-07-31
29	53	14	2016-02-20
30	32	10	2017-07-24
31	12	15	2018-04-25
32	77	13	2017-06-09
33	30	4	2017-10-24
34	37	24	2016-01-14
35	27	26	2017-06-05
36	1	16	2018-05-06
37	21	9	2016-03-19
38	69	28	2017-03-29
39	17	19	2017-03-14
40	8	9	2016-04-22
41	63	18	2015-01-25
42	65	20	2016-10-10
43	51	19	2015-07-28
44	23	12	2017-01-25
45	17	4	2017-04-18
46	68	5	2016-09-06
47	46	13	2017-09-30
48	15	13	2017-07-05
49	11	19	2017-12-14
50	78	15	2017-01-26
51	47	9	2015-03-03
52	68	7	2016-05-26
53	37	26	2017-02-06

54	48	27	2015-12-30
55	9	21	2017-10-21
56	29	8	2018-04-01
57	64	18	2017-08-29
58	61	26	2018-02-21
59	39	28	2016-07-26
60	73	18	2018-08-22
61	11	13	2018-01-17
62	45	6	2016-07-20
63	33	13	2018-03-18
64	10	17	2016-06-06
65	28	18	2017-02-17
66	51	3	2016-12-09
67	29	2	2015-09-18
68	28	30	2017-09-14
69	74	20	2015-12-12
70	15	22	2015-01-14
71	57	8	2017-08-20
72	2	5	2015-01-18
73	74	12	2018-04-14
74	51	10	2016-02-25
75	25	17	2015-02-24
76	45	21	2017-02-10
77	27	25	2016-08-03
78	32	28	2016-06-15
79	71	21	2017-05-21
80	75	26	2016-05-03
81	56	32	2015-12-23
82	26	32	2015-05-16
83	66	32	2015-05-30
84	57	18	2017-09-15
85	40	15	2016-09-02
86	65	4	2017-08-17
87	54	7	2015-12-19
88	29	4	2017-07-22
89	44	9	2017-12-31
90	56	31	2015-06-13
91	17	4	2015-04-01
92	35	16	2018-07-19
93	22	18	2017-06-22

94	39	24	2015-05-29
95	63	14	2018-01-20
96	53	21	2016-07-31
97	40	9	2016-07-10
98	52	4	2017-04-05
99	27	20	2016-09-04
100	72	29	2015-12-06
101	49	16	2017-12-19
102	6	12	2016-12-04
103	74	31	2016-07-27
104	48	32	2016-06-29
105	69	2	2016-12-27
106	60	32	2017-10-29
107	45	22	2017-06-12
108	42	15	2017-05-14
109	79	8	2016-10-13
110	70	18	2016-12-04
111	34	8	2016-03-06
112	43	8	2015-12-19
113	42	32	2016-04-20
114	67	5	2017-03-06
115	80	25	2015-06-23
116	54	11	2017-05-03
117	34	28	2017-08-30
118	65	20	2017-08-26
119	61	19	2018-01-05
120	38	12	2018-01-17
121	51	4	2016-05-13
122	7	16	2016-03-17
123	46	16	2016-11-25
124	75	30	2018-08-12
125	72	32	2015-03-12
126	44	17	2015-06-15
127	68	15	2016-02-21
128	21	1	2016-06-19
129	14	25	2016-10-10
130	68	21	2016-05-27
131	35	20	2015-03-19
132	16	27	2016-08-08
133	79	31	2018-03-07

134	14	17	2018-04-28
135	29	28	2018-03-11
136	41	4	2018-08-08
137	42	3	2016-02-23
138	45	3	2017-07-10
139	36	16	2018-07-19
140	36	30	2015-08-07
141	54	32	2018-03-14
142	61	15	2017-03-28
143	1	13	2018-05-17
144	43	1	2015-05-14
145	37	14	2015-07-30
146	62	17	2015-09-19
147	50	22	2016-12-02
148	45	1	2016-07-24
149	32	17	2018-03-10
150	13	28	2016-02-14
151	15	9	2018-08-11
152	10	19	2018-08-29
153	66	3	2016-11-27
154	68	29	2017-07-12
155	21	14	2018-06-27
156	35	9	2016-01-22
157	17	24	2016-08-25
158	40	21	2015-07-09
159	1	24	2016-03-28
160	70	27	2015-07-10
161	80	26	2016-04-24
162	29	5	2015-10-18
163	76	12	2018-04-25
164	22	4	2016-12-24
165	2	2	2017-10-26
166	35	13	2016-02-28
167	40	8	2017-10-02
168	68	9	2016-01-03
169	32	5	2016-11-13
170	34	17	2016-09-15
171	34	16	2018-04-13
172	80	30	2016-10-13
173	20	32	2015-11-17

174	36	10	2017-09-01
175	78	12	2018-06-27
176	57	8	2016-03-22
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179	48	22	2015-09-29
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185	30	27	2016-11-23
186	26	3	2016-08-13
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188	47	15	2016-02-10
189	53	30	2018-08-08
190	80	16	2016-03-31
191	70	13	2018-02-03
192	14	25	2016-03-27
193	46	22	2016-01-13
194	30	32	2015-08-06
195	60	14	2016-11-27
196	14	13	2018-05-23
197	71	15	2016-06-22
198	38	21	2015-12-27
199	69	30	2017-04-29
200	49	31	2018-06-03
201	28	28	2015-05-29
202	49	3	2016-08-30
203	75	1	2015-10-29
204	78	3	2017-05-12
205	43	18	2015-03-25
206	27	21	2016-02-22
207	64	22	2015-04-03
208	21	11	2017-12-09
209	66	29	2016-12-20
210	45	13	2017-04-15
211	48	30	2015-01-31
212	20	25	2017-12-20
213	41	20	2018-01-29

214	51	12	2015-07-05
215	5	1	2015-04-12
216	40	3	2018-02-24
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220	17	9	2018-01-29
221	38	13	2016-05-09
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229	29	3	2017-08-13
230	66	11	2018-06-05
231	36	16	2016-04-28
232	26	2	2016-10-23
233	32	1	2017-10-31
234	62	14	2017-07-25
235	12	4	2015-07-08
236	38	32	2015-02-24
237	29	16	2016-07-28
238	36	25	2017-05-07
239	76	7	2015-06-13
240	28	16	2016-08-15
241	60	13	2016-08-26
242	8	3	2017-07-28
243	25	1	2016-07-30
244	62	29	2018-08-24
245	51	8	2016-09-01
246	27	23	2015-02-08
247	69	12	2018-06-25
248	51	12	2015-07-04
249	7	4	2015-05-01
250	31	15	2017-10-29
251	14	23	2015-01-15
252	14	1	2018-05-21
253	39	25	2015-12-26

254	79	24	2016-05-31
255	40	15	2016-03-18
256	51	13	2018-04-13
257	61	1	2015-02-11
258	15	24	2018-03-02
259	10	22	2018-01-21
260	67	10	2017-07-08
261	79	11	2016-12-11
262	19	32	2016-05-04
263	35	11	2017-08-01
264	27	13	2017-12-15
265	30	22	2015-12-22
266	8	7	2015-06-26
267	70	9	2016-03-20
268	56	18	2016-01-29
269	13	19	2015-03-06
270	61	2	2016-06-18
271	47	13	2017-09-18
272	30	22	2016-02-19
273	18	22	2016-12-31
274	34	29	2017-10-27
275	32	21	2015-06-03
276	9	28	2016-03-30
277	62	24	2015-03-23
278	44	22	2017-04-29
279	27	5	2015-03-25
280	61	28	2017-07-14
281	5	13	2016-12-04
282	43	19	2018-03-15
283	34	19	2016-06-05
284	35	5	2018-02-19
285	13	12	2016-09-23
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288	42	17	2016-06-15
289	51	24	2018-07-30
290	45	30	2015-01-15
291	70	17	2017-10-07
292	77	7	2017-01-06
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295	10	2	2017-04-18
296	16	21	2016-10-03
297	48	5	2016-09-17
298	72	3	2017-02-10
299	26	23	2016-03-01
300	49	23	2016-10-25

Grading Rubric

Your project will be graded based on the following rubric:

Category	**Unacceptable (0-1)**	**Needs Improvement (2-3)**	**Good (4)**	**Excellent (5)**	**Total Possible Points**
Create the database tables	All tables are not created correctly	2 or more tables are not created correctly	Correct created tables, queries are not optimal	Correct queries and correct resulted tables	5
Define the primary keys of the tables	All primary keys are not created correctly	2 or more primary keys are not created correctly	NA	All primary keys are created correctly	5
Create the relationships among the tables using foreign keys	All relationships are not created correctly	2 or more relationships are not created correctly	NA	All relationships are created correctly	5
Populate the tables with data	Tables are not populated by the given data	Some tables are populated by part of the given data	All tables are populated by part of the given data	All tables are correctly populated with the given data	5
Query 1	Query does not exist	Query is close to correct, results are not correct	Correct results, query is not optimal	Correct query and correct results. Notes written to explain query.	5
Query 2	Query does not exist	Query is close to correct, results are not correct	Correct results, query is not optimal	Correct query and correct results. Notes written to explain query.	5
Query 3	Query does not exist	Query is close to correct, results are not correct	Correct results, query is not optimal	Correct query and correct results. Notes written to explain query.	5
Query 4	Query does not exist	Query is close to correct, results are not correct	Correct results, query is not optimal	Correct query and correct results. Notes written to explain query.	5
Query 5	Query does not exist	Query is close to correct, results are not correct	Correct results, query is not optimal	Correct query and correct results. Notes written to explain query.	5
Query 6	Query does not exist	Query is close to correct, results are not correct	Correct results, query is not optimal	Correct query and correct results. Notes written to explain query.	5

Query 7	Query does not exist	Query is close to correct, results are not correct	Correct results, query is not optimal	Correct query and correct results. Notes written to explain query.	5
Query 8	Query does not exist	Query is close to correct, results are not correct	Correct results, query is not optimal	Correct query and correct results. Notes written to explain query.	5
Query 9	Query does not exist	Query is close to correct, results are not correct	Correct results, query is not optimal	Correct query and correct results. Notes written to explain query.	5
Query 10	Query does not exist	Query is close to correct, results are not correct	Correct results, query is not optimal	Correct query and correct results. Notes written to explain query.	5
Query 11	Query does not exist	Query is close to correct, results are not correct	Correct results, query is not optimal	Correct query and correct results. Notes written to explain query.	5
Query 12	Query does not exist	Query is close to correct, results are not correct	Correct results, query is not optimal	Correct query and correct results. Notes written to explain query.	5
Query 13	Query does not exist	Query is close to correct, results are not correct	Correct results, query is not optimal	Correct query and correct results. Notes written to explain query.	5
Query 14	Query does not exist	Query is close to correct, results are not correct	Correct results, query is not optimal	Correct query and correct results. Notes written to explain query.	5
Create the required indexes	No indexes chosen	Indexes are poorly chosen, queries are not correct	Indexes are poorly chosen, queries are correct	Indexes are correctly chosen, queries are correctly written	5
Create required view	No view created	The syntax of the view creation is not correct	The view is correctly created but not correctly used	The view is correctly created and used	5
Total					100

Related Lessons & References

This assignment covers material presented in the course. You can refer to the following lessons for guidance:

- Database Table: Design & Conventions
- Advanced SQL Query Syntax
- SQL Views: Definition & Example
- Advanced SQL Subqueries: Use & Examples
- SQL: Create Index

Other lessons you can reference to help with using MySQL include:

- MySQL Commands: Lists and Examples
- Practical Application for Introduction to SQL: Installing Sample Data for MySQL
- Practical Application for Relational Databases & SQL: Creating a Database in MySQL

Before You Submit

When you complete your assignment, we suggest taking some time to check for any errors or to add any finishing touches. We also suggest that you use online plagiarism checkers such as PlagScan or DupliChecker to make sure that your assignment is not too similar to any existing materials. Plagiarized submissions will NOT be graded.

How to Submit Your Assignment

When you are ready to submit your assignment, **please fill out the submission form** and attach your assignment in Microsoft Word, PDF, or Text document. You should receive your assignment grade within one week.

If you are not satisfied with the score you receive on your assignment, you may revise or rewrite it, and resubmit them for grading using the same submission form above. Keep in mind that the grade you receive on your assignment is only a portion of your overall grade for the course. Please see the course syllabus for a more detailed breakdown of the grading policy.