SQL Fundamentals
Project Book

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Introduction

This Project Book contains projects designed to allow students to apply the concepts described in the *SQL Fundamentals* course. It includes a project, which includes an introduction, a case study describing the project specifics, and the steps to be followed during implementation, exercises, and examples. The projects may be completed in tandem with the completion of corresponding lessons for the duration of the course.

How to Use this Project Book

The projects may be used at various stages of the course to allow students the opportunity to put into practice what they are learning during the class.

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Simplified Library Database

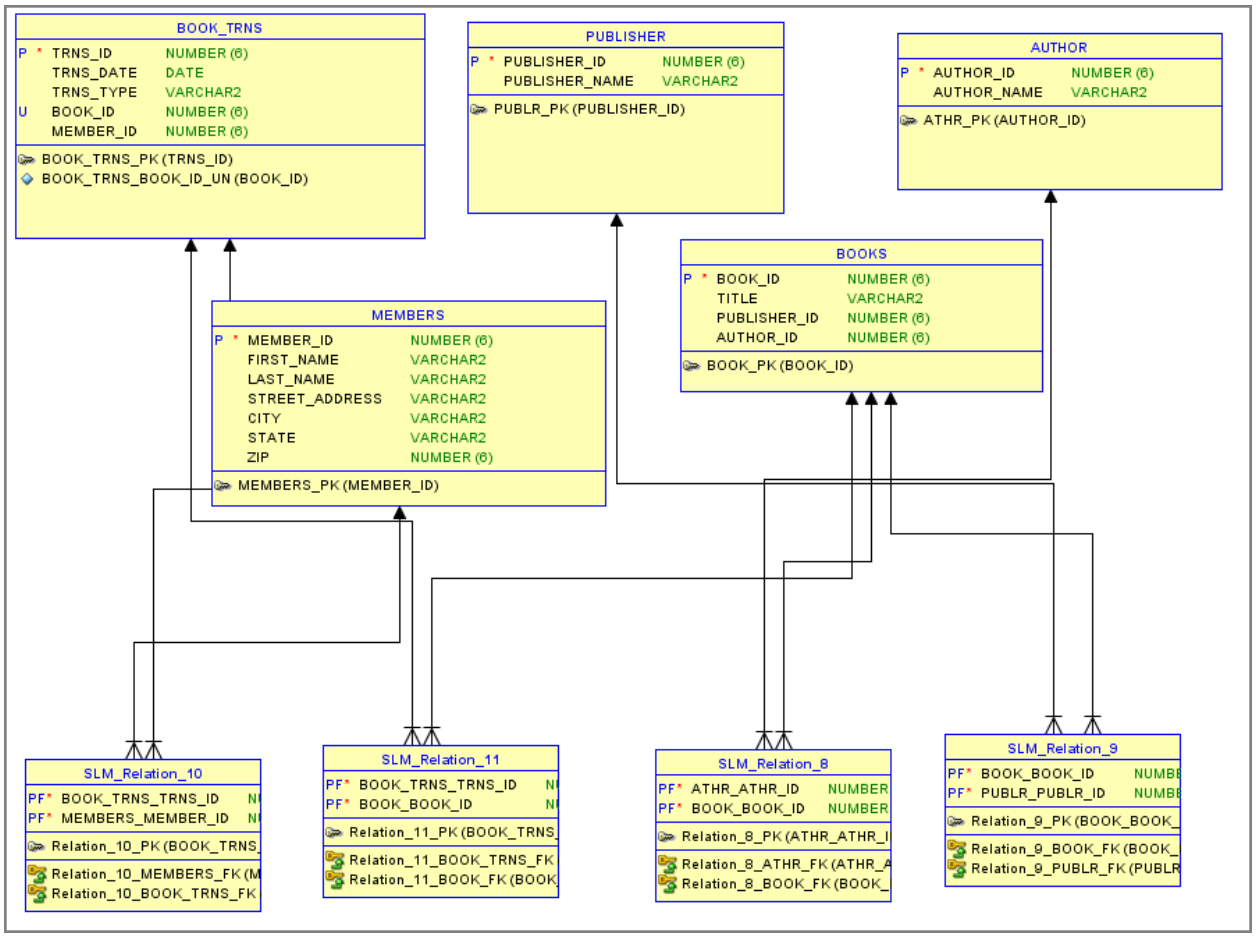
Introduction

The simplified Library Database provides reading services to its members. Any person can become a member of the library. Members can issue books and return them at the specified time.

In this case study, you build a set of database tables for the simplified library database. After you create the tables, you insert, update, and delete records in the library database and generate various reports. The database contains only the essential tables.

The simplified library database contains the following tables: `BOOKS`, `MEMBERS`, `AUTHOR`, `BOOK_TRNS`, and `PUBLISHER`.

The following is a diagram of tables and their relationships for the simplified library application:



Note: To build the tables, you can execute the commands in the `SLM_Create_Table.sql` script in SQL Developer. To drop the tables, you can execute the commands in the `SLM_Drop_Tables.sql` script in SQL Developer. Then you can execute the commands in the `<<SLM_Populate.sql>>` script in SQL Developer to create and populate the tables.

All the three SQL scripts are present in the `SQL_labs/labs` folder.

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- If you use the `SLM_Create_Table.sql` script to build the tables, start with Task 2.
- If you use the `SLM_Drop_Tables.sql` script to remove the tables, start with Task 1.
- If you use the `<<SLM_Populate.sql>>` script to build and populate the tables, start with Task 6.

Project Overview

In this project, you perform the following tasks to develop a Simple Library Management application.

Task

1. Create the tables based on the following table instance charts. Select the appropriate data types and be sure to add the primary key(PK), reference or foreign keys(FK), and other integrity constraints.

TABLE NAME: AUTHOR				
Column	Data Type	Key	Constraints	Table Dependent on
AUTHOR_ID	NUMBER(6,0)	PK		
AUTHOR_NAME	VARCHAR2(25)		NOT NULL	

TABLE NAME: MEMBERS				
Column	Data Type	Key	Constraints	Table Dependent on
MEMBER_ID	NUMBER(6,0)	PK		
FIRST_NAME	VARCHAR2(25)		NOT NULL	
LAST_NAME	VARCHAR2(20)		NOT NULL	
STREET_ADDRESS	VARCHAR2(60)			
CITY	VARCHAR2(25)		NOT NULL	
STATE	VARCHAR2(35)		NOT NULL	
ZIP	NUMBER(6,0)			

TABLE NAME: PUBLISHER				
Column	Data Type	Key	Constraints	Table Dependent on
PUBLISHER_ID	NUMBER(6,0)	PK		
PUBLISHER_NAME	VARCHAR2(25)		NOT NULL	

TABLE NAME: BOOKS				
Column	Data Type	Key	Constraints	Table Dependent on
BOOK_ID	NUMBER(6,0)	PK		

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TITLE	VARCHAR2(50)		NOT NULL	
PUBLISHER_ID	NUMBER(6,0)	FK	NOT NULL	PUBLISHER(PUBLISHER_ID)
AUTHOR_ID	NUMBER(6,0)	FK	NOT NULL	AUTHOR(AUTHOR_ID)

TABLE NAME: BOOK_TRNS				
Column	Data Type	Key	Constraints	Table Dependent on
TRNS_ID	NUMBER(6,0)	PK		
TRNS_DATE	DATE		NOT NULL	
TRNS_TYPE	VARCHAR2(20)		NOT NULL	
BOOK_ID	NUMBER(6,0)		NOT NULL	
MEMBER_ID	NUMBER(6,0)		NOT NULL	

2. Add additional referential integrity constraints to the BOOK_TRNS table. Alter the BOOK_TRNS table to add two foreign keys as shown in the following table:

BOOK_ID	FK	BOOKS(BOOK_ID)
MEMBER_ID	FK	MEMBERS(MEMBER_ID)

3. Verify that the tables were created properly by checking in the Connections Navigator in SQL Developer.
4. Create a sequence to uniquely identify each row in the BOOK_TRNS table.
   a. Start with 500; do not allow caching of the values. Name the sequence BOOK_TRNS_ID_SEQ. Increment by 1.
   b. Verify the existence of the sequences in the Connections Navigator in SQL Developer.

5. Add data to the tables as shown in the following tables. Create a script for each set of data to be added. Use substitution variables to enter values.

Table: Author	
AUTHOR_ID	**AUTHOR_NAME**
101	Thomas Hardy
102	Shakespeare
103	H.G.Wells
104	Rudyard Kipling
105	Kalidas
106	John Milton
107	R.K.Narayan

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108	Charles Dickens

Table: Publisher	
PUBLISHER_ID	**PUBLISHER_NAME**
301	AC Barls
302	Penguin Group
303	Elsevier
304	Pearson Education
305	Inc Publication
306	Embel
307	Anthoys
308	Cengage
309	Wilsey
310	Mc Graw

Table: Books			
BOOK_ID	**TITLE**	**AUTHOR_ID**	**PUBLISHER_ID**
401	Invisible Man	103	301
402	The Girl with the Dragon Tattoo	101	302
403	Raghuvamsa	105	303
404	Shakuntala	105	303
405	Antony and Cleopatra	102	306
406	Oliver Twist	108	305
407	Introduction to Database	107	304
408	Jungle Book	104	307
409	Paradise lost	106	308
410	Othello	102	304
411	Pickwick Papers	108	305
412	The Tempest	102	304

Table: MEMBERS						
MEMBER_ID	FIRST_NAME	LAST_NAME	STREET_ADDRESS	CITY	STATE	ZIP
201	Fiorello	Louis	3 Hangar Center 17th Ave	Manhattan	New York	10010
202	Frank	Miller	101 West Ohare	Newark	New York	14513
203	Turner	Stephen	123 Old Tree Way	Sacramento	CA	94212

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204	Rebecca	Jackson	562 W University Dr	Tempe	AZ	85281
205	John	Williams	450 Aviation Drive Sterling	San Antonio	TX	78258
206	William	Jones	600 North Terminal Parkway	San Jose	CA	95002
207	Edward	Sterling	1 Harborside Drive East	Los Angeles	CA	93536
208	Albert	Einstein	107 Lambert International Blvd	St. Louis	Missouri	63031
209	Eugene	Linfa	21 Windsor Locks Dolphin Dr	Los Angeles	CA	93536
210	King	George	602 Sunset Boulevard	Scottsdale	AZ	85633
211	Blake	Hawks	89 Camelback Road	Scottsdale	AZ	85633
212	Clark	James	562 New Blvd	San Francisco	CA	94102
213	Jonathan	Taylor	80 Lauran St	San Carlos	CA	94321
214	Ellen	Abel	56 Fountain Ave	Los Angeles	CA	90005
215	Pat	Fay	345 Broadway St	Manhattan	NY	10019

Table: Book_TRNS (Use the sequence to populate TRNS_ID.)

TRNS_ID	TRNS_DATE	TRNS_TYPE	BOOK_ID	MEMBER_ID
501	20-APR-2015	STUDENT	401	201
502	5-APR-2015	FACULTY	402	203
503	15-DEC-2015	STUDENT	411	202
504	25-OCT-2015	FACULTY	404	204
505	13-FEB-2016	STUDENT	405	212
506	12-AUG-2015	FACULTY	404	209
507	10-MAR-2015	STUDENT	412	210
508	07-MAY-2015	FACULTY	408	205
509	02-JAN-2015	STUDENT	409	207
510	15-JAN-2015	FACULTY	410	209
511	01-APR-2016	STUDENT	411	210
512	29-FEB-2016	FACULTY	410	215
513	13-DEC-2015	STUDENT	405	213
514	28-NOV-2015	FACULTY	405	205
515	03-JAN-2016	STUDENT	402	214
516	21-OCT-2015	FACULTY	403	215

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6. Create a view named MEMBER_DETAILS to show the Member Name, Address, City, and details of the books borrowed by the member. Order the results by MEMBER_ID.
7. Make changes to the data in the BOOKS table.
   a. Add a new book detail. Verify if author detail for the book is available in the AUTHORS table. If not, make an entry in the AUTHORS table. Verify if publisher detail for the book is available in the PUBLISHERS table. If not, make an entry in the PUBLISHERS table.

413	Great Expectations	Inc Publication	Charles Dickens

8. John William borrows Jungle Book from the library. Record the transaction in the BOOK_TRNS table.

9. Write a query to find all the members who borrowed the book Shakuntala.

10. Write a query to find all the books by Shakespeare that are available in the library.

11. The librarian wants to keep track of the multiple copies of books. Add the no_of_copies column to the BOOKS table. Specify it as a numeric, NOT NULL column.

12. Update the BOOKS table with the following data for existing books:

Table: Books	
BOOK_ID	**no_of_copies**
401	10
402	6
403	4
404	3
405	8
406	9
407	9
408	2
409	7
410	5
411	2
412	4
413	6

13. Display the books borrowing history of the member King George.

14. Show a list of members who have borrowed books more than one time.

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15. Query the data dictionary to view all the tables owned by you.

16. Create a view, `BOOKS_VIEW`, which shows the book name, author of the book, and number of copies of the book. View all the rows from the view.

	TITLE	AUTHOR_NAME	NO_OF_COPIES
1	Invisible Man	H.G. Wells	10
2	The Girl with the Dragon Tattoo	Thomas Hardy	6
3	Raghuvamsa	Kalidas	4
4	Shakuntala	Kalidas	3
5	Antony and Cleopatra	Shakespeare	8
6	Oliver Twist	Charles Dickens	9
7	Introduction to Database	R.K. Narayan	9
8	Jungle Book	Rudyard Kipling	2
9	Paradise Lost	John Milton	7
10	Othello	Shakespeare	5
11	Pickwick Papers	Charles Dickens	2
12	The Tempest	Shakespeare	4
13	Great Expectations	Charles Dickens	6

17. You want to create a common login user for all members using which the members can view records from `BOOKS_VIEW`. Members have access to this view to know about the books that are available in the library.

a) Create a user named `login_books`. To make sure that the new user has all the privileges required, a role `orax` has already been created for you. Grant this role to the new user.

b) Grant this user select privileges on `BOOKS_VIEW`.

18. Open a new SQL Developer session by clicking the SQL Developer desktop icon. Create a new connection, `login_con`. Enter the connection details by using the `login_books` username. Test the connection. Click Connect. Query the view to show all the books that are available in the library.

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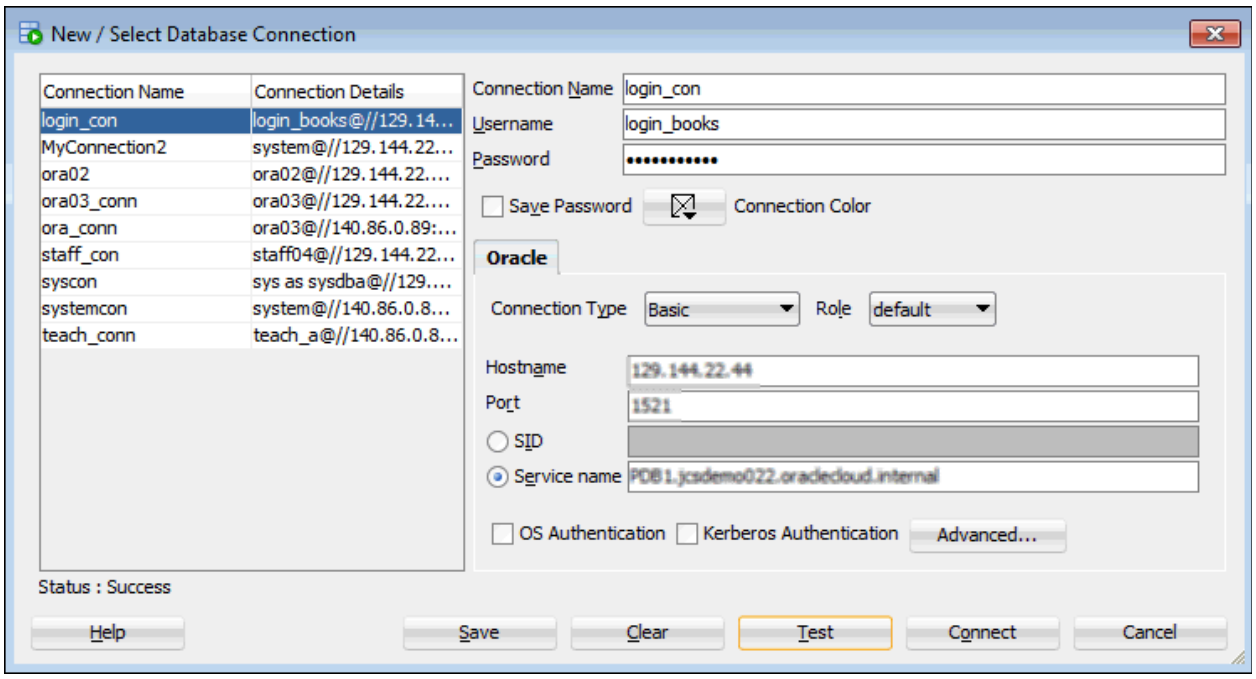

The query result looks as shown in the following screenshot:

	TITLE	AUTHOR_NAME	NO_OF_COPIES
1	Invisible Man	H.G. Wells	10
2	The Girl with the Dragon Tattoo	Thomas Hardy	6
3	Raghuvamsa	Kalidas	4
4	Shakuntala	Kalidas	3
5	Antony and Cleopatra	Shakespeare	8
6	Oliver Twist	Charles Dickens	9
7	Introduction to Database	R.K. Narayan	9
8	Jungle Book	Rudyard Kipling	2
9	Paradise Lost	John Milton	7
10	Othello	Shakespeare	5
11	Pickwick Papers	Charles Dickens	2
12	The Tempest	Shakespeare	4
13	Great Expectations	Charles Dickens	6

Note that now a common user can access and view the books that are available in the library by logging in as `login_books`.

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