

## **Part 6: Project Demonstration**

### **Introduction:**

The demonstration part of the project is intended to show the full functionality of our library DBMS. A query is provided for each requirement from our original requirements doc. This ensures the full scope of the DBMS has been implemented.

### **Requirements:**

1. Database maintains list of all books and digital media, storing key details such as author, ISBN, publication year, genre, and availability status.
2. Track logins to desktop computers.
3. Users can reserve and renew items (create holds and update transactions).
4. Users can check their loan statuses.
5. Users can search the catalog for books and digital media.
6. Library workers can list items that are out of stock.
7. Library workers can check out items and process returns (create transactions).
8. Library workers can add new Items to the database.
9. The database can create a report showing borrowing trends by genre.
10. Library workers can check/calculate fine amounts.
11. Users can view all the available books in a given genre.
12. Library workers can check the most frequent borrowers of a given genre in the past year.
13. Library workers can view all books due in the next week.
14. Library workers can view all members with at least one overdue book.
15. Library workers can view the average borrowing time of books for each genre.

## Queries

Req.	Query
1	<b>List All Books and Digital Media with Key Details and Availability:</b> SELECT i.Item_ID, i.Title, i.ISBN, i.Publication_Year, a.first_name AS Author_First_Name, a.last_name AS Author_Last_Name, p.Name AS Publisher, g.Name AS Genre, b.Quantity_Available AS Book_Available, d.Quantity_Available AS DigitalMedia_Available, d.Medium FROM Item i LEFT JOIN Author a ON i.Author_ID = a.Author_ID LEFT JOIN Publisher p ON i.Publisher_ID = p.Publisher_ID LEFT JOIN Genre g ON i.Genre_ID = g.Genre_ID LEFT JOIN Book b ON i.Item_ID = b.Item_ID LEFT JOIN DigitalMedia d ON i.Item_ID = d.Item_ID;
2	<b>Track Desktop Computer Logins:</b> SELECT ca.Computer_ID, ca.User_ID, au.First_Name, au.Last_Name, ca.Login_Time, ca.Logout_Time FROM Computer_Activity ca JOIN AppUser au ON ca.User_ID = au.User_ID ORDER BY ca.Login_Time DESC;
3	<b>Reserve item (create hold)</b> INSERT INTO Hold(Hold_ID, User_ID, Copy_ID, Hold_Date, Expiration_Date, Status) VALUES(31, 32, 137, '2025-05-01', '2025-05-14', 'Active');
4	<b>This check loaned books for a given member.</b> SELECT

	<pre> i.Title, t.Date_CheckOut, t.Due_Date, t.Return_Date FROM     Transactions t JOIN     Copy c ON t.Copy_ID = c.Copy_ID JOIN     Item i ON c.Item_ID = i.Item_ID WHERE     t.User_ID = 13     AND t.Return_Date IS NULL ORDER BY     t.Due_Date; </pre>
5	<p><b>a. Search both books and items:</b></p> <pre> SELECT copy.copy_id, Item.title FROM copy NATURAL JOIN Item WHERE status = 'Available' </pre> <p><b>b. Search books:</b></p> <pre> SELECT copy.copy_id, Item.title FROM copy NATURAL JOIN Item NATURAL JOIN book WHERE status = 'Available' </pre> <p><b>c. Search digital media</b></p> <pre> SELECT copy.copy_id, Item.title FROM copy NATURAL JOIN Item NATURAL JOIN DigitalMedia WHERE status = 'Available' </pre>
6	<p><b>Lists books that have NO available copies</b></p> <pre> SELECT i.Title, COUNT(c.Copy_ID) AS Total_Copies FROM Item i JOIN Copy c ON i.Item_ID = c.Item_ID GROUP BY i.Title HAVING SUM(CASE WHEN c.Status = 'Available' THEN 1 ELSE 0 END) = 0; </pre>
7	<p><b>This query inserts a new transaction for an item checkout, including user ID, copy ID, checkout date, due date, and default</b></p>

	<p><b>values for renewals and return status.</b></p> <pre> INSERT INTO transactions (     transaction_id,     copy_id,     user_id,     date_checkout,     due_date,     num_renewals,     return_date ) VALUES (     9039,          -- new transaction_id (must be unique)     530,          -- copy_id being checked out     1,            -- user_id checking it out     CURRENT_DATE,     CURRENT_DATE + INTERVAL '14 days',     0,     NULL ); </pre>
8	<p><b>This sets the return_date for the active (unreturned) transaction where copy_id = 530 and user_id = 1.</b></p> <pre> UPDATE transactions SET return_date = CURRENT_DATE WHERE copy_id = 530 AND user_id = 1 AND return_date IS NULL; </pre>
9	<p><b>This query returns a count of books borrowed by genre in order of decreasing frequency from 4/1/2025 - 4/30/2025.</b></p> <pre> SELECT     g.Name AS Genre, </pre>

	<pre> COUNT(*) AS Borrow_Count FROM     Transactions t JOIN     Copy c ON t.Copy_ID = c.Copy_ID JOIN     Item i ON c.Item_ID = i.Item_ID JOIN     Genre g ON i.Genre_ID = g.Genre_ID WHERE     t.Date_CheckOut BETWEEN '2025-04-01' AND '2025-04-30' GROUP BY     g.Name ORDER BY     Borrow_Count DESC; </pre>
10	<p><b>This ranks users' total fine amounts in descending order.</b></p> <pre> SELECT     user_id,     SUM(amount) AS total_fine FROM     Amount GROUP BY     user_id ORDER BY     total_fine DESC; </pre>
11	<p><b>This lists all books in a given genre that have available copies.</b></p> <pre> SELECT     i.Title,     a.first_name,     a.last_name,     g.Name AS Genre,     b.Quantity_Available FROM     Book b JOIN     Item i ON b.Item_ID = i.Item_ID JOIN     Genre g ON i.Genre_ID = g.Genre_ID </pre>

	<pre> JOIN   Author a ON i.Author_ID = a.Author_ID WHERE   b.Quantity_Available &gt; 0   AND g.Name = 'Romance'; </pre>
12	<p><b>This lists the members who borrowed the most from a given genre in the past year.</b></p> <pre> SELECT   lm.LibraryMember_ID,   au.First_Name,   au.Last_Name,   COUNT(*) AS Num_Borrowed FROM   Transactions t JOIN   Copy c ON t.Copy_ID = c.Copy_ID JOIN   Item i ON c.Item_ID = i.Item_ID JOIN   Genre g ON i.Genre_ID = g.Genre_ID JOIN   AppUser au ON t.User_ID = au.User_ID JOIN   LibraryMember lm ON au.User_ID =   lm.LibraryMember_ID WHERE   g.Name = 'Horror'   AND t.Date_CheckOut &gt;= CURRENT_DATE -   INTERVAL '1 year' GROUP BY   lm.LibraryMember_ID, au.First_Name, au.Last_Name ORDER BY   Num_Borrowed DESC; </pre>
13	<p><b>This lists all books due in the next week.</b></p> <pre> SELECT   i.Title,   au.First_Name,   au.Last_Name, </pre>

	<pre> t.Due_Date, t.Date_CheckOut, t.Return_Date FROM Transactions t JOIN Copy c ON t.Copy_ID = c.Copy_ID JOIN Item i ON c.Item_ID = i.Item_ID JOIN AppUser au ON t.User_ID = au.User_ID WHERE t.Due_Date BETWEEN CURRENT_DATE AND CURRENT_DATE + INTERVAL '7 days' AND return_date IS NULL ORDER BY t.Due_Date ASC; </pre>
14	<p><b>This lists all members with at least one overdue book and the titles.</b></p> <pre> SELECT Appuser.user_id, Appuser.first_name, Appuser.last_name, due_date, return_date, title FROM AppUser NATURAL JOIN transactions NATURAL JOIN COPY NATURAL JOIN Item WHERE return_date is NULL and due_date &lt; '2025-05-02'; </pre>
15	<p><b>This lists the average borrowing time of books of each genre.</b></p> <pre> SELECT g.name AS genre_name, ROUND(AVG(t.return_date - t.date_checkout), 0) AS avg_borrow_days FROM Transactions t JOIN Copy c ON t.copy_id = c.copy_id JOIN Item i ON c.item_id = i.item_id </pre>

	<pre>JOIN   Genre g ON i.genre_id = g.genre_id WHERE   t.return_date IS NOT NULL GROUP BY   g.name ORDER BY   avg_borrow_days DESC;</pre>
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# Output

Some screenshots don't show the full output, as there are hundreds of items in the library.

1.

item_id	publisher	title	genre	book_available	isbn	publication_year	author_first_name	author_last_name	medium
1	Long send because				4025297006533	2022	Jasmine	Gonzalez	S
wanson-Williams		Thriller		4					
2	Stop guess tell				2853730176460	2011	Christine	Clark	C
arroll, George and Martinez		Non-Fiction		2					
3	Recently happy model				8910220898062	1996	Leonard	Frazier	T
aylor Inc		Science Fiction		3					
4	Sign discuss sure pull				9840641496748	2005	Hart	Nurnberg	C
haney Ltd		Thriller		1					
5	South send education last her				2027430454654	1998	Sriya	Annem	J
acobs, West and Barber		Non-Fiction		4					
6	Sister write though lawyer past				3005274726482	2017	Keith	Brooks	W
eaver Inc		Horror		4					
7	Speech travel themselves heart surface				0958308880613	2002	Margaret	Campbell	H
odge LLC		Fantasy		0					
8	Ready its offer				7424731664481	1998	Matthew	Smith	H
ill-Franco		Horror		4					
9	Score me well				2952838485169	2013	John	Vasquez	L
ee Ltd		Mystery		1					
10	Natural behavior note really				0854892420255	2013	Joseph	Peters	C
antu-Johnston		Mystery		5					
11	Stage record wide soon truth				8287134718255	2012	Brian	Thornton	S
mith, Banks and Little		Mystery		2					
12	What at news				8515982584251	1997	Jodi	Davis	G
alvan-Macdonald		Biography		3					
13	Reach fund too				8826431836480	2018	Kenneth	Phillips	P
ittman-Johnson		Historical		5					
14	Whole drive medical				5971216557934	2018	Amy	Wilcox	M
artin, Lopez and Yu		Fantasy		3					
15	Country state PM back				7537187677433	2024	Anna	Ross	S

2.

computer_id	user_id	first_name	last_name	login_time	logout_time
4	8	Amber	Thomas	2025-04-28 15:30:00	2025-04-28 17:00:00
7	27	Clifford	Williams	2025-04-28 14:10:00	2025-04-28 15:00:00
2	21	Travis	Spencer	2025-04-28 14:00:00	2025-04-28 15:45:00
1	57	Rebecca	Simon	2025-04-28 13:45:00	2025-04-28 14:30:00
3	40	Hannah	Smith	2025-04-28 13:20:00	2025-04-28 14:55:00
8	30	William	Thomas	2025-04-28 12:00:00	2025-04-28 13:15:00
6	59	Johnathan	Long	2025-04-28 11:25:00	2025-04-28 12:35:00
10	18	Robert	Gomez	2025-04-28 11:00:00	2025-04-28 12:20:00
1	3	Joshua	Williams	2025-04-28 10:50:00	2025-04-28 11:40:00
7	34	Samuel	Carter	2025-04-28 10:05:00	2025-04-28 11:25:00
5	63	Karen	Lynn	2025-04-28 09:45:00	2025-04-28 10:30:00
9	5	Robert	Jefferson	2025-04-28 09:15:00	2025-04-28 12:10:00
9	3	Joshua	Williams	2025-04-28 09:00:00	2025-04-28 10:15:00
6	9	Beverly	Jones	2025-04-28 08:30:00	2025-04-28 10:00:00
3	12	Joseph	King	2025-04-28 08:13:00	2025-04-28 09:47:00

3. INSERT 0 1

title	date_checkout	due_date	return_date
Bad off threat	2025-04-29	2025-05-04	
Speech travel themselves heart surface	2025-04-25	2025-05-05	
Move around up	2025-01-28	2025-05-05	
Chair law easy	2025-05-01	2025-05-15	

4. (4 rows)

5. A.

copy_id	title
1	Long send because
2	Long send because
3	Long send because
4	Long send because
5	Stop guess tell
6	Stop guess tell
7	Recently happy model
8	Recently happy model
9	Recently happy model
10	Sign discuss sure pull
11	South send education last her
12	South send education last her
13	South send education last her
14	South send education last her
15	Sister write though lawyer past
17	Sister write though lawyer past
18	Sister write though lawyer past
19	Sister write though lawyer past

B.

copy_id	title
1	Long send because
2	Long send because
3	Long send because
4	Long send because
5	Stop guess tell
6	Stop guess tell
7	Recently happy model
8	Recently happy model
9	Recently happy model
10	Sign discuss sure pull
11	South send education last her
12	South send education last her

C.

copy_id	title
1182	Trouble particularly threat manage owner
1183	Trouble particularly threat manage owner
1184	Trouble particularly threat manage owner
1185	Old source system democratic
1187	Old source system democratic
1188	Media debate establish
1189	Mind western threat each
1190	Mind western threat each
1191	South reason act security firm
1192	South reason act security firm
1193	South reason act security firm
1194	Here director even
1195	Here director even
1196	Here director even
1197	Here director even
1198	Here director even
1199	Send candidate read establish treatment
1200	Send candidate read establish treatment
1201	Send candidate read establish treatment

6.

title	total_copies
Speech travel themselves heart surface	1
Statement financial language like material	1
Professor development growth	1
Campaign minute choice natural black	1
Never order	1
Serious subject always scientist light	2
Week place mission person	1
Cell talk energy seek	1
Most city	1
Allow know so tree	3
Now back try seat source	1
Capital remember budget when east	2
West new common soon	1
Will director fill	1
Become relationship letter	2
Chair law easy	1
(16 rows)	

7. INSERT 0 1

8. UPDATE 1

genre	borrow_count
Thriller	13
Non-Fiction	10
Horror	10
Fantasy	10
Biography	8
Romance	8
Young Adult	7
Science Fiction	6
Mystery	5
Historical	3
(10 rows)	

9.

10. .

user_id	total_fine
1	15.00
14	15.00
17	15.00
2	15.00
10	15.00
19	15.00
11	10.00
4	10.00
5	10.00
27	10.00
16	5.00
32	5.00
12	5.00
24	5.00
25	5.00
33	5.00
18	5.00
22	5.00
8	5.00
9	5.00
15	5.00
26	5.00
21	5.00
3	5.00
28	5.00
29	5.00
34	5.00
6	5.00
(28 rows)	

11.

title	first_name	last_name	genre	quantity_available
Share behavior talk vote	Laura	Alvarado	Romance	2
Technology support whose method organization	Tyrone	Hernandez	Romance	4
Particular really example	Baby	Jayhawk	Romance	2
Technology table team	Philip	Philips	Romance	3
Wall friend record protect	Amy	Wilcox	Romance	2
Course organization blood	Jace	Jadin	Romance	1
Most industry pick	Richard	Jackson	Romance	1
Wonder visit	Jose	Hansen	Romance	1
Scientist color any	William	White	Romance	1
Political affect phone idea	Judy	Bullock	Romance	4
Media us despite	Sarah	Vega	Romance	2
Behind member market like	Leonard	Frazier	Romance	5
Mean should executive	Kimberly	Williams	Romance	3
We company thought	David	Zomer	Romance	2
Mention about without campaign	Michael	Jordan	Romance	3
Well all	Audrey	Pan	Romance	4
Sound try watch	Kevin	Jacobson	Romance	3
Movie range	Jodi	Harris	Romance	5
Shake fill manager south add	James	Terrys	Romance	2
North buy both good	Paul	Strong	Romance	5
Early laugh	Michael	Jordan	Romance	2
Especially near new plant table	Taylor	Swift	Romance	2
Full focus second cold	Thomas	Hawkins	Romance	2
Finish decision head	Regina	Martinez	Romance	2
Any thousand next	Cassandra	Smith	Romance	2
Sing young	Mark	Ruiz	Romance	5
Into around buy parent	Brian	Castillo	Romance	4
Leg certainly form student	Jason	Walker	Romance	4
Treat coach able wife process	Justin	Wood	Romance	3

12.

librarymember_id	first_name	last_name	num_borrowed
15	Scott	Martin	3
30	William	Thomas	3
35	Renee	Mooney	2
9	Beverly	Jones	2
20	Michael	Fuentes	2
23	Kristen	Hansen	2
26	Sandy	Perez	2
27	Clifford	Williams	2
2	Vickie	Allison	2
28	Zachary	Serrano	1
21	Travis	Spencer	1
4	Benjamin	Gallagher	1
24	Melody	Bennett	1
12	Joseph	King	1
14	Derek	White	1
8	Amber	Thomas	1
16	Ann	Carroll	1
19	Paul	Campbell	1

(18 rows)

13.

title	first_name	last_name	due_date	date_checkout	return_date
Key grow lead big	Robert	Gomez	2025-05-04	2025-01-30	
Law occur	William	Thomas	2025-05-04	2025-01-28	
Price tree serious begin	Michael	Lopez	2025-05-04	2025-02-24	
Image include	Benjamin	Gallagher	2025-05-04	2025-03-23	
Nothing top	Kristen	Hansen	2025-05-04	2025-03-11	
Head test people	Clifford	Williams	2025-05-04	2025-01-29	
Police letter way per above	Brent	Becker	2025-05-04	2025-01-12	
Anyone money force	Joseph	King	2025-05-04	2025-02-04	
Bad off threat	Douglas	Burns	2025-05-04	2025-04-29	
Course fast any dark	Scott	Martin	2025-05-04	2025-03-30	
Step let no	Kristen	Hansen	2025-05-04	2025-01-01	
Will director fill	Renee	Mooney	2025-05-05	2025-04-26	
Speech travel themselves heart surface	Douglas	Burns	2025-05-05	2025-04-25	
Whole drive medical	Ann	Carroll	2025-05-05	2025-04-17	
Idea exactly indeed	Kristen	Hansen	2025-05-05	2025-03-06	
At performance get	Melody	Bennett	2025-05-05	2025-03-19	
Knowledge them city new choose	Jonathan	Thompson	2025-05-05	2025-02-13	
Move around up	Douglas	Burns	2025-05-05	2025-01-28	
Military floor	Vickie	Allison	2025-05-05	2025-03-22	
Give lot defense per see	Michael	Lopez	2025-05-05	2025-02-15	
Recently discover manager issue gas	Amber	Thomas	2025-05-05	2025-02-01	
Allow know so tree	Samuel	Carter	2025-05-05	2025-05-01	
We company thought	Renee	Mooney	2025-05-05	2025-01-15	
We company thought	Vickie	Allison	2025-05-05	2025-03-22	

14.

user_id	first_name	last_name	due_date	return_date	title
14	Derek	White	2025-04-25		What at news
17	Brent	Becker	2025-05-01		Whole drive medical
28	Zachary	Serrano	2025-04-16		Consumer win
1	Bryan	Johnson	2025-05-01		In who
34	Samuel	Carter	2025-03-29		In who
6	Anna	Howe	2025-03-30		Coach suggest father music
18	Robert	Gomez	2025-03-27		Particular really example
29	Michael	Lopez	2025-05-01		Wall friend record protect
12	Joseph	King	2025-03-26		Someone believe
14	Derek	White	2025-05-01		Key grow lead big
3	Joshua	Williams	2025-05-01		Image include
10	Jonathan	Thompson	2025-05-01		Possible read beautiful teach expert
21	Travis	Spencer	2025-05-01		Course fast any dark
33	Samantha	Gonzalez	2025-05-01		Concern stage TV tell
1	Bryan	Johnson	2025-03-27		Allow know so tree
9	Beverly	Jones	2025-03-30		Western other history song ground
11	Joyce	Dickson	2025-03-31		Professor development growth
33	Samantha	Gonzalez	2025-05-01		Article however
11	Joyce	Dickson	2025-05-01		Capital remember budget when east
19	Paul	Campbell	2025-03-31		Serious subject always scientist light
27	Clifford	Williams	2025-04-01		Become relationship letter
26	Sandy	Perez	2025-03-27		Become relationship letter
8	Amber	Thomas	2025-05-01		Fund born common surface describe
17	Brent	Becker	2025-05-01		Garden dream by personal
25	Nicholas	Stone	2025-04-15		Current article source
2	Vickie	Allison	2025-05-01		Discuss part current

(26 rows)

genre_name	avg_borrow_days
Thriller	16
Young Adult	16
Biography	15
Science Fiction	14
Non-Fiction	14
Fantasy	13
Horror	13
Mystery	13
Romance	13
Historical	12

15.