GROUP PROJECT REPORT - GROUP 6

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Objective: Manage the borrowing and returning of books for readers as well as provide a free online reading platform.

1. **Information Management:**
   - Store information about books, authors, publishers, genres, etc.
   - Store information about members and member accounts.
   - Books are rated according to criteria: star rating, comments.
2. **Process Automation:**
   - Allow members to search for, reserve, borrow, and return books online.
   - Manage the process of borrowing and returning books and track the status of books.
   - Provide a free online reading platform.
3. **Provide Statistical Reports:**
   - Statistics on the number of books, members, and borrowed/returned books.
   - Statistics by genre, author, publisher.

Use Case + Business Functions

- **Use Case:** Manage book borrowing in the library.
- **Business Functions:**
  - **Book and Reader Management:** The system allows library staff to manage information about books in stock, including borrowing/returning information, borrowing history, and the number of books each reader is borrowing.
  - **Borrowing/Returning Books:** Library staff can perform the function of borrowing and returning books for readers at the borrowing desk. Staff

records information about borrowing and returning to track the status of each book.

- **Online Account Management:** The system provides online accounts for readers, allowing them to search for and select books to borrow online, and read online. Readers can view information about available books in stock and their current borrowing status.
- **Reporting and Statistics:** The system automatically generates reports on the status of borrowing/returning books, the number of books in stock, the condition of books (new, damaged, needing repair), and borrowing/returning information for each reader.
- **Online Book Management:** Readers can access the online system to view the book catalog, search for books by title or author, and select books to read online.
- **Book Information Update:** Library staff can update information about newly added books in online reports.

Data + Requirements + Data Relationships

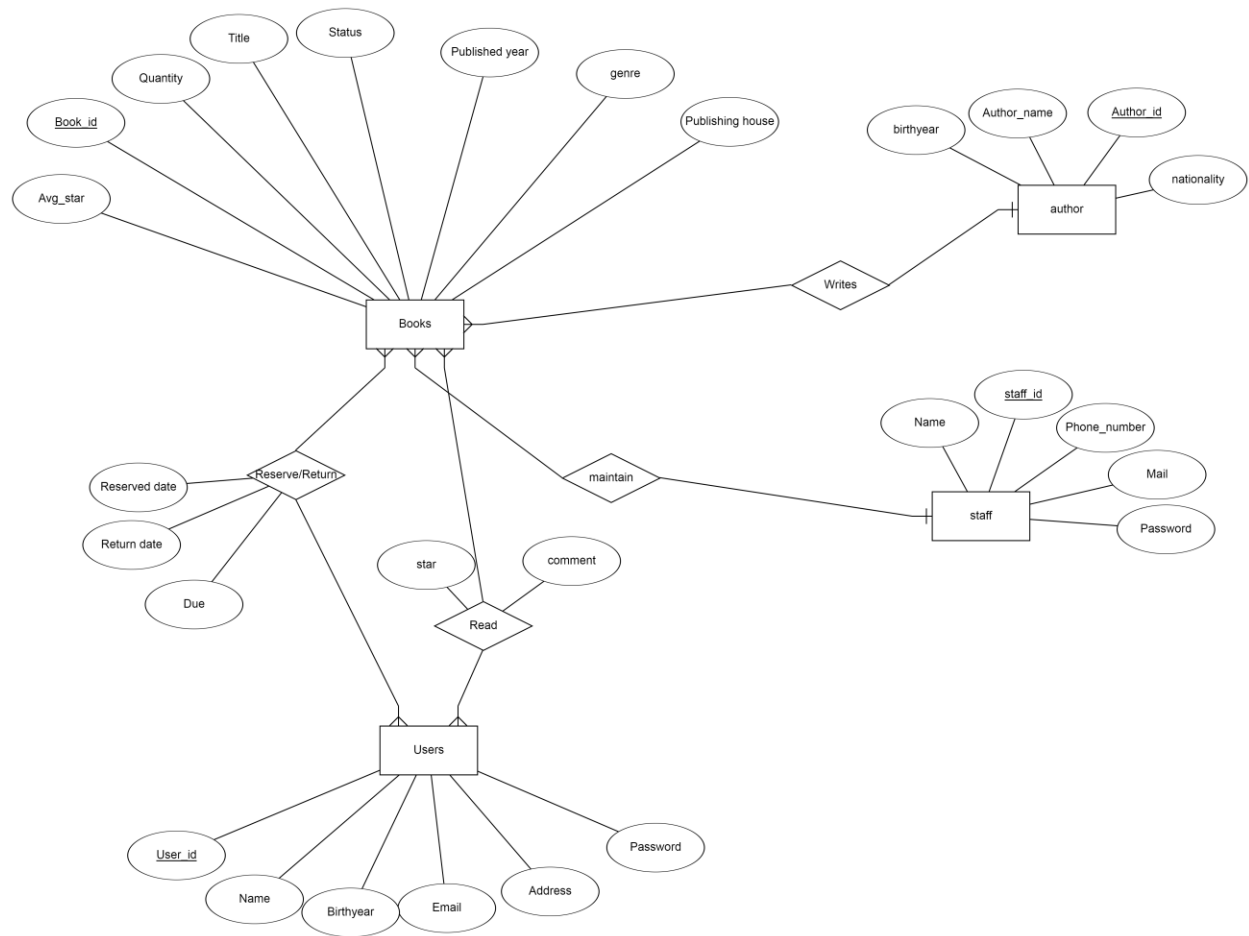- **Data:** Entities and associated attributes
  - **Books:**
    - Book ID
    - Title
    - Genre
    - Quantity
    - Status
    - Publishing house
    - Published year
    - Avg star rating
    - Author_id
    - Staff_id
  - **Author:**
    - Author ID
    - name
    - Nationality
    - Birth year
  - **Users:**
    - User ID
    - Name

- Birth year
- Email
- Address
- Password
- **Staff:**
    - Staff ID
    - Name
    - Phone number
    - Email
    - Password
- **Reserve/Return:**
    - Reserve date
    - Return date
    - Due
    - Book_id
    - User_id
- Read:
    - Star
    - Comment
    - Book_id
    - User_id

- **Data Relationships:**
    - An author can write many books.
    - Many users read many different books.
    - A staff member manages many books.
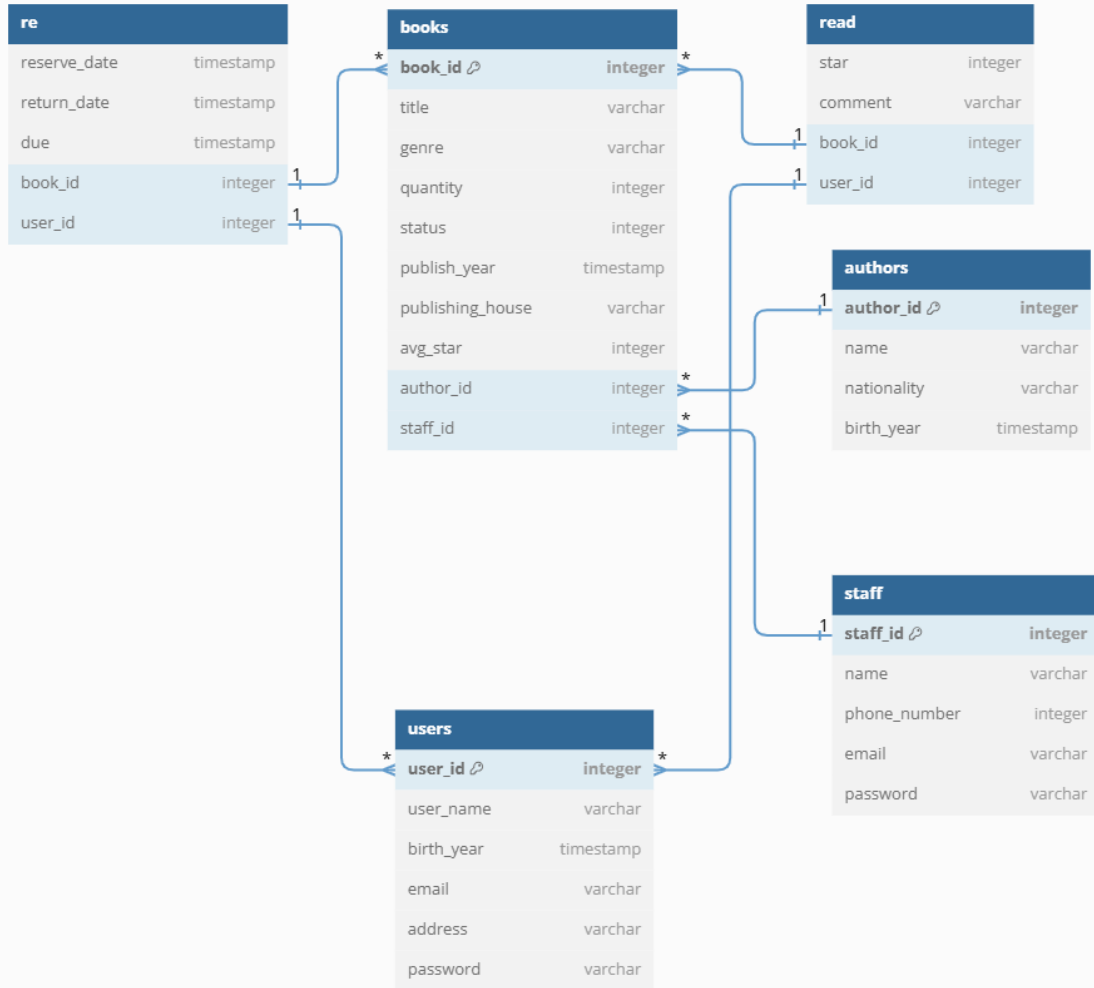   - Many users borrow many different books.

Technical Requirements:

- **Front-end:** Use tools like HTML, CSS, JavaScript to design a user-friendly online library website.
- **Back-end:** Use Node.js to integrate the database with the website, aiming for a convenient user experience.

4. ER diagram (entity relationship diagram)

5. Relationship table

re

reserve_date	timestamp
return_date	timestamp
due	timestamp
book_id	integer
user_id	integer

books

book_id	integer
title	varchar
genre	varchar
quantity	integer
status	integer
publish_year	timestamp
publishing_house	varchar
avg_star	integer
author_id	integer
staff_id	integer

read

star	integer
comment	varchar
book_id	integer
user_id	integer

authors

author_id	integer
name	varchar
nationality	varchar
birth_year	timestamp

staff

staff_id	integer
name	varchar
phone_number	integer
email	varchar
password	varchar

users

user_id	integer
user_name	varchar
birth_year	timestamp
email	varchar
address	varchar
password	varchar

dbdiagram.io

6. Function/Trigger/Query

a) Return book information based on the author's name.

```sql
1   CREATE or REPLACE FUNCTION find_books_by_author(author_name VARCHAR)
2   RETURNS TABLE (id INT, title VARCHAR, genre varchar) AS $$
3▼  BEGIN
4       RETURN QUERY
5       SELECT book.book_id, book.title, book.genre
6       from book
7       join author on book.author_id = author.author_id
8       where author.name = author_name;
9   END;
10  $$ LANGUAGE plpgsql;
11
12
13  select find_books_by_author('Roz Tuiller');
```

b) List the most active users.

```sql
1   CREATE OR REPLACE FUNCTION get_most_active_users(p_limit INT) RETURNS TABLE (
2       user_id INT,
3       user_name VARCHAR,
4       activity_count INT
5   )
6   AS $$
7▼  BEGIN
8       RETURN QUERY
9       SELECT u.user_id, u.user_name, COALESCE(r.read_count, 0) + COALESCE(re.reserve_count, 0) AS activity_count
10      FROM users u
11      LEFT JOIN (
12          SELECT user_id, COUNT(*) AS read_count
13          FROM read
14          GROUP BY user_id
15      ) r ON u.user_id = r.user_id
16      LEFT JOIN (
17          SELECT user_id, COUNT(*) AS reserve_count
18          FROM re
19          GROUP BY user_id
20      ) re ON u.user_id = re.user_id
21      ORDER BY activity_count DESC
22      LIMIT p_limit;
23  END;
24  $$ LANGUAGE plpgsql;
25
```

c) User account registration/login.

```
1  insert into users (user_id, user_name, birth_year, email, password, address)
2  values('1001', 'Donald Trump', '1945-05-05', 'trump@president.com', '12345678', 'America');
3
4  select * from users where user_id = 1001;
5
```

Data Output   Messages   Notifications

user_id [PK] integer	user_name character varying (50)	birth_year date	email character varying (50)	password character varying (50)	address character varying (50)
1001	Donald Trump	1945-05-05	trump@president.com	12345678	America

d) Display a user's borrowed books list.

{=} reserving_list(id integer)   ✕

General   Definition   Code   Options   Parameters   Security   SQL

```
1
2▼ BEGIN
3      RETURN query
4      select book.book_id, book.title, count(re.book_id)::integer as soluong
5      from book
6      join re on book.book_id = re.book_id
7      where re.user_id = id
8      group by book.book_id;
9  END;
10
```

Query   Query History

```
1  select reserving_list(240);
```

Data Output   Messages   Notifications

reserving_list record 🔒
(683,"The Green Fairy Book",1)

e) Display a list of users currently borrowing books

```
{≡} reserving(id integer, OUT num integer)
```

General	Definition	Code	Options	Parameters	Security	SQL

```
1
2▼  BEGIN
3       select count(*) into num
4       from re
5       where user_id = id
6       and return_date is null;
7   END;
8
```

Query   Query History

```
1  select user_id, user_name, reserving(user_id) from users
2  where reserving(user_id) > 0;
```

Data Output   Messages   Notifications

	user_id [PK] integer	user_name character varying (50)	reserving integer
1	214	Gui Chaundy	1
2	240	Alana Jebb	1
3	278	Steve Argont	1
4	398	Melodie Scally	1
5	445	Walton Peare	1
6	606	Frederigo Eggleton	1
7	618	Kaleb Fleury	1
8	655	Vinita Tebboth	1
9	663	Faun Ennor	1
10	855	Ingaberg McGaugie	1
11	859	Emmett Ensley	1

F, Register to borrow books.

Query   Query History

```
1  insert into re (book_id, user_id, reserve_date, return_date, due) values (666, 999, '2024-02-25', null, '2024-04-25');
2
```

Data Output   Messages   Notifications

```
INSERT 0 1

Query returned successfully in 46 msec.
```

g, Return books.

```
1  update re
2  set return_date = now()
3  where book_id = 666
4  and user_id = 999
5  and reserve_date = '2024-02-25'
```

Data Output   Messages   Notifications

UPDATE 1

Query returned successfully in 77 msec.

h, Add new books


```
1  insert into book (book_id, title, genre, quantity, status, published_year, published_house, avg_star, author_id, staff_id)
2  values (1001, 'Robert Louis Stevenson: His Big Tropes', 'sci-fi', 34, 1, '2023-09-19', 'Hansen, Koelpin and Rolfson', 3.5, 543, 1);
3
4  select * from book
5  where book_id = 1001;
```

ook_id PK] integer	title character varying (59)	genre character varying (11)	quantity integer	status integer	published_year date	published_house character varying (50)	avg_star numeric (2,1)	author_id integer	staff_id integer
1001	Robert Louis Stevenson: His Big Tropes	sci-fi	34	1	2023-09-19	Hansen, Koelpin and Rolfson	3.5	543	1

i, Update book information.


```
1  update book
2  set quantity = quantity + 10
3  where book_id = 1001;
4
5  select * from book
6  where book_id = 1001;
```

book_id [PK] integer	title character varying (59)	genre character varying (11)	quantity integer	status integer	published_year date	published_house character varying (50)	avg_star numeric (2,1)	author_id integer	staff_id integer
1001	Robert Louis Stevenson: His Big Tropes	sci-fi	44	1	2023-09-19	Hansen, Koelpin and Rolfson	3.5	543	1

j, List overdue books

quahan()

General Definition Code Options Parameters Security SQL

```
1
2  begin
3  return QUERY
4  SELECT * FROM public.re
5  where return_date is null
6  and due < now();
7  end;
```

k, Search for books by genre.

find_books_by_genre(book_genre character varying)

General Definition Code Options Parameters Security SQL

```
1
2  BEGIN
3      RETURN QUERY
4      SELECT book.book_id, book.title, author.name
5      from book
6      join author on book.author_id = author.author_id
7      where book.genre = book_genre
8      order by book.book_id;
9  END;
10
```

l, Average star rating by genre.

```
{≡} get_avg_rating_by_genre()

General    Definition    Code    Options    Parameters    Security    SQL

1
2▼ BEGIN
3       RETURN QUERY
4       SELECT b.genre, AVG(r.star) AS avg_rating
5       FROM books b
6       JOIN read r ON b.book_id = r.book_id
7       GROUP BY b.genre;
8   END;
9
```

M, List highly-rated books.

```
Query    Query History

1   select b.book_id, b.title, read.star
2   from book b
3   join read
4   on b.book_id = read.book_id
5   where star > 3
6   order by star DESC;
```

Data Output   Messages   Notifications

	book_id 🔒 integer	title 🔒 character varying (59)	star 🔒 numeric (3,2)
1	242	The Return of the Native	5.00
2	637	The Rajah's Diamond	4.99
3	851	Robert Louis Stevenson: His Literary Methods	4.99
4	911	Robert Louis Stevenson: His Literary Boost	4.97
5	163	Jude the Obscure	4.97
6	579	Robert Louis Stevenson: His Literary Jump	4.97
7	92	Robert Louis Stevenson: His Literary Technique	4.97
8	290	Persuasion	4.97
9	695	The Odyssey	4.97
10	616	The Wrecker	4.96

o, List most borrowed books over the last 2 months.

```sql
1  SELECT b.*, COUNT(r.book_id) AS borrow_count
2  FROM books b
3  JOIN re r ON b.book_id = r.book_id
4  WHERE r.reserve_date BETWEEN NOW() - INTERVAL '2 MONTH' AND NOW()
5  GROUP BY b.book_id
6  ORDER BY borrow_count DESC
7  LIMIT 20;
8
```

Data Output Messages Notifications

	book_id [PK] integer	title character varying (59)	genre character varying (11)	quantity integer	status integer	published_year date	published_house character varying (50)	avg_star numeric (2,1)	author_id integer	staff_id integer	borrow_count bigint
1	13	The Green Fairy Book	family	89	1	2023-09-20	Reynolds-Lakin	4.9	366	6	1
2	51	Crime and Punishment	biography	67	2	2023-11-18	O'Hara LLC	4.9	305	1	1
3	52	The Trumpet-Major	fantasy	71	1	2023-09-01	Wisozk Group	3.6	121	15	1
4	141	The Brown Fairy Book	sports	41	2	2023-07-19	O'Conner-Barton	1.8	205	6	1
5	173	Robert Louis Stevenson: His Literary Inspiration	comedy	83	-1	2024-02-01	Weissnat-Langosh	1.3	550	8	1
6	220	Robert Louis Stevenson: His Literary Climb	adventure	22	-1	2024-01-23	Hayes, Blanda and Fay	2.1	111	8	1
7	295	Robert Louis Stevenson: His Literary Upward Surge	adventure	36	-1	2024-04-05	Pollich-Ondricka	4.3	250	14	1
8	305	A Farewell to Arms	comedy	92	0	2024-02-04	Casper, Russel and Hilll	4.0	937	20	1
9	315	Robert Louis Stevenson: His Literary Upward Trip	musical	15	0	2023-06-26	Becker, O'Kon and Runolfsson	1.4	112	13	1
10	339	Robert Louis Stevenson: His Literary Criticism	fantasy	27	-1	2024-02-29	Lowe-Marvin	1.7	433	12	1
11	398	Robert Louis Stevenson: His Literary Scale	war	54	0	2024-01-27	Moen-Rodriguez	1.5	547	10	1
12	618	Robert Louis Stevenson: His Literary Upward Advan...	drama	44	1	2024-04-01	Heaney LLC	3.4	132	11	1
13	677	Fahrenheit 451	sci-fi	51	0	2024-02-26	Hintz-Borer	4.4	87	19	1

P, Display notification for books nearing return due date.

,

```sql
1  CREATE OR REPLACE VIEW notifications AS
2  SELECT
3      r.user_id,
4      'Your reserved book "' || b.title || '" is nearing its due date.' AS message
5  FROM re r
6  JOIN books b ON r.book_id = b.book_id
7  WHERE r.due BETWEEN CURRENT_DATE AND CURRENT_DATE + INTERVAL '3 DAY';
8
9  -- select * from notifications
```

Data Output Messages Notifications

	user_id integer	message text
1	463	Your reserved book "Crime and Punishment" is nearing its due da...

q, Display books managed by a specific staff member.

```
1  --sách mà staff 1 quản lý
2  select * from books
3  join staff on books.staff_id=staff.staff_id
4  where staff.staff_id=1
```

Data Output · Messages · Notifications

	book_id integer	title character varying (59)	genre character varying (11)	quantity integer	status integer	published_year date	published_house character varying (50)	avg_star numeric (2,1)	author_id integer	staff_id integer	staff_id integer
1	4	A Laodicean	musical	77	1	2024-03-16	Weber, Effertz and Wilkinson	3.7	183	12	1
2	55	The Crimson Fairy Book	biography	16	2	2024-02-01	Spencer, Jast and Kautzer	2.0	544	12	1
3	62	Robert Louis Stevenson: His Literary Techniques	documentary	12	-1	2023-10-26	Rice LLC	3.0	317	12	1
4	75	The Beach of Falesá	comedy	98	-1	2024-02-10	Funk, Bode and Hartmann	2.2	266	12	1
5	82	Robert Louis Stevenson: His Literary Styles	fantasy	19	2	2024-03-14	D'Amore-Gislason	2.4	311	12	1
6	87	Daniel Deronda	crime	77	-1	2024-05-31	Kassulke, Goldner and Kertzmann	2.3	726	12	1
7	88	Robert Louis Stevenson: His Literary Form	fantasy	49	-1	2023-07-03	Corkery, Russel and Turcotte	1.7	231	12	1

Q, Display the number of people who have borrowed books so far.

```
1   create or replace function number_users_reserve_books()
2   returns int as $$
3   declare sum int;
4   begin
5       select count(*) into sum
6       from users
7       where user_id in
8       (SELECT DISTINCT user_id FROM re WHERE extract(epoch FROM reserve_date) < extract(epoch FROM now()));
9       return sum;
10  end;
11  $$ language plpgsql;
12
13  -- select number_users_reserve_books();
```

Data Output · Messages · Notifications

	number_users_reserve_books integer
1	619

DISPLAY TOP 10 GENRES WITH THE MOST AUTHORS WRITING BOOKS

Query · Query History

```
1  SELECT genre, COUNT(DISTINCT author_id) AS author_count
2  FROM books
3  GROUP BY genre
4  ORDER BY author_count DESC
5  LIMIT 10;
6
```

Data Output · Messages · Notifications

	genre character varying (11)	author_count bigint
1	comedy	61
2	documentary	58
3	war	55
4	musical	54
5	crime	54
6	sports	54
7	drama	53
8	sci-fi	53
9	western	52
10	adventure	51

DISPLAY TOP 10 COUNTRIES WITH THE MOST BOOKS WRITTEN

```
1  select a.nationality, count(b.book_id) AS so_luong_sach from authors a
2  join books b
3  on a.author_id = b.author_id
4  group by a.nationality
5  ORDER BY count(b.book_id) desc
6  LIMIT 10
7
8
```

Data Output | Messages | Notifications

	nationality character varying (50)	so_luong_sach bigint
1	China	181
2	Indonesia	95
3	Philippines	53
4	Russia	46
5	Poland	39
6	France	35
7	Brazil	33
8	United States	28
9	Portugal	27
10	Japan	27

DISPLAY THE HIGHEST-RATED BOOKS

```
1  --sách nhiều sao nhất--
2  SELECT *
3  FROM books
4  WHERE avg_star = (SELECT MAX(avg_star) FROM books);
```

Data Output | Messages | Notifications

	book_id [PK] integer	title character varying (59)	genre character varying (11)	quantity integer	status integer	published_year date	published_house character varying (50)	avg_star numeric (2,1)	author_id integer	staff_id integer
1	933	1984	animation	[null]	0	2023-08-10	Fay Inc	5.0	576	2
2	53	The Ebb-Tide	war	24	0	2023-12-07	Dickinson, Von and Goldner	5.0	305	15
3	194	Robert Louis Stevenson: His Literary Criticism	documentary	54	2	2023-07-03	Bode-Casper	5.0	692	13
4	428	The Great North Road	thriller	52	2	2023-12-31	Murphy-Crona	5.0	510	9
5	482	The Antiquary	fantasy	70	-1	2023-12-27	Weissnat-Ruecker	5.0	389	19
6	505	Emma	horror	82	0	2024-04-27	D'Amore, Prohaska and Barrows	5.0	794	16
7	551	Robert Louis Stevenson: His Literary Upward Advance	adventure	51	2	2023-11-11	Adams, Bogan and Johnston	5.0	374	16

DISPLAY THE LIST OF BOOKS PUBLISHED BY A SPECIFIC PUBLISHER

```
1  SELECT *
2  FROM books
3  WHERE published_house = 'Fay Inc';
4
5
6
```

Data Output | Messages | Notifications

	book_id [PK] integer	title character varying (59)	genre character varying (11)	quantity integer	status integer	published_year date	published_house character varying (50)	avg_star numeric (2,1)	author_id integer	staff_id integer
1	933	1984	animation	[null]	0	2023-08-10	Fay Inc	5.0	576	2

CALCULATE THE TOTAL NUMBER OF BOOKS PUBLISHED BY EACH PUBLISHER

```sql
1  SELECT published_house, COUNT(*) AS total_books_published
2  FROM books
3  GROUP BY published_house
4  ORDER BY total_books_published DESC;
5
```

Data Output   Messages   Notifications

	published_house character varying (50)	total_books_published bigint
1	Beer Inc	3
2	Weber and Sons	3
3	Fadel and Sons	3
4	Spencer and Sons	2
5	Greenholt LLC	2
6	Emmerich LLC	2
7	Parker LLC	2
8	Hand LLC	2
9	Wilkinson Group	2

LIST BOOKS WITH CURRENT QUANTITY BELOW A CERTAIN THRESHOLD (e.g., 5 BOOKS)

```
1  SELECT *
2  FROM books
3  WHERE quantity < 5;
4
```

	book_id [PK] integer	title character varying (59)	genre character varying (11)	quantity integer	status integer	published_year date	published_house character varying (50)	av nu
1	11	Prayers Written at Vailima	mystery	4	-1	2023-11-02	Schowalter and Sons	
2	111	Robert Louis Stevenson: A Comprehensive Bibliography	drama	2	-1	2024-03-27	Dickens Inc	
3	187	The Blue Fairy Book	crime	2	1	2023-07-01	Willms, Rau and Mitchell	
4	204	The Strange Case of Dr. Jekyll and Mr. Hyde and Other Tal...	drama	4	0	2023-10-17	Kiehn, Fay and Legros	
5	219	The Violet Fairy Book	biography	2	0	2023-12-15	Grant-Haag	
6	229	Robert Louis Stevenson: His Literary Course	romance	3	0	2023-07-17	Bernhard, Bailey and Bergstrom	
7	270	The Secret Garden	thriller	4	2	2023-07-05	White, Moen and Koch	

LIST THE NUMBER OF BOOKS PUBLISHED EACH YEAR

```
1  SELECT EXTRACT(YEAR FROM published_year) AS year, COUNT(*) AS book_count
2  FROM books
3  GROUP BY year
4  ORDER BY year DESC;
5
```

	year numeric	book_count bigint
1	2024	447
2	2023	553

DISPLAY BOOKS WITH THE MOST COMMENTS

Query   Query History

```sql
1  SELECT b.title, COUNT(r.comment) AS comment_count
2  FROM books b
3  JOIN read r ON b.book_id = r.book_id
4  WHERE r.comment IS NOT NULL
5  GROUP BY b.title
6  ORDER BY comment_count DESC
7  LIMIT 10;
8
```

Data Output   Messages   Notifications

	title character varying (59)	comment_count bigint
1	Robert Louis Stevenson: His Literary Methods	11
2	The Olive Fairy Book	11
3	Robert Louis Stevenson: His Literary Journey	10
4	Pride and Prejudice	9
5	Robert Louis Stevenson: His Literary Push	9
6	Robert Louis Stevenson: His Literary Progress	9
7	The Strange Case of Dr. Jekyll and Mr. Hyde and Other Tal...	9
8	Robert Louis Stevenson: His Literary Ages	8
9	Robert Louis Stevenson: His Literary Leap	8
10	Robert Louis Stevenson: His Literary Innovations	8

LIST THE HIGHEST-RATED BOOKS BY A SPECIFIC READER

Query Query History

```sql
1  SELECT b.title, r.star
2  FROM books b
3  JOIN read r ON b.book_id = r.book_id
4  WHERE r.user_id = 10
5
6  ORDER BY r.star DESC
7  LIMIT 10;
8
9
```

Data Output Messages Notifications

title character varying (59)	star numeric (3,2)
1	The Catcher in the Rye	3.36

DISPLAY BOOKS THAT HAVE NEVER BEEN READ OR RATED

Query Query History   Scratch Pad ✕

```sql
1  SELECT b.*
2  FROM books b
3  LEFT JOIN read r ON b.book_id = r.book_id
4  WHERE b.book_id NOT IN
5  (select book_id from read)
6
7
```

Data Output Messages Notifications

	book_id [PK] integer	title character varying (59)	genre character varying (11)	quantity integer	status integer	published_year date	published_house character varying (50)	av nu
1	251	The Odyssey	historical	69	0	2024-03-17	Leannon Group	
2	106	Robert Louis Stevenson: His Literary Wandering	mystery	66	1	2023-07-19	Shanahan, Goodwin and Klein	
3	497	Robert Louis Stevenson: His Literary Upward Surge	sci-fi	70	2	2023-09-10	Goyette-Windler	
4	452	The Poetry of Robert Louis Stevenson	biography	56	2	2023-07-30	Nicolas Group	
5	606	The Hand of Ethelberta	drama	54	1	2023-10-06	D'Amore, Wilderman and Zulauf	
6	807	The Catcher in the Rye	fantasy	89	1	2023-07-09	Reichel, Johns and Raynor	
7	253	Prayers Written at Vailima	crime	51	-1	2023-06-19	Daniel-Erdman	
8	270	The Secret Garden	thriller	4	2	2023-07-05	White, Moen and Koch	
9	620	Robert Louis Stevenson: His Literary Odyssey	thriller	77	0	2023-09-10	Schulist, O'Reilly and Klein	
10	549	Frankenstein	comedy	53	0	2023-07-21	Mosciski, Watsica and Schroeder	
11	268	The Works of Robert Louis Stevenson: South Seas Editi...	adventure	96	1	2023-09-13	Cronin and Sons	

CALCULATE THE TOTAL NUMBER OF BOOKS BORROWED OF A SPECIFIC GENRE THIS YEAR

```sql
1  SELECT COUNT(*) AS total_borrows
2  FROM re r
3  JOIN books b ON r.book_id = b.book_id
4  WHERE b.genre = 'action'
5  AND EXTRACT(YEAR FROM r.reserve_date) = EXTRACT(YEAR FROM CURRENT_DATE);
6
```

Data Output   Messages   Notifications

	total_borrows bigint
1	7

SEARCH FOR BOOKS MOST LOVED BY USERS BY PUBLISHER

```sql
1  SELECT b.title, b.published_house, AVG(r.star) AS avg_rating
2  FROM books b
3  JOIN read r ON b.book_id = r.book_id
4  WHERE b.published_house = 'Beer Inc'
5  GROUP BY b.book_id, b.title, b.published_house
6  ORDER BY avg_rating DESC
7  LIMIT 10;
8
```

Data Output   Messages   Notifications

	title character varying (59)	published_house character varying (50)	avg_rating numeric
1	Robert Louis Stevenson: His Literary Inspirati...	Beer Inc	2.3800000000000000
2	The Olive Fairy Book	Beer Inc	2.3450000000000000