



Team 6

Library Management System

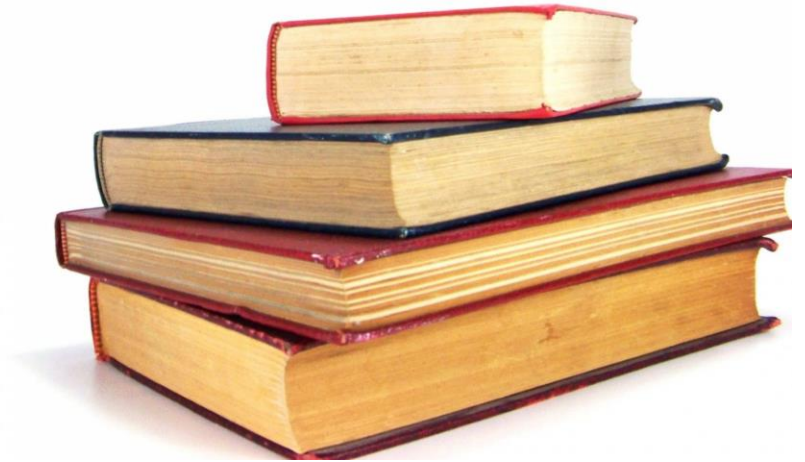
Tamara Plante, Iana Setrakova, Médéric Blouin

Requirements

The library system helps keep track of a large catalogue of books and supports borrowing and returning them.

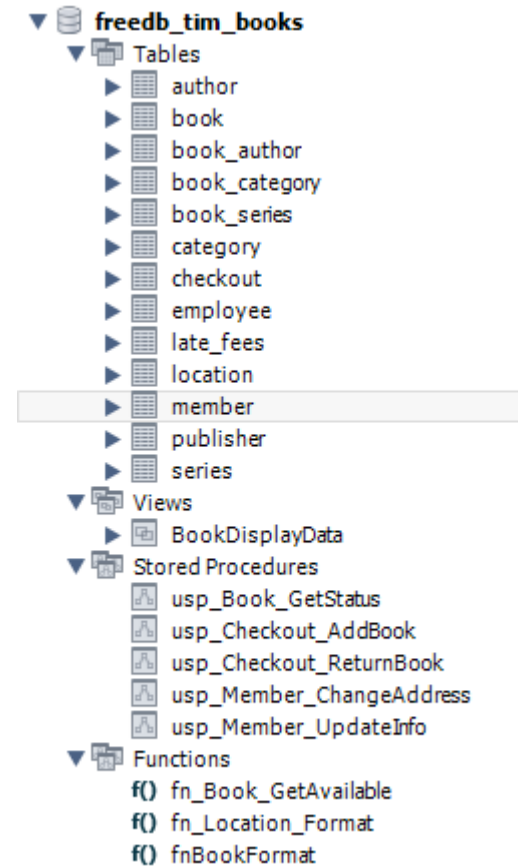
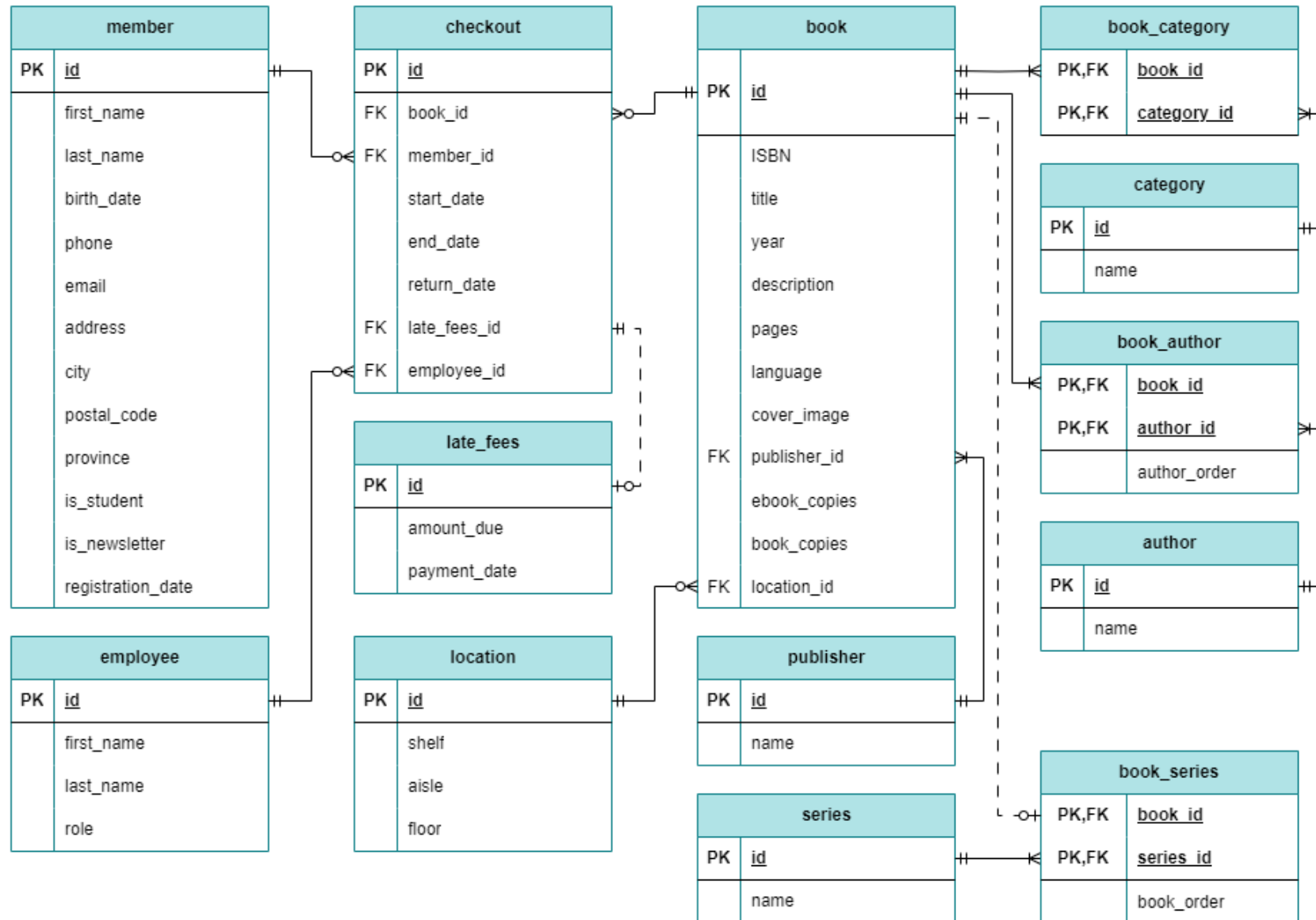
The system tracks of who currently has a particular book, as well as if any late fees need to be paid upon its return. The system also has detailed information on each book in the catalogue, a list of employees, and a list of members with their information.

Members can borrow eBooks directly from the system.



Key Functionalities

- **Catalogue Management:** Manages detailed book information including authors, categories, titles, publishers, publication years, locations, and available copies.
- **Membership Management:** Stores members' personal details including names, birthdates, contact information (phone and email), addresses, and subscription status (e.g., student or newsletter).
- **Checkout Management:**
 - Tracks book borrowing and returns, including due dates.
 - Limits borrowing of physical books by 10 per member at a time, subject to their account status.
 - Returning of eBook automatically upon their checkout's end date.
- **Late Fee Management:** Tracks overdue book fees and payment deadlines.
- **Employee Database:** Stores unique employee IDs, names, and roles.



Availability

Book Status

```
DELIMITER //
CREATE PROCEDURE usp_Book_GetStatus(arg_book_id INT)
BEGIN
    SELECT
        fn_Book_GetAvailable(id, TRUE) AS available,
        fn_Location_Format(location_id) AS location,
        (SELECT end_date FROM checkout
         WHERE
             book_id = book.id
             AND employee_id <> 1
             AND return_date IS NULL
             ORDER BY end_date
             LIMIT 1) AS earliest_return
    FROM book
    WHERE id = arg_book_id;
END //
DELIMITER ;
```

```
CALL usp_Book_GetStatus(20);
```

available	location	earliest_return
1	Floor: 0, Aisle: 1, Shelf: 1	2024-05-05

Available formats

```
SELECT
    title,
    `year`,
    fn_Book_GetAvailable(id, TRUE) AS book_avail,
    fn_Book_GetAvailable(id, FALSE) AS ebook_avail
FROM book WHERE id = 29;
```

title	year	book_avail	ebook_avail
Faster Than The Speed of Love	2016	1	0

Checkout a Book

With the following validations:

- A member can borrow 10 books at a time.
- A member can borrow a single copy of a book.
- Their account must be in good standing.

```
DELIMITER //
CREATE PROCEDURE usp_Checkout_AddBook(arg_book_id INT, arg_member_id INT,
arg_employee_id INT)
BEGIN
    DECLARE val_book_limit TINYINT DEFAULT 10;
    DECLARE val_book_count TINYINT;
    DECLARE val_has_book TINYINT;
    DECLARE val_fees DECIMAL(5, 2);
    DECLARE error_msg VARCHAR(50);

    -- Get the member's currently borrowed books (ignoring ebooks)
    SELECT COUNT(*), SUM(IF(book_id = arg_book_id, 1, 0))
    INTO val_book_count, val_has_book
    FROM checkout
    WHERE
        member_id = arg_member_id
        AND employee_id <> 1
        AND return_date IS NULL;
```

```
    IF val_has_book > 0 THEN
        SIGNAL SQLSTATE '45000' SET MESSAGE_TEXT = 'Checkout denied. Book already
checked out by this member.';
    ELSEIF val_book_count = val_book_limit THEN
        SIGNAL SQLSTATE '45000' SET MESSAGE_TEXT = 'Checkout denied. Book limit
reached.';
    END IF;

    -- Get the member's unpaid late fees
    SELECT SUM(amount_due) INTO val_fees
    FROM checkout
    JOIN late_fees ON late_fees_id = late_fees.id
    WHERE
        member_id = arg_member_id
        AND payment_date IS NULL;
    IF val_fees IS NOT NULL THEN
        SET error_msg = CONCAT('Checkout denied. Late fees due: ', val_fees, '$');
        SIGNAL SQLSTATE '45000' SET MESSAGE_TEXT = error_msg;
    END IF;

    -- Error: If there's any checkout that are late and not returned.

    -- Checkout
    INSERT INTO checkout (book_id, member_id, start_date, end_date, employee_id)
    VALUES (arg_book_id, arg_member_id, CURDATE(), DATE_ADD(CURDATE(), INTERVAL 14
DAY), arg_employee_id);

    SELECT * FROM checkout WHERE id = LAST_INSERT_ID();
END //
DELIMITER ;

CALL usp_Checkout_AddBook(8, 2, 6);
```

id	book_id	member_id	start_date	end_date	return_date	late_fees_id	employee_id
23	8	2	2024-05-05	2024-05-19	NULL	NULL	6

Checkout Highlight

Before

```
-- ensure the member unique book id in current checkout
SELECT COUNT(*) INTO book_count FROM checkout
WHERE
    member_id = arg_member_id
    AND employee_id <> 1 -- ignore ebooks
    AND book_id = arg_book_id
    AND return_date IS NULL
LIMIT 1;
-- unique book id checkout
IF book_count > 0 THEN
    SIGNAL SQLSTATE '45000' SET MESSAGE_TEXT =
        'Checkout denied. Book already checked out by this member.';
END IF;

-- get the count of member's currently borrowed books
SELECT COUNT(*) INTO book_count FROM checkout
WHERE
    member_id = arg_member_id
    AND employee_id <> 1 -- ignore ebooks
    AND return_date IS NULL
LIMIT book_limit;
-- limit of 10 books can be borrowed
IF book_count = book_limit THEN
    SIGNAL SQLSTATE '45000' SET MESSAGE_TEXT =
        'Checkout denied. Book limit reached.';
END IF;
```

After

```
-- Get the member's currently borrowed books (ignoring ebooks)
SELECT COUNT(*), SUM(IF(book_id = arg_book_id, 1, 0))
INTO book_count, has_book
FROM checkout
WHERE
    member_id = arg_member_id
    AND employee_id <> 1
    AND return_date IS NULL;

IF has_book > 0 THEN
    SIGNAL SQLSTATE '45000' SET MESSAGE_TEXT =
        'Checkout denied. Book already checked out by this member.';
ELSEIF book_count = book_limit THEN
    SIGNAL SQLSTATE '45000' SET MESSAGE_TEXT =
        'Checkout denied. Book limit reached.';
END IF;
```

Return a Book

Generating fees

- If the return date is late, generate late fees of 0.50\$/day.

```
DELIMITER //
CREATE PROCEDURE usp_Checkout_ReturnBook(arg_book_id INT, arg_member_id INT)
BEGIN
    DECLARE val_today DATE DEFAULT CURDATE();
    DECLARE val_late_days INT DEFAULT 0;
    DECLARE val_fees DECIMAL(5, 2) DEFAULT 0;
    DECLARE val_amount_per DECIMAL(5, 2) DEFAULT 0.50;
    DECLARE val_id INT;
    DECLARE val_end_date DATE;
    DECLARE insert_lfi INT;

    -- Get checkout infos
    SELECT id, end_date
    INTO val_id, val_end_date
    FROM checkout
    WHERE
        member_id = arg_member_id
        AND book_id = arg_book_id
        AND return_date IS NULL;
```

```
-- Check if the return was late
SET val_late_days = DATEDIFF(val_today, val_end_date);
IF val_late_days > 0 THEN
    SET val_fees = val_amount_per * val_late_days;
    INSERT INTO late_fees (amount_due) VALUES (val_fees);
    SET insert_lfi = LAST_INSERT_ID();
END IF;
```

```
-- Update the checkout entry with return date and late_fees if any
UPDATE checkout
SET return_date = val_today, late_fees_id = insert_lfi
WHERE id = val_id;
```

```
SELECT
    member_id,
    book_id,
    late_fees_id,
    val_late_days AS days_late,
    val_fees AS amount_due
FROM checkout
WHERE id = val_id;
END //
DELIMITER ;
```

```
CALL usp_Checkout_ReturnBook(29, 1);
```

member_id	book_id	late_fees_id	days_late	amount_due
1	29	16	2	1.00

Catalogue View

Retrieve the complete book catalogue data with:

- Authors and Series
- Available book formats
- Location details

```
CREATE VIEW BookDisplayData AS
SELECT
    b.id,
    b.ISBN,
    b.title AS 'Title',
    GROUP_CONCAT(DISTINCT(a.`name`) ORDER BY ba.author_order ASC SEPARATOR
    ', ' ) as 'Author(s)',
    GROUP_CONCAT(DISTINCT(c.`name`) ORDER BY c.`name` ASC SEPARATOR ', ' )
    as 'Category',
    s.`name` AS 'Series',
    b.`description` AS 'Description',
    p.`name` AS 'Publisher''s name',
    b.cover_image AS 'Cover image',
    fnBookFormat(b.id) AS 'Book Format',
    b.pages AS 'Number of pages',
    b.`language` AS 'Language',
    b.`year` AS 'Year',
    fn_Location_Format(b.location_id) AS 'Location'

FROM book AS b
LEFT JOIN book_author AS ba ON b.id = ba.book_id
LEFT JOIN author AS a ON ba.author_id = a.id
LEFT JOIN book_category AS bc ON b.id = bc.book_id
LEFT JOIN category AS c ON bc.category_id = c.id
LEFT JOIN publisher AS p ON b.publisher_id = p.id
LEFT JOIN book_series AS bs ON b.id = bs.book_id
LEFT JOIN series AS s ON bs.series_id = s.id

GROUP BY b.id;
```

A **View** to retrieve the complete book catalogue data with authors, categories, available book formats and location details.

Catalogue View Data

```
SELECT * FROM BookDisplayData;
```

book_id	ISBN	Title	Author(s)	Category	Series	Description	Publisher's name	Cover image	Book Format	Number	Language	Year	Location
1	9780062315007	To Kill a Mockingbird	Harper Lee	Fiction, Historical	To Kill a Mockingbird	The unforgettable novel of a childhood in a sleepy	HarperCollins Publishers	to-kill-a-mockingbird-1960.jpg	Printed books: 3	323	English	1960	Floor: 0, Aisle: 1, Shelf: 1
2	9780062409850	Go Set a Watchman	Harper Lee	Classics, Fiction	To Kill a Mockingbird	From Harper Lee comes a landmark new novel	HarperCollins Publishers	go-set-a-watchman-2015.jpg	Printed books: 2	278	English	2015	Floor: 0, Aisle: 1, Shelf: 1
3	9780316029193	Blood of Elves	Andrzej Sapkowski	Adventure, Fantasy	The Witcher	For over a century, humans, dwarves, gnomes	Hachette Book Group	blood-of-elves-1960.jpg	eBooks: 1, Printed books: 2	398	English	1960	Floor: 0, Aisle: 1, Shelf: 2
4	9780316219136	The Time of Contempt	Andrzej Sapkowski	Adventure, Fantasy	The Witcher	Geralt is a witcher: guardian of the innocent; f	Hachette Book Group	the-time-of-contempt-1995.jpg	eBooks: 1, Printed books: 2	331	English	1995	Floor: 0, Aisle: 1, Shelf: 2
5	9780316219181	Baptism of Fire	Andrzej Sapkowski	Adventure, Fantasy	The Witcher	The Wizards Guild has been shattered by a co	Hachette Book Group	baptism-of-fire-1996.jpg	eBooks: 1, Printed books: 1	349	English	1996	Floor: 0, Aisle: 1, Shelf: 2
6	9782211304276	Moby-Dick or, The Whale	Herman Melville	Classics, Fiction		"It is the horrible texture of a fabric that shoul	Harper and Brothers	moby-dick-or-the-whale-1851.jpg	Printed books: 2	720	English	1851	Floor: 0, Aisle: 1, Shelf: 3
7	9782267046090	Le Hobbit	J. R. R. Tolkien	Fantasy, Fiction	The Lord of the Rings	Comme tous les hobbits, Bilbo Bessac est un	Houghton Mifflin Harcour	le-hobbit-1937.jpg	eBooks: 2, Printed books: 1	491	French	1937	Floor: 0, Aisle: 1, Shelf: 4
8	97800008376123	The Fellowship of the Ring	J. R. R. Tolkien	Fantasy, Fiction	The Lord of the Rings	One Ring to rule them all, One Ring to find the	Houghton Mifflin Harcour	the-fellowship-of-the-ring-1954.jpg	eBooks: 5, Printed books: 2	432	English	1954	Floor: 0, Aisle: 1, Shelf: 4
9	97800008376130	The Two Towers	J. R. R. Tolkien	Fantasy, Fiction	The Lord of the Rings	One Ring to rule them all, One Ring to find the	Houghton Mifflin Harcour	the-fellowship-of-the-ring-1954.jpg	eBooks: 3, Printed books: 2	432	English	1954	Floor: 0, Aisle: 1, Shelf: 4
10	9798464205475	The Great Gatsby	F. Scott Fitzgerald	Classics, Fiction		The Great Gasby is the tragic tale of the pursui	Charles Scribner's Sons	the-great-gatsby	Printed books: 1	180	English	1925	Floor: 0, Aisle: 2, Shelf: 1
11	9781408855652	Harry Potter and the Philosopher's Stone	J.K. Rowling	Fantasy, Magic	Harry Potter	"Turning the envelope over, his hand tremblin	Bloomsbury	harry-potter-and-the-philos	eBooks: 5, Printed books: 2	333	English	1997	Floor: 0, Aisle: 2, Shelf: 2
12	9781408845653	Harry Potter and the Chamber of Secrets	J.K. Rowling	Fantasy, Magic	Harry Potter	Ever since Harry Potter had come home for the	Bloomsbury	harry-potter-and-the-chamb	eBooks: 4, Printed books: 2	352	English	1998	Floor: 0, Aisle: 2, Shelf: 2
13	9780316769174	The Catcher in the Rye	J.D. Salinger	Classics, Fiction		Fleeing the crooks at Pencey Prep, he pinballs	Little, Brown and Compan	the-catcher-in-the-rye-1951.jpg	Printed books: 1	277	English	1951	Floor: 0, Aisle: 2, Shelf: 3
14	9780307277671	The Da Vinci Code	Dan Brown	Magic, Mystery	Robert Langdon	While in Paris on business, Harvard symbolo	Doubleday Group	the-da-vinci-code-2003.jpg	eBooks: 5, Printed books: 3	480	English	2003	Floor: 0, Aisle: 2, Shelf: 4
15	9781416524793	Angels & Demons	Dan Brown	Magic, Mystery	Robert Langdon	When a world, renowned scientist is found bri	Doubleday Group	angels-demons-2000.jpg	eBooks: 3, Printed books: 2	736	English	2000	Floor: 0, Aisle: 2, Shelf: 4
16	9782709626309	Digital Fortress	Dan Brown	Mystery, Thriller		When the National Security Agency's invincibl	Doubleday Group	digital-fortress-2000.jpg	eBooks: 1, Printed books: 1	510	English	1998	Floor: 0, Aisle: 2, Shelf: 4
17	9780307265432	The Road	Cormac McCarthy	Fiction, Suspense		A father and his son walk alone through burn	Alfred A. Knopf	the-road-2006.jpg	Printed books: 1	241	English	2006	Floor: 1, Aisle: 1, Shelf: 1
18	9780060883287	One Hundred Years of Solitude	Gabriel García Márquez	Fantasy, Fiction		The brilliant, bestselling, landmark novel that	Editorial Sudamericana	one-hundred-years-of-solitu	Printed books: 2	417	English	1970	Floor: 1, Aisle: 1, Shelf: 2
19	9780439568470	Welcome to Dead House	R.L. Stine	Fiction, Horror	Goosebumps	Amanda and Josh think the old house they ha	Scholastic	welcome-to-dead-house-1992.jpg	Printed books: 1	126	English	1992	Floor: 0, Aisle: 1, Shelf: 1
20	9780439626293	Monster Blood	R.L. Stine	Fiction, Horror	Goosebumps	Something scary is happening in GOOSEBUMF	Scholastic	monster-blood-1992.jpg	Printed books: 2	144	English	1992	Floor: 0, Aisle: 1, Shelf: 1
21	9780786838653	The Lightning Thief	Rick Riordan	Fantasy, Mythology	Percy Jackson and the Ol	Percy Jackson is about to be kicked out of bo	Disney Hyperion Books	the-lightning-thief-2005.jpg	eBooks: 2, Printed books: 3	377	English	2005	Floor: 0, Aisle: 1, Shelf: 2
22	9780120000319	The Sea of Monsters	Rick Riordan	Fantasy, Mythology	Percy Jackson and the Ol	After a year spent trying to prevent a catastro	Disney Hyperion Books	the-sea-of-monsters-2006.jpg	eBooks: 2, Printed books: 2	279	English	2006	Floor: 0, Aisle: 1, Shelf: 2
23	9780553588484	A Game of Thrones	George R.R. Martin	Fantasy, Fiction	A Song of Ice and Fire	Long ago, in a time forgotten, a preternatural	Bantam	a-game-of-thrones-1996.jpg	Printed books: 2	835	English	1996	Floor: 0, Aisle: 1, Shelf: 3
24	9780553582024	A Feast for Crows	George R.R. Martin	Fantasy, Fiction	A Song of Ice and Fire	Crows will fight over a dead man's flesh, and	Bantam	a-feast-of-crows-2005.jpg	Printed books: 1	1060	English	2005	Floor: 0, Aisle: 1, Shelf: 3
25	60234814	The Lion, the Witch and the Wardrobe	C.S. Lewis	Classics, Fantasy, F	The Chronicles of Narnia	Narnia... the land beyond the wardrobe door,	HarperCollins Publishers	the-lion-the-witch-and-the-v	Printed books: 7	206	English	1950	Floor: 0, Aisle: 1, Shelf: 4
26	9780007202300	Prince Caspian	C.S. Lewis	Classics, Fantasy, F	The Chronicles of Narnia	Narnia ... where animals talk ... where trees w	HarperCollins Publishers	prince-caspian-1951.jpg	Printed books: 2	240	English	1951	Floor: 0, Aisle: 1, Shelf: 4
27	9780521777681	The Elements of Java™ Style	Allan Vermeulen, Scott W. Arr	Computer Science	SIGS Reference Library	The Elements of Java Style, written by renowne	Cambridge: Cambridge U	the-elements-of-java-style-2	eBooks: 5	142	English	2000	
28	9780521648196	Advanced Object-Oriented Analysis and Des	James J. Odell	Computer Science	SIGS Reference Library	This 1998 book conveys the essence of object	Cambridge: Cambridge U	advanced-object-oriented-a	eBooks: 5	246	English	1998	
29		Faster Than The Speed of Love	Brian Griffin	Fiction		When Roger's father, an elite Air Force Pilot, is	Pewterschmidt Publishin		Printed books: 1	16	English	2016	Floor: 0, Aisle: 2, Shelf: 2

A **View** to retrieve the complete book catalogue data with authors, categories, available book formats and location details.



Added Functionalities

Get books by a category

```
SELECT
    c.`name` as 'Category',
    b.id,
    b.ISBN,
    b.title AS 'Title',
    GROUP_CONCAT(DISTINCT(a.`name`) ORDER BY ba.author_order ASC SEPARATOR ', ')
as 'Author(s)',
    s.`name` AS 'Series',
    fnBookFormat(b.id) AS 'Book Format'
FROM book AS b
JOIN book_author AS ba ON b.id = ba.book_id
JOIN author AS a ON ba.author_id = a.id
JOIN book_category AS bc ON b.id = bc.book_id
JOIN category AS c ON bc.category_id = c.id
JOIN book_series AS bs ON b.id = bs.book_id
JOIN series AS s ON bs.series_id = s.id
WHERE c.name LIKE '%fiction%'
GROUP BY b.id;
```

Category	id	ISBN	Title	Author(s)	Series	Book Format
Fiction	1	9780062315007	To Kill a Mockingbird	Harper Lee	To Kill a Mockingbird	Printed books: 3
Fiction	2	9780062409850	Go Set a Watchman	Harper Lee	To Kill a Mockingbird	Printed books: 2
Fiction	7	9782267046090	Le Hobbit	J. R. R. Tolkien	The Lord of the Rings	eBooks: 2, Printed books: 1
Fiction	8	9780008376123	The Fellowship of the Ring	J. R. R. Tolkien	The Lord of the Rings	eBooks: 5, Printed books: 2
Fiction	9	9780008376130	The Two Towers	J. R. R. Tolkien	The Lord of the Rings	eBooks: 3, Printed books: 2
Fiction	19	9780439568470	Welcome to Dead House	R.L. Stine	Goosebumps	Printed books: 1
Fiction	20	9780439626293	Monster Blood	R.L. Stine	Goosebumps	Printed books: 2
Fiction	23	9780553588484	A Game of Thrones	George R.R. Martin	A Song of Ice and Fire	Printed books: 2
Fiction	24	9780553582024	A Feast for Crows	George R.R. Martin	A Song of Ice and Fire	Printed books: 1
Fiction	25	0060234814	The Lion, the Witch and the Wardrobe	C.S. Lewis	The Chronicles of Narnia	Printed books: 7
Fiction	26	9780007202300	Prince Caspian	C.S. Lewis	The Chronicles of Narnia	Printed books: 2

Get the book formats

```
DELIMITER //
CREATE FUNCTION fnBookFormat(argBookID INT)
RETURNS VARCHAR(50) NOT DETERMINISTIC
BEGIN
    DECLARE bookFormatString VARCHAR(50);
    DECLARE ebook_copies_var INT;
    DECLARE book_copies_var INT;

    SELECT ebook_copies, book_copies
    INTO ebook_copies_var, book_copies_var
    FROM book WHERE id = argBookID;

    IF ebook_copies_var > 0 AND book_copies_var > 0 THEN
        SET bookFormatString = CONCAT('eBooks: ', ebook_copies_var, ', Printed
books: ', book_copies_var);
    ELSEIF ebook_copies_var > 0 THEN
        SET bookFormatString = CONCAT('eBooks: ', ebook_copies_var);
    ELSEIF book_copies_var > 0 THEN
        SET bookFormatString = CONCAT('Printed books: ', book_copies_var);
    ELSE
        SET bookFormatString = 'Unknown format';
    END IF;

    RETURN bookFormatString;
END //
DELIMITER ;

SELECT fnBookFormat(20) AS 'Book Format';
```

Book Format

Printed books: 2

Added Functionalities

Get the members with unpaid late fees

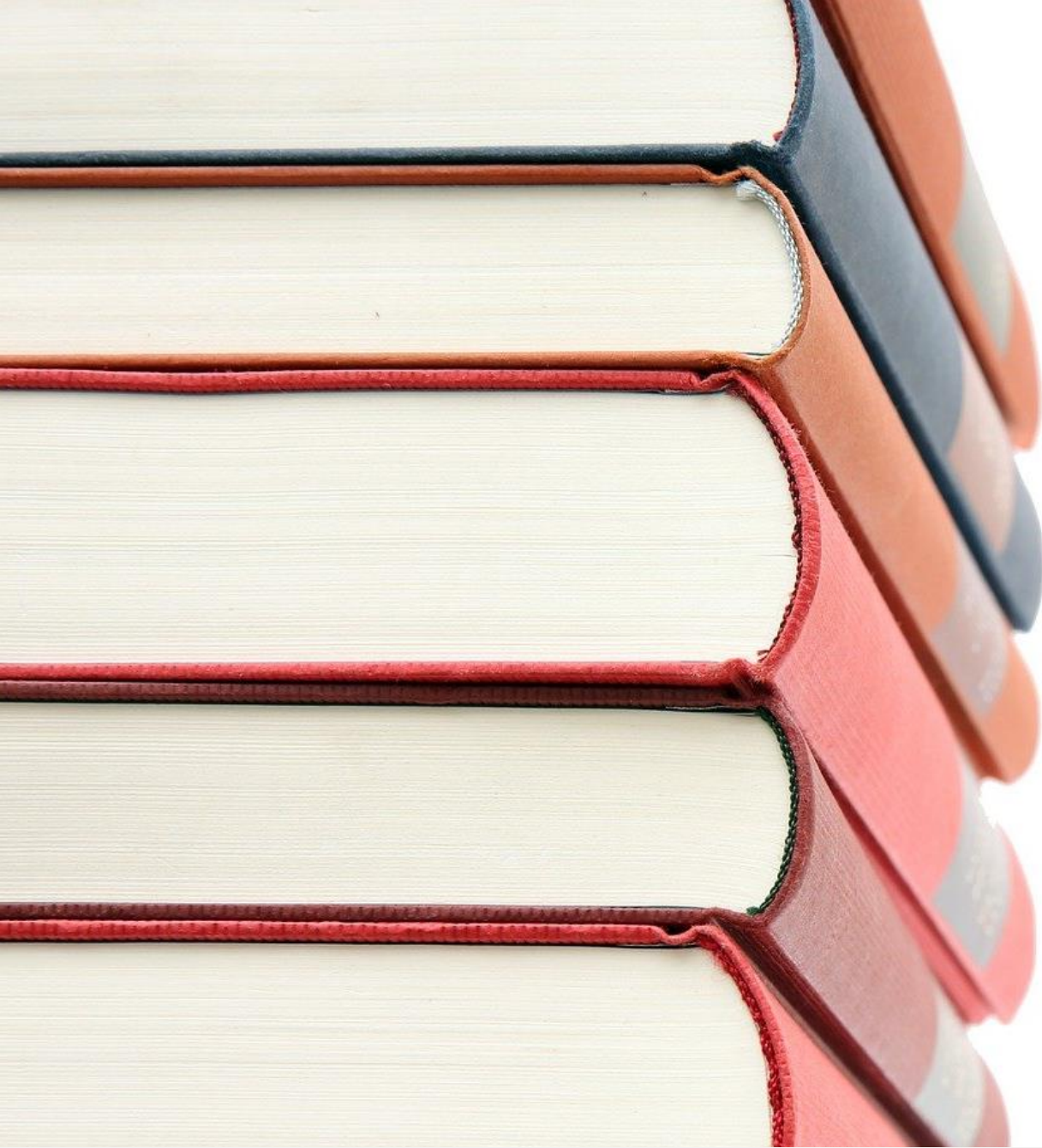
```
SELECT
    `member`.id,
    `member`.first_name,
    `member`.last_name,
    late_fees.amount_due
FROM late_fees
JOIN checkout ON late_fees.id = checkout.late_fees_id
JOIN `member` ON checkout.member_id = `member`.id
WHERE late_fees.payment_date IS NULL;
```

id	first_name	last_name	amount_due
3	John	Michaels	0.50
1	John	Doe	1.00

Get books by an author's name

```
SELECT
    author.`name`,
    book.title,
    book.`description`,
    book.pages,
    book.`language`,
    book.id
FROM book
JOIN book_author ON book.id = book_author.book_id
JOIN author ON book_author.author_id = author.id
WHERE author.`name` LIKE '%Tolkien%';
```

name	title	description	pages	language	id
J. R. R. Tolkien	Le Hobbit	Comme tous les hobbits, Bilbo Bessac est u	491	French	7
J. R. R. Tolkien	The Fellowship of the Ring	One Ring to rule them all, One Ring to find th	432	English	8
J. R. R. Tolkien	The Two Towers	One Ring to rule them all, One Ring to find th	432	English	9



TIM Books

Thank You

Tamara Plante

Iana Setrakova

Médéric Blouin