Sequence Diagram 1: Borrow Book

Scenario

A **Library Member** borrows a book.
The system checks:

- Member borrow limit (max 3 books)

- Book availability
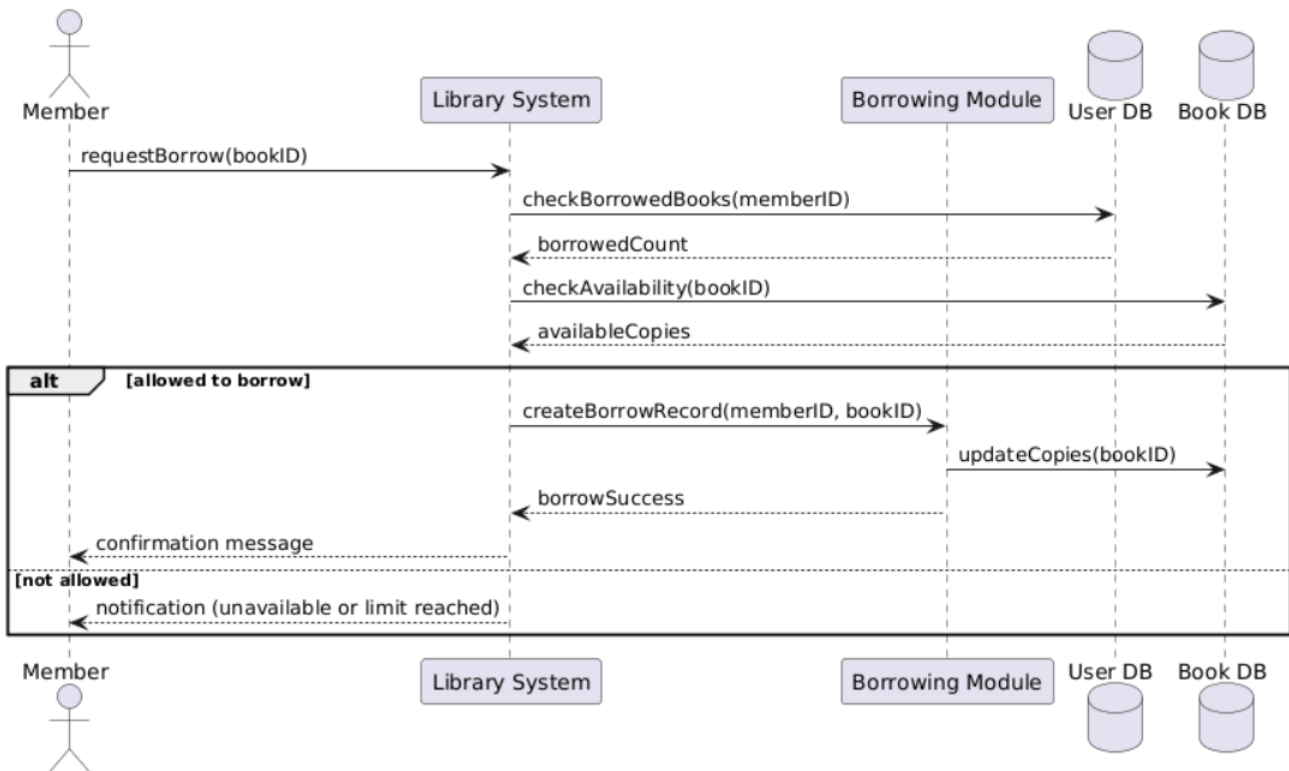 If allowed, the borrowing is recorded.

Participants

- **Member** (Actor)

- **Library System**

- **Borrowing Module**

- **Book Database**

- **User Database**

Interaction Steps

1. Member requests to borrow a book.

2. System checks member's borrowed books count.

3. System checks book availability.

4. If available → borrowing is recorded.

5. If unavailable → notification is sent.

Combined Fragment

- **alt**

    o Book available & limit not exceeded

    o Book unavailable / limit exceeded

```
Member        Library System                    Borrowing Module   User DB   Book DB

  │     requestBorrow(bookID)    │                      │             │         │
  │──────────────────────────────▶                      │             │         │
  │                              │  checkBorrowedBooks(memberID)      │         │
  │                              │─────────────────────────────────────▶        │
  │                              │        borrowedCount │             │         │
  │                              ◀- - - - - - - - - - - - - - - - - - -│         │
  │                              │   checkAvailability(bookID)        │         │
  │                              │───────────────────────────────────────────────▶
  │                              │        availableCopies             │         │
  │                              ◀- - - - - - - - - - - - - - - - - - - - - - - -│

┌─alt──────[allowed to borrow]──────────────────────────────────────────────────┐
│ │                              │ createBorrowRecord(memberID, bookID)│         │
│ │                              │─────────────────────────────────────▶         │
│ │                              │                      │ updateCopies(bookID)   │
│ │                              │                      │────────────────────────▶
│ │                              │        borrowSuccess │             │         │
│ │                              ◀- - - - - - - - - - - -│             │         │
│ │    confirmation message      │                      │             │         │
│ ◀- - - - - - - - - - - - - - - -│                      │             │         │
├─[not allowed]──────────────────────────────────────────────────────────────────┤
│ │ notification (unavailable or limit reached)          │             │         │
│ ◀- - - - - - - - - - - - - - - -│                      │             │         │
└─────────────────────────────────────────────────────────────────────────────────┘

Member        Library System                    Borrowing Module   User DB   Book DB
```

Sequence Diagram 2: Return Book with Fine Calculation

Scenario

A **Member** returns a borrowed book.
If the return is late:

- A fine is calculated automatically

- Fine = **50 pounds per day**

Participants

- **Member** (Actor)

- **Library System**

- **Borrowing Module**

- **Fine Calculator**

- **Book Database**

Interaction Steps

1. Member returns the book.

2. System checks borrowing record.

3. System calculates delay (if any).

4. Fine is calculated automatically.

5. Book availability is updated.

6. Fine is shown to the member.

Combined Fragment

- **alt**

    - Late return

    - On-time return