**Library Management System - Normalization Practice**

**Normalization: Book Table**

UNF - Book:

BookID | ISBN | Title | Genre(s) | Price | IsAvailable | ShelfLocation | LibraryID

Issue: Genre is multivalued (e.g., Fiction, Classic)

→ 1NF:

Split Genre into a separate table or rows (Atomic values only)  
Book [ BookID, ISBN, Title, Price, IsAvailable, ShelfLocation, LibraryID ]  
BookGenre [ BookID, Genre ]

→ 2NF:

PK is BookID (already single attribute)  
All attributes fully depend on BookID -- No partial dependency

→ 3NF:

No transitive dependencies (e.g., ShelfLocation only depends on BookID)  
\* Book is in 3NF

**Normalization: Loan Table**

UNF - Loan:

LoanID | MemberID | BookID | LoanDate | DueDate | ReturnDate | Status | FineAmount

Issue: FineAmount is derived from (ReturnDate - DueDate)

→ 1NF:

All values are atomic; no multivalued or repeating groups  
Loan [ LoanID, MemberID, BookID, LoanDate, DueDate, ReturnDate, Status, FineAmount ]

→ 2NF:

LoanID is single-column PK  
All attributes depend entirely on LoanID (no partial dependency)

→ 3NF:

FineAmount is a derived attribute → Remove it  
Loan [ LoanID, MemberID, BookID, LoanDate, DueDate, ReturnDate, Status ]  
\* Loan is now in 3NF