

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