

# NORMALIZATION PROOFS & FUNCTIONAL DEPENDANCIES

## 1) BOOK\_LOCATION(SHELF\_ID, SECTION, ACCESSION\_NO)

No FDs

ALREADY IN BCNF

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## 2) ISSUE/RETURN (ACCESSION\_NO, ISSUEDATE, MID, EXPECTED\_RETURN, ACTUAL\_RETURN, APPLICABLE\_FINE)

FDs

1. {Accession\_no, IssueDate} → Expected\_Return
2. {Accession\_no, IssueDate} → Actual\_Return
3. {Accession\_no, IssueDate} → Mid
4. {Accession\_no, IssueDate, Mid, Expected\_Return, Actual\_Return} → Applicable\_Fine

ALREADY IN BCNF

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## 3) OLD BOOK\_DETAILS (ISBN, TITLE, GENRE, PRICE, AUTHOR\_ID, AVAILABLE\_COPIES, PUBLISHER\_ID)

FDs

1. {ISBN} → Title, Price, Publisher\_id, Available\_copies, Author\_id
2. {ISBN} -->> Genre

NOT IN 4NF

CULPRIT FDs

1. {ISBN} -->> Genre

“SO WE HAVE TO BREAK BOOK\_DETAILS TO MAKE IT IN BCNF, BY SEPARATING GENRE”

**NEW BOOK\_DETAILS** (ISBN, TITLE, PRICE, AUTHOR\_ID,  
AVAILABLE\_COPIES, PUBLISHER\_ID)

**FDs**

1. {ISBN} → Title, Price, Publisher\_id, Available\_copies, Author\_id

**Now IN BCNF**

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**4) NEW BOOK\_GENRE** (ISBN, GENRE)

**Now IN BCNF**

**No FDs**

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**5) BOOK\_TABLE** (ACCESSION\_NO, ISBN, STATUS)

**FDs**

1. {Accession\_no} → ISBN, Status

**ALREADY IN BCNF**

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**6) RESERVATION** (TIME, ISBN, MID)

**FDs**

1. {Time} → ISBN, Mid

**ALREADY IN BCNF**

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**7) AUTHOR** (AUTHOR\_ID, FNAME, MINIT, LNAME, EMAIL)

**FDs**

1. {Author\_id} → Fname, Minit, Lname, Email

**ALREADY IN BCNF**

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## 8) PUBLISHER (PID, PNAME, EMAIL, URL, ADDRESS)

### FDs

1. {Pid} → Pname, Email, URL, Address

ALREADY IN BCNF

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## 9) MEMBER (MID, FNAME, MINIT, LNAME, MEMBER\_TYPE, EMAIL, CONTACT\_NO)

### FDs

1. {Mid} → Fname, Minit, Lname, Member\_type, Email, Contact\_no

ALREADY IN BCNF

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## 10) LOAN\_DETAILS (LOAN\_TYPE, MEMBER\_TYPE, FINE, DURATION)

### FDs

1. {Loan\_Type, Member\_Type} → Fine, Duration

ALREADY IN BCNF

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## 11) BOOK\_LOAN\_TYPE (ISBN, MEMBER\_TYPE, LOAN\_TYPE)

### FDs

1. {ISBN, Member\_Type} → Loan\_Type

ALREADY IN BCNF

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