

Different Normalization Form of the Project “Library Management System”

Step 1: Unnormalized Form(UNF)

The original unnormalized data structure contains repeated groups and redundant data.

Book ID	Title	Author Name	Member ID	Member Name	Loan Date	Return Date
1	Book A	Author X	101	Alice	2025-01-01	2025-01-15
2	Book B	Author Y	102	Bob	2025-01-03	2025-01-17
1	Book A	Author X	103	Charlie	2025-02-01	2025-02-15

Step 2: First Normal Form (1NF)

In 1NF, we ensure atomicity and remove repeating groups by splitting multivalued attributes into separate rows.

Loan ID	Book ID	Title	Author Name	Member ID	Member Name	Loan Date	Return Date
1	1	Book A	Author X	101	Alice	2025-01-01	2025-01-15
2	2	Book B	Author Y	102	Bob	2025-01-03	2025-01-17
3	1	Book A	Author X	103	Charlie	2025-02-01	2025-02-15

Step 3: Second Normal Form (2NF)

In 2NF, we remove partial dependencies by ensuring every non-key attribute is fully dependent on the primary key.

Books Table:

Book ID	Title	Author Name
1	Book A	Author X
2	Book B	Author Y

Members Table:

Member ID	Member Name
101	Alice
102	Bob
103	Charlie

Loans Table:

Loan ID	Book ID	Member ID	Loan Date	Return Date
1	1	101	2025-01-01	2025-01-15
2	2	102	2025-01-03	2025-01-17
3	1	103	2025-02-01	2025-02-15

Step 5: Third Normal Form (3NF)

In 3NF, we remove transitive dependencies by ensuring no non-prime attribute depends on another non-prime attribute.

Authors Table:

Author ID	Author Name
1	Author X
2	Author Y

Updated Books Table:

Book ID	Title	Author ID
1	Book A	1
2	Book B	2