

## Sample Solution RCL Normalisation

### (i) ReadMore Community Library Catalogue Search Output:

<b>Call No:</b>	005.74 C822D 2023
<b>Title:</b>	Database systems : design, implementation, and management
<b>Authors</b>	<ul style="list-style-type: none"> <li>• <b>ID:</b> 2036 <b>Name:</b> Coronel, Carlos</li> <li>• <b>ID:</b> 4809 <b>Name:</b> Morris, Steven</li> </ul>
<b>Subjects:</b>	<ul style="list-style-type: none"> <li>• <b>ID:</b> 1045 <b>Description:</b> Database design</li> <li>• <b>ID:</b> 1044 <b>Description:</b> Database management</li> <li>• <b>ID:</b> 1040 <b>Description:</b> Databases</li> </ul>
<b>Contents:</b>	Part I: Database Concepts-- 1. Database Systems -- 2. Data Models -- Part II: Design Concepts-- 3. The Relational Database Model -- 4. Entity Relationship (ER) Modeling -- 5. Advanced Data Modeling -- 6. Normalization of Database Tables -- Part III: Advanced Design and Implementation -- 7. Introduction to Structured Query Language (SQL) -- 8. Advanced SQL -- 9. Database Design -- Part IV: Advanced Database Concepts -- 10. Transaction Management and Concurrency Control -- 11. Database Performance Tuning and Query Optimization -- 12. Distributed Database Management Systems -- 13. Business Intelligence and Data Warehouses -- 14. Big Data Analytics and NoSQL -- Part V: Databases and the Internet -- 15. Database Connectivity and Web Technologies -- Part VI: Database Administration -- 16. Database Administration and Security.
<b>Publisher:</b>	<b>ID:</b> 1230 <b>Name:</b> Cengage Learning
<b>Date Published:</b>	2023
<b>Edition</b>	14th Edition
<b>No pages:</b>	816
<b>Language:</b>	English
<b>Note:</b>	Includes bibliographical references and index.
<b>Identifiers:</b>	<ul style="list-style-type: none"> <li>• <b>ISBN:</b> 9780357673034 <b>Type:</b> Hardcover</li> <li>• <b>ISBN:</b> 9780357673072 <b>Type:</b> Loose Leaf</li> </ul>

### UNF

CATALOGUE (cat\_call\_no, cat\_title, (author\_id, author\_fname, author\_lname), (subject\_id, subject\_desc), cat\_contents, pub\_id, pub\_name, cat\_pub\_year, cat\_edition, cat\_no\_pages, cat\_language, cat\_note (isbn\_no, isbn\_type))

### INF

CATALOGUE (cat\_call\_no, cat\_title, cat\_contents, pub\_id, pub\_name, cat\_pub\_year, cat\_edition, cat\_no\_pages, cat\_language, cat\_note)

CK cat\_call\_no

CAT\_AUTHOR (cat\_call\_no, author\_id, author\_fname, author\_lname)

CK cat\_call\_no, author\_id

CAT\_SUBJECT (cat\_call\_no, subject\_id, subject\_desc)  
CK cat\_call\_no, subject\_id

ISBN (isbn\_no, isbn\_type, cat\_call\_no)

CK isbn\_no

Partial Dependencies:

author\_id -> author\_fname, author\_lname

subject\_id -> subject\_desc

## 2NF

CATALOGUE (cat\_call\_no, cat\_title, cat\_contents, pub\_id, pub\_name, cat\_pub\_year, cat\_edition, cat\_no\_pages, cat\_language, cat\_note)

CAT\_AUTHOR (cat\_call\_no, author\_id)

AUTHOR (author\_id, author\_fname, author\_lname)

CAT\_SUBJECT (cat\_call\_no, subject\_id)

SUBJECT (subject\_id, subject\_desc)

ISBN (isbn\_no, isbn\_type, cat\_call\_no)

Transitive Dependencies:

pub\_id -> pub\_name

## 3NF

CATALOGUE (cat\_call\_no, cat\_title, cat\_contents, pub\_id, cat\_pub\_year, cat\_edition, cat\_no\_pages, cat\_language, cat\_note)

PUBLISHER (pub\_id, pub\_name)

CAT\_AUTHOR (cat\_call\_no, author\_id)

AUTHOR (author\_id, author\_fname, author\_lname)

CAT\_SUBJECT (cat\_call\_no, subject\_id)

SUBJECT (subject\_id, subject\_desc)

ISBN (isbn\_no, isbn\_type, cat\_call\_no)

Full Dependencies:

cat\_call\_no -> cat\_title, cat\_contents, pub\_id, cat\_pub\_year, cat\_edition, cat\_no\_pages, cat\_language, cat\_note

pub\_id -> pub\_name

author\_id -> author\_fname, author\_lname

subject\_id -> subject\_desc

isbn\_no -> isbn\_type, cat\_call\_no

(ii) ReadMore Community Library Borrowers Quarterly Report:

QUARTERLY BORROWER LOAN REPORT

Borrower No1234

Report Date:30 Jun 2024

Borrower

First Name: Mary

Last Name: Greenwood

Borrower Class

Adult

Borrowing Status

Permitted☐

Banned☒

Branch Code	Book Copy ID	Branch Name	Borrowed	Due Back	Returned	Fine Amnt	Date Fine Paid
100	2373	Clayton Central	02 Apr 2024 09:10	09 Apr 2024	07 Apr 2024 09:15		
100	4455	Clayton Central	15 Apr 2024 14:00	18 Apr 2024	20 Apr 2024 12:34	\$4	20 Apr 2024
100	4901	Clayton Central	28 Apr 2024 10:00	4 May 2024	4 May 2024 10:21		
100	4455	Clayton Central	28 Apr 2024 11:10	4 May 2024	4 May 2024 11:06		
100	4216	Clayton Central	28 Apr 2024 10:15	4 May 2024	4 May 2024 10:09		
100	7536	Clayton Central	4 May 2024 10:00	11 May 2024	11 May 2024 10:20		
100	2373	Clayton Central	4 May 2024 12:30	11 May 2024	11 May 2024 09:10		
102	0372	West Riding	11 May 2024 13:00	18 May 2024	11 May 2024 09:16		
102	4455	West Riding	11 May 2024 13:05	18 May 2024	18 May 2024 12:15		
... multiple rows omitted ...							
100	0876	Clayton Central	15 Jun 2024 13:15	16 Jun 2024	16 Jun 2024 16:10		
102	2354	West Riding	20 Jun 2024 16:00	27 Jun 2024			

Note overdue loans are flagged in this report with:

Ignore report date

UNF

BORROWER ( bor\_no, bor\_fname, bor\_lname, bor\_class, bor\_status (branch\_code, bc\_id, branch\_name, loan\_datetime, loan\_due\_date, loan\_return\_datetime, fine\_amount, fine\_datepaid))

1NF

BORROWER (bor\_no, bor\_fname, bor\_lname, bor\_class, bor\_status)

CK bor\_no

LOAN (branch\_code, loan\_datetime, bc\_id, branch\_name, loan\_due\_date, loan\_return\_datetime, fine\_amount, fine\_datepaid, bor\_no)

CK branch\_code, loan\_datetime

- all loans in a branch are differentiated by one second - added in Assignment 1 Logical FAQ
- ALLOW without penalty** a CK/PK of branch\_code, loan\_datetime, bc\_id since this is what was accepted in Assignment 1 Conceptual

bor\_no, loan\_datetime

Partial Dependencies:

branch\_code -> branch\_name

## 2NF

BORROWER (bor\_no, bor\_fname, bor\_lname, bor\_class, bor\_status)

LOAN (branch\_code, loan\_datetime, bc\_id, loan\_due\_date, loan\_return\_datetime, fine\_amount, fine\_datepaid, bor\_no)

BRANCH (branch\_code, branch\_name)

Transitive Dependencies:

Nil

## 3NF

BORROWER (bor\_no, bor\_fname, bor\_lname, bor\_class, bor\_status)

LOAN (branch\_code, loan\_datetime, bc\_id, loan\_due\_date, loan\_return\_datetime, fine\_amount, fine\_datepaid, bor\_no)

BRANCH (branch\_code, branch\_name)

Full Dependencies:

bor\_no -> bor\_fname, bor\_lname, bor\_class, bor\_status

branch\_code, loan\_datetime -> bc\_id, loan\_due\_date, loan\_return\_datetime, fine\_amount, fine\_datepaid, bor\_no

branch\_code -> branch\_name

## ATTRIBUTE SYNTHESIS

CATALOGUE (cat\_call\_no, cat\_title, cat\_contents, pub\_id, cat\_pub\_year, cat\_edition, cat\_no\_pages, cat\_language, cat\_note)

PUBLISHER (pub\_id, pub\_name)

CAT\_AUTHOR (cat\_call\_no, author\_id)

AUTHOR (author\_id, author\_fname, author\_lname)

CAT\_SUBJECT (cat\_call\_no, subject\_id)

SUBJECT (subject\_id, subject\_desc)

ISBN (isbn\_no, isbn\_type, cat\_call\_no)

BORROWER (bor\_no, bor\_fname, bor\_lname, bor\_class, bor\_status)

LOAN (branch\_code, loan\_datetime, bc\_id, loan\_due\_date, loan\_return\_datetime, fine\_amount, fine\_datepaid, bor\_no)

BRANCH (branch\_code, branch\_name)

**No synthesis required; final 3NF relations:**

CATALOGUE (cat\_call\_no, cat\_title, cat\_contents, pub\_id, cat\_pub\_year, cat\_edition, cat\_no\_pages, cat\_language, cat\_note)

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SUBJECT (subject\_id, subject\_desc)

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BORROWER (bor\_no, bor\_fname, bor\_lname, bor\_class, bor\_status)

LOAN (branch\_code, loan\_datetime, bc\_id, loan\_due\_date, loan\_return\_datetime, fine\_amount, fine\_datepaid, bor\_no)

BRANCH (branch\_code, branch\_name)