2814ICT – DATA MANAGEMENT
7003ICT – DATABASE DESIGN
School of Information & Communication Technology
Trimester 1, 2021

Assignment Part 1:
Designing a Database for BigM

ASSIGNMENT TITLE: Logical Database model for BigM

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Course Code: 2814ICT		Workshop/Lab day & time: Fri 10:00-11:50 am
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List of Illustrations

Statement of Completion:

All tasks have been completed.

Acknowledgements:

Mohammad Awrangjeb
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Md Polash

Case Example

Library is a database that keeps track of information concerning the books and their information in an imaginary departmental library. The data that populates the database are artificially constructed and by no means correspond to actual real world data (this is a disclaimer :).

Library DB consists of the following tables:

- o Author, which keeps track of personal information about authors (first, last names, etc).
- o Publisher, which keeps track of publishers (their name, etc).
- o Book, which contains information about the books that are available in the library (title, etc.).
- o Every book must have at least one or more authors and it is related to one or more publishers.
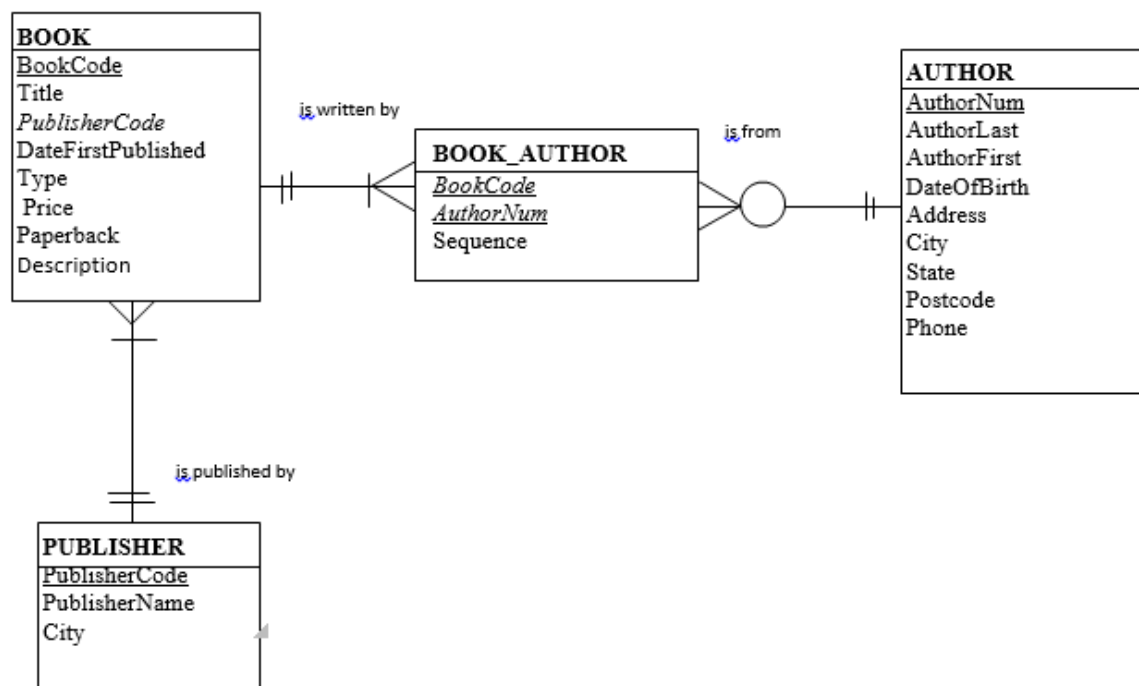
Entity Relationship Diagram

Figure1: Entity Relationship Diagram

Assumptions

- A book must be published by a publisher
- A publisher must publish at least one book, but may publish many books.
- An author may publish one or more books
- A book must be written by one or more authors.

Normalisation

a) Relation Schema

1. BOOK (<u>BookCode</u>, Title, *PublisherCode*, DateFirstPublished, Type, Price, Paperback, Description)

2. AUTHOR (<u>AuthorNum</u>, AuthorLast, AuthorFirst, DateOfBirth, Address, City, State, Postcode, Phone)

3. BOOK_AUTHOR (*<u>BookCode</u>, <u>AuthorNum</u>*, sequence)

4. PUBLISHER (<u>PublisherCode</u>, PublisherName, City)

b) Normalisation

1. For **BOOK** table the dependency diagram is:
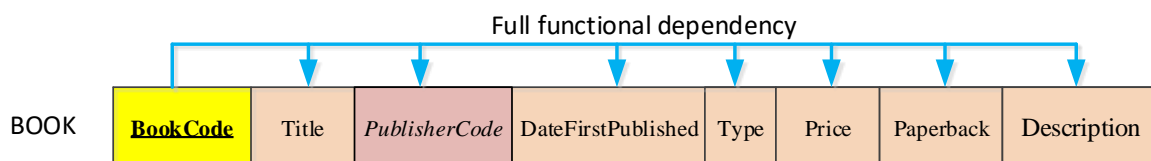
Full functional dependency

| BOOK | **BookCode** | Title | *PublisherCode* | DateFirstPublished | Type | Price | Paperback | Description |

The table is in 3NF because it has only the full dependency (and no partial & transitive dependencies):
- BookCode ➜ Title, PublisherCode, DateFirstPublished, Type, Price, Paperback, Description

2. For **AUTHOR** table the dependency diagram is:

Full functional dependency

| AUTHOR | AuthorNum | AuthorLast | AuthorFirst | DateOfBirth | Address | City | State | Postcode | Phone |

Transitive dependency
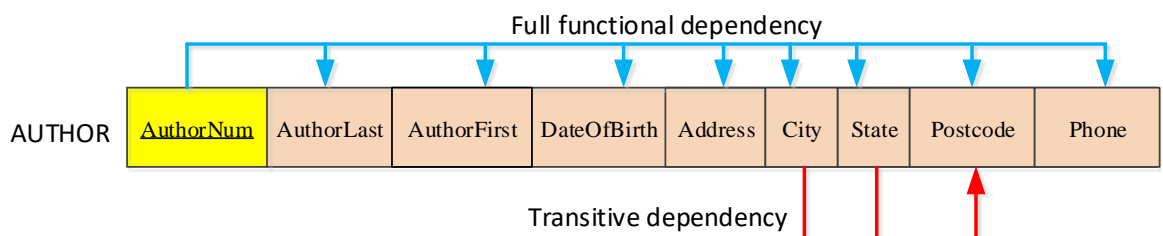
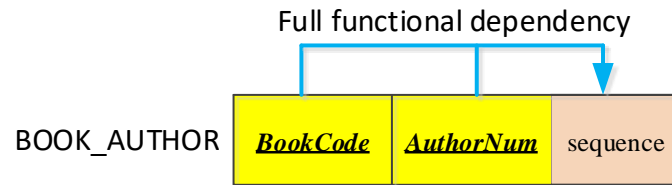This table is in a 2NF because it has a transitive dependency (and but no partial dependency):
- **Full dependency:** AuthorNum ➜ AuthorLast, AuthorFirst, DateOfBirth, Address, City, State, Phone
- **Transitive dependency:** {City, State} ➜ Postcode

There is a transitive functional dependency among AuthorID, City, State and PostCode. The PostCode is related to the City/State combination, i.e., a transitive dependency, therefore, not in 3NF.

- AuthorID ➜ City, State
- {City, State} ➜ PostCode

However, postcode doesn't introduce big redundancy (only one attribute), so there is no need to decompose this table into two.
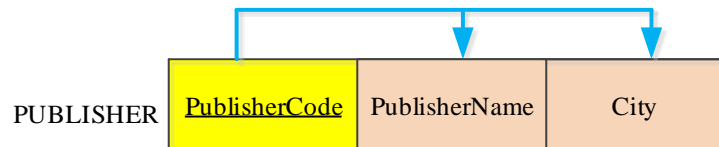
3. For **BOOK_AUTHOR** table the dependency diagram is:

Full functional dependency

BOOK_AUTHOR | ***BookCode*** | ***AuthorNum*** | sequence

The table is in 3NF because it has only the full dependency (and no partial & transitive dependencies):
- o {BookCode, AuthorNum} ➔ Sequence

4. For **PUBLISHER** table the dependency diagram is:

PUBLISHER | PublisherCode | PublisherName | City

The table is in 3NF because it has only the full dependency (and no partial & transitive dependencies):
- o   PublisherCode ➔ PublisherName, City

Note: For each table you may be required to draw a dependency diagram and/or write all its functional dependencies. See the detail requirement in the assignment specification file. Then, tell in which normal form the table is in and explain why.

Appendices [<mark>Optional</mark>]

Any additional work other than what has been requested.

Bibliography

[1] Coronel, C., Morris, S. and Rob, P. (2017). *Database Systems: Design Implementation, and Management.* Cengage Learning.

[2] Connolly, Thomas and Begg, Carolyn. (2017). *A Practical Approach to Design, Implementation and Management.* Addison Wesley.