Course: IST-659

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Homework #4

Due Date: 4/22/2020

Date Submitted: 4/26/2020

Topic: Lab04 – Normalization

## Part-1

### Case Study 2 - More Bicycles

Pre-3NFifying relationship is as follows:

OrderItem(*Order Num*, Line, Item Number, Description, Qty Ordered, Price Each)

Process of 3NFifying:

Identify the Transitive Functional Dependencies (TFDs) from the data. From the table, filtering on non-key attribute Item Number based on a few instances shows a clear TFD between Item Number and Description:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Order Num** | **Line** | **Item Number** | **Description** | **Qty Ordered** | **Price Each** |
| 106 | 1 | FA-10000 | Bicycle Model 30,26" | 100 | $280.00 |
| 110 | 1 | FA-10000 | Bicycle,Model-30,26" | 250 | $280.00 |
| 116 | 1 | FA-10000 | Bicycle,Model-30,26" | 100 | $290.00 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Order Num** | **Line** | **Item Number** | **Description** | **Qty Ordered** | **Price Each** |
| 109 | 2 | CP-15000 | Seat,Deluxe | 1,500 | $8.00 |
| 110 | 4 | CP-15000 | Seat,Deluxe | 100 | $4.00 |
| 116 | 3 | CP-15000 | Seat,Deluxe | 50 | $5.00 |

We could therefore create a new relation Item as below with Item Number as the Primary Key (PK) in the new table Item which exists as a Foreign Key (FK) in the parent table OrderItem:

* Item(Item Number, Description)
* OrderItem(*Order Num*, Line, *Item Number*, Qty Ordered, Price Each)

Existing relationships are already in 3NF form:

Order (Order Num, *Cust Num*, Ordered Date)  
Customer (Cust Num, Name, Postal Code, State)

The corresponding E-ERD can be represented by:

A screenshot of a cell phone

Description automatically generated

### Case Study 3 – Books Again

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The Books table comprises multi-values in the Authors column for BookID = 2. This means it is in 0NF form.

**Step-1:** Converting to 1NF form, the Books table should look like this

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **BookID** | **BookTitle** | **Authors** | **PublishedYear** | **PublisherName** |
| 1 | Languages and Machines | Sudkamp | 1997 | Addison Wesley |
| 2 | Modern Database Management | Hoffer | 2015 | Pearson |
| 2 | Modern Database Management | Kamesh | 2015 | Pearson |
| 2 | Modern Database Management | Topi | 2015 | Pearson |
| 3 | Data Structures and Algorithm Analysis in C++ | Weiss | 2014 | Pearson |

**Step-2:** Converting to 2NF form

Identifying **Candidate Keys**: BookID, Authors

At the outset, the relationship is:

* Books(BookID, BookTitle, Authors, PublishedYear, PublisherName)

Identify and resolve PFD between non-key attributes & candidate keys - BookTitle, Published Year and PublisherName and are partially dependent on BookID, the resultant relationships are:

* BooksInfo(BookID, BookTitle, PublishedYear, PublisherName)
* Books(*BookID*, Authors)

**Step-3:** Converting to 3NF form

|  |  |
| --- | --- |
| **BookID** | **Authors** |
| 1 | Sudkamp |
| 2 | Hoffer |
| 2 | Kamesh |
| 2 | Topi |
| 3 | Weiss |

Identifying and resolving TFD in table BooksInfo & Books:

|  |  |  |  |
| --- | --- | --- | --- |
| **BookID** | **BookTitle** | **PublishedYear** | **PublisherName** |
| 1 | Languages and Machines | 1997 | Addison Wesley |
| 2 | Modern Database Management | 2015 | Pearson |
| 3 | Data Structures and Algorithm Analysis in C++ | 2014 | Pearson |

Since no TFDs exist the tables are in 3NF with relationships:

* BooksInfo(BookID, BookTitle, PublishedYear, PublisherName)
* Books(*BookID*, Authors)

## Part-2

Initial relationship:

Video(VideoID, Video Title, UserName, UserTier, Min Tier Followers, Stream Start, Video Duration(mins), Content Rating, Rating Description)

After 3NFifying:

Non-key attributes TFD exists between UserTier & Min Tier Followers + Content Rating & Rating Description). The relationships therefore can be represented as:

* Tier(UserTier, Min Tier Followers)
* Rating(Content Rating, Rating Description)
* Video(VideoID, Video Title, UserName, *UserTier*, Stream Start, Video Duration(mins), *Content Rating*)

The corresponding E-ERD can be represented by:

A screenshot of a cell phone

Description automatically generated