

Part 2 Functional Dependencies

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There are no non-trivial FDs that violate BCNF. Below is a listing of all non-trivial FDs for each relation in the schema. Note that we have condensed the FDs of the form $a \rightarrow b$, $a \rightarrow c$ to the form $a \rightarrow bc$ for brevity's sake.

Library

name \rightarrow address, city, zip
name, address \rightarrow city, zip
name, city \rightarrow address, zip
name, zip \rightarrow address, city
name, address, city \rightarrow zip
name, address, zip \rightarrow city
name, city, zip \rightarrow address

Customer

customerID \rightarrow lastName, firstName, birthDate
customerID, lastName \rightarrow firstName, birthDate
customerID, firstName \rightarrow lastName, birthDate
customerID, birthDate \rightarrow firstName, lastName
customerID, lastName, firstName \rightarrow birthDate
customerID, firstName, birthDate \rightarrow lastName
customerID, lastName, birthDate \rightarrow firstName

Item

itemID, libraryName \rightarrow author, title, year, length, genre, artist
itemID, libraryName, author \rightarrow title, year, length, genre, artist
itemID, libraryName, title \rightarrow author, year, length, genre, artist
itemID, libraryName, year \rightarrow author, title, length, genre, artist
itemID, libraryName, length \rightarrow author, title, year, genre, artist
itemID, libraryName, genre \rightarrow author, title, year, length, artist
itemID, libraryName, artist \rightarrow author, title, year, length, genre
itemID, libraryName, author, title \rightarrow year, length, genre, artist
itemID, libraryName, author, year \rightarrow title, length, genre, artist
itemID, libraryName, author, length \rightarrow title, year, genre, artist
itemID, libraryName, author, genre \rightarrow title, year, length, artist
itemID, libraryName, author, artist \rightarrow title, year, length, genre
itemID, libraryName, title, year \rightarrow author, length, genre, artist
itemID, libraryName, title, length \rightarrow author, year, genre, artist
itemID, libraryName, title, genre \rightarrow author, year, length, artist
itemID, libraryName, title, artist \rightarrow author, year, length, genre

itemID, libraryName, year, length -> author, title, genre, artist
itemID, libraryName, year, genre -> author, title, length, artist
itemID, libraryName, year, artist -> author, title, length, genre
itemID, libraryName, length, genre -> author, title, year, artist
itemID, libraryName, length, artist -> author, title, year, genre
itemID, libraryName, genre, artist -> author, title, year, length
itemID, libraryName, author, title, year -> length, genre, artist
itemID, libraryName, author, title, length -> year, genre, artist
itemID, libraryName, author, title, genre -> year, length, artist
itemID, libraryName, author, title, artist -> year, length, genre
itemID, libraryName, author, year, length -> title, genre, artist
itemID, libraryName, author, year, genre -> title, length, artist
itemID, libraryName, author, year, artist -> title, length, genre
itemID, libraryName, author, length, genre -> title, year, artist
itemID, libraryName, author, length, artist -> title, year, genre
itemID, libraryName, author, genre, artist -> title, year, length
itemID, libraryName, title, year, length -> author, genre, artist
itemID, libraryName, title, year, genre -> author, length, artist
itemID, libraryName, title, year, artist -> author, length, genre
itemID, libraryName, title, length, genre -> author, year, artist
itemID, libraryName, title, length, artist -> author, year, genre
itemID, libraryName, title, genre, artist -> author, year, length
itemID, libraryName, year, length, genre -> author, title, artist
itemID, libraryName, year, length, artist -> author, title, genre
itemID, libraryName, year, genre, artist -> author, title, length
itemID, libraryName, length, genre, artist -> author, title, year
itemID, libraryName, author, title, year, length -> genre, artist
itemID, libraryName, author, title, year, genre -> length, artist
itemID, libraryName, author, title, year, artist -> length, genre
itemID, libraryName, author, title, length, genre -> year, artist
itemID, libraryName, author, title, length, artist -> year, genre
itemID, libraryName, author, title, genre, artist -> year, length
itemID, libraryName, author, year, length, genre -> title, artist
itemID, libraryName, author, year, length, artist -> title, genre
itemID, libraryName, author, year, genre, artist -> title, length
itemID, libraryName, author, length, genre, artist -> title, year
itemID, libraryName, title, year, length, genre -> author, artist
itemID, libraryName, title, year, length, artist -> author, genre
itemID, libraryName, title, year, genre, artist -> author, length
itemID, libraryName, title, length, genre, artist -> author, year
itemID, libraryName, year, length, genre, artist -> author, title
itemID, libraryName, author, title, year, length, genre -> artist
itemID, libraryName, author, title, year, length, artist -> genre

itemID, libraryName, author, title, year, genre, artist -> length
 itemID, libraryName, author, title, length, genre, artist -> year
 itemID, libraryName, author, year, length, genre, artist -> title
 itemID, libraryName, title, year, length, genre, artist -> author

Employee

employeeID -> lastName, firstName, title, salary, libraryName
 employeeID, lastName -> firstName, title, salary, libraryName
 employeeID, firstName -> lastName, title, salary, libraryName
 employeeID, title -> lastName, firstName, salary, libraryName
 employeeID, salary -> lastName, firstName, title, libraryName
 employeeID, libraryName -> lastName, firstName, title, salary
 employeeID, lastName, firstName -> title, salary, libraryName
 employeeID, lastName, title -> firstName, salary, libraryName
 employeeID, lastName, salary -> firstName, title, libraryName
 employeeID, lastName, libraryName -> firstName, title, salary
 employeeID, firstName, title -> lastName, salary, libraryName
 employeeID, firstName, salary -> lastname, title, libraryName
 employeeID, firstName, libraryName -> lastName, salary, title
 employeeID, title, salary -> firstName, lastName, libraryName
 employeeID, title, libraryName -> firstName, lastName, salary
 employeeID, salary, libraryName -> firstName, lastName, title
 employeeID, lastName, firstName, title -> salary, libraryName
 employeeID, lastName, firstName, salary-> title, libraryName
 employeeID, lastName, firstName, libraryname-> salary, title
 employeeID, lastName, title, salary-> firstName, libraryName
 employeeID, lastName, title, libraryName-> fistName, salary
 employeeID, lastName, salary, libraryname-> firstName, title
 employeeID, firstName, title, salary-> lastName, libraryName
 employeeID, firstName, title, libraryName-> lastName, salary
 employeeID, firstname, salary, libraryName-> lastName, title
 employeeID, title, salary, libraryName->firstName, lastName
 employeeID, lastName, firstName, title, salary ->libraryName
 employeeID, lastName, fistName, title, libraryName-> salary
 employeeID, lastName, firstName, salary, libraryName-> title
 employeeID, lastName, title, salary, libraryName-> firstName
 employeeID, firstName, title, salary, libraryName-> lastName

Accesses

no non-trivial FDs

Loan

lendingLibrary, date, itemID -> borrowingLibrary

Checkout

libraryName, itemID, dateOut -> customerID, fineAmount, dateDue
libraryName, itemID, dateOut, customerID, fineAmount -> dateDue
libraryName, itemID, dateOut, customerID, dateDue -> fineAmount
libraryName, itemID, dateOut, fineAmount, dateDue -> customerID

libraryName, itemID, dateOut, customerID -> fineAmount, dateDue
libraryName, itemID, dateOut, fineAmount -> customerID, dateDue
libraryName, itemID, dateOut, dateDue -> customerID, fineAmount