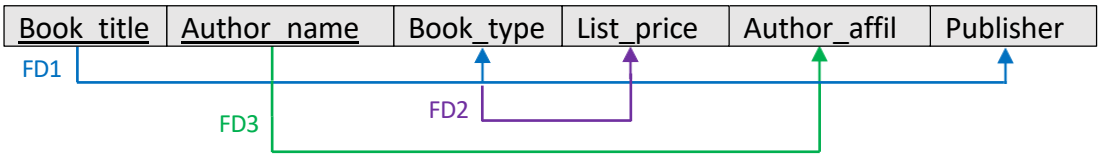
CSC430/530 – Database Management Systems
Assignment #4 – Functional Dependencies & Normalization

1. Consider following relation for published books:

BOOK



- *Author_affil* refers to the affiliation of the author.
- Primary key is {*Book_title, Author_name*}.
- Functional dependencies are:
  FD1: *Book_title -> Publisher, Book_type*
  FD2: *Book_type -> List_price*
  FD3: *Author_name -> Author_affil*

a. What normal form this relation in (1NF, 2NF, 3NF)? Justify your answer by describing violations of normal forms (if any).

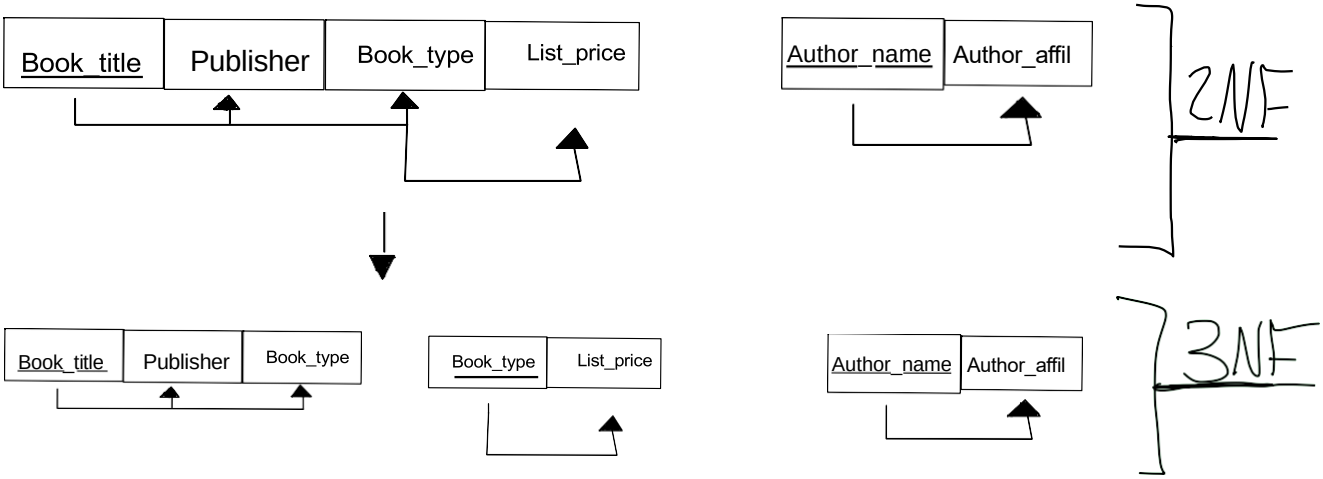
This relation is in 1NF.

FD1 violates 2NF.
The non-prime attributes Book_type and Publisher are partially functionally dependent on Book_title.

FD3 violates 2NF.
Author_affil is partially functionally dependent on Author_name.

FD2 violates 3NF.
Transitive dependency formed by Book_title -> Book_type and Book_type -> List_price.

b. Describe steps to normalize this relation up to 3NF. For full points, show all decomposed relations.



2. Define which of the provided functional dependencies may hold for the given relation. If the dependency does not hold, explain why by specifying tuples that cause the violation.

	Instructor	Course	Text	Quarter
1	Smith	Data Structures	Bartam	Spring
2	Hall	Systems Programming	White	Winter
3	Brown	Programming Languages	Williams	Summer
4	Smith	Data Structures	Bartam	Winter
5	Ross	Data Mining	Williams	Summer
6	Hall	Systems Programming	White	Spring
7	Johnson	Databases	Elmasri	Fall

A. Text -> Course

B. Text -> Instructor

C. Instructor -> Course

D. Course -> Text

E. Course -> Quarter

A. Doesn't hold. (Williams -> Programming Languages and Williams -> Data Mining) 3 & 5 violate it.

B. Doesn't hold. (Williams -> Brown and Williams -> Ross) 3 & 5 violate it.

C. Holds.

D. Holds.

E. Doesn't hold. (Data Structures -> Spring and Data Structures -> Winter) 1 & 4 violate it.