

# Assignment 4

Monday, May 10, 2021 8:24 AM

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1.) Given:

<u>Book_title</u>	<u>Author_name</u>	Book_type	List_price	Author-affil	Publisher
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FD1: Book\_title → Author\_name  
 FD2: Book\_title → Book\_type  
 FD3: Book\_title → Publisher

a.) All of the attributes are atomic and don't consist of sets of values, so it is in 1NF.

Author-affil is partially dependent on the primary key, so the relation is not in 2NF.

Also, Book-Type and Publisher are partially dependent on the primary key, so the relation is not in 2NF.

b.) To normalize, first we get it to second normal form first.

BOOK 1			
<u>Book_title</u>	Book_type	Publisher	List_Price

FD1: Book\_title → Book\_type  
 FD2: Book\_title → List\_Price

BOOK 2	
<u>Author_name</u>	Author-affil

FD3: Author\_name → Author-affil

Now we put it in 3NF by removing the transitive dependence on the primary key in BOOK1 with FD2.

BOOK 1A		
<u>Book_title</u>	Book_type	Publisher

FD1: Book\_title → Book\_type  
 FD2: Book\_title → Publisher

BOOK 2	
<u>Author_name</u>	Author-affil

FD3: Author\_name → Author-affil

BOOK 1B	
Book_type	List-Price

FD2: Book\_type → List-Price

2.) a.) Text  $\rightarrow$  Course, Does not hold.

$$t_3[\text{text}] = t_5[\text{text}] = \text{williams} \\ \text{Prog. Lang} = t_3[\text{course}] \neq t_5[\text{course}] = \text{Data Mining.}$$

b.) Text  $\rightarrow$  Instructor, Does not hold.

$$t_3[\text{text}] = t_5[\text{text}] = \text{williams} \\ \text{Brown} = t_3[\text{instructor}] \neq t_5[\text{instructor}] = \text{Ross}$$

c.) Instructor  $\rightarrow$  Course, Holds.

d.) Course  $\rightarrow$  Text, Holds.

e.) Course  $\rightarrow$  Quarter, Does Not Hold.

$$\text{Violation} \left\{ \begin{array}{l} t_1[\text{course}] = t_4[\text{course}] = \text{Data Structures.} \\ \text{Spring} = t_1[\text{Quarter}] \neq t_4[\text{Quarter}] = \text{Winter} \end{array} \right.$$

$$\text{Another Violation} \left\{ \begin{array}{l} t_2[\text{course}] = t_6[\text{course}] = \text{systems programming} \\ \text{Winter} = t_2[\text{Quarter}] \neq t_6[\text{Quarter}] = \text{Spring} \end{array} \right.$$