

Task 2:

1. **STUDENT**(snumber, full-name, degree, school)  
Primary Key = (snumber)

**BOOK**(call-number, ISBN, title, price)

**LIBRARY**(campus, building-number, total-books)  
Primary Key = (campus, building-number)

2. **STUDENT:**  
snumber → full-name, degree, school

**BOOK:**  
call-number → ISBN, title, price  
ISBN → call-number, title, price  
title → call-number, ISBN, price

**LIBRARY:**  
campus, building-number → total-books  
campus → building-number, total-books  
building-number → campus, total-books

3. **STUDENT:**  
Minimal Keys: (snumber)

**BOOK:**  
Minimal Keys: (ISBN)

**LIBRARY:**  
Minimal Keys: (campus, building-number)

4. **STUDENT**(snumber, full-name, degree, school) = (a, b, c, d):

Checking 2NF:  $a \rightarrow b, c, d$

Doesn't violate 2NF requirements

LHS subset of key

RHS not all key attributes

Checking 3NF:  $a \rightarrow b, c, d$

Doesn't violate 3NF requirements

LHS superkey

RHS key attributes

Checking BCNF:

LHS is a superkey for non-trivial FD;  $a \rightarrow b, c, d$

**BOOK**(call-number, ISBN, title, price) = (a, b, c, d):

Checking 2NF:  $a \rightarrow b, c, d$

$b \rightarrow a, c, d$

$c \rightarrow b, a, d$

$d \rightarrow b, c, a$

Doesn't violate 2NF requirements

LHS subset of key

RHS not all key attributes

Checking 3NF:  $a \rightarrow b, c, d$

$b \rightarrow a, c, d$

$c \rightarrow b, a, d$

$d \rightarrow b, c, a$

Doesn't violate 3NF requirements

LHS superkey

RHS key attributes

Checking BCNF:

LHS is a superkey for non-trivial FD;  $a \rightarrow b, c, d$

$b \rightarrow a, c, d$

$c \rightarrow b, a, d$

$d \rightarrow b, c,$

**LIBRARY**(campus, building-number, total-books) = (a, b, c):

Checking 2NF:  $a, b \rightarrow c$

$a \rightarrow b, c$

$b \rightarrow a, c$

Doesn't violate 2NF requirements

LHS subset of key

RHS not all key attributes

Checking 3NF:  $a, b \rightarrow c$

$a \rightarrow b, c$

$b \rightarrow a, c$

Doesn't violate 3NF requirements

LHS superkey

RHS key attributes

Checking BCNF:

LHS is a superkey for non-trivial FD;  $a, b \rightarrow c$

$a \rightarrow b, c$

$b \rightarrow a, c$