**Database system**

**Assignement 1 Solution2**

**Apr 2024 Semester**

**Name: Jeslyn Ho Ka Yan:**

**ID: 10241485**

**Table of Content**

1 Find all minimal keys 3

2 Find the highest Normal form 4

3 Decompose the Relational Table into BCNF 5

# Find all minimal keys

Book (bookTitle, authorName, bookType, listPrice, authorAffil, publisher)

Functional dependencies:

* bookTitle 🡪 publisher,bookType
* bookType 🡪 listPrice
* authorName 🡪 authorAffil

**Find the minimal super key.**

{ bookTitle}+

={ bookTitle }

={ bookTitle, publisher,bookType } (using bookTitle 🡪 publisher,bookType)

={ bookTitle, publisher,bookType, listPric } (using bookType 🡪 listPric )

If bookTitle 🡪 publisher,bookType, listPric and authorName 🡪 authorAffil, then through using composite inference rule, we have,

bookTitle, authorName 🡪 publisher,bookType, listPric, authorAffil.

{ bookTitle, authorName }+={ bookTitle, authorName, publisher,bookType, listPric, authorAffil }

**Ans: Hence, the minimal super key is (bookTitle, authorName)**

# Find the highest Normal form

A diagram of a website

Description automatically generated with medium confidence

Since(bookTitle, authorName) is the minimal super key,

there exist a partial Functional dependency,

bookTitle 🡪 publisher,bookTyp and

bookType 🡪 listPrice and

authorName 🡪 authorAffil . Which violates 2NF requirements.

**Ans: Hence, the relational schema R is in 1NF**

# Decompose the Relational Table into BCNF

Since there exist a partial dependency in the relational schema R, to transform the relational schema to BCNF, we need to remove the partial dependency, and split it into three relational shcemas

**R1=( authorName, bookTitle),**

**R2=( authorName, authorAffil)** and

**R3= (bookTitle, publisher bookType)**

**In relational schema R1=**

**( authorName, bookTitle),**

the minimal super key is (**authorName, bookTitle**),

and the relational shcema R have no partial dependency, transitive dependency and non-trivial dependency violations. Hence, the relationasl schema R1= **(authorName, bookTitle**) is in BCNF.

**In relational schema R2=( authorName, authorAffil),**

the minimal super key is (**authorName**),

and the relational shcema R have no partial dependency, transitive dependency and non-trivial dependency violations. Hence, the relationasl schema R2=( **authorName, authorAffil**) is in BCNF.

**In relational schema R3=(** **bookTitle, publisher, bookType),**

the minimal super key is (**bookTitle**),

however, there exist a partial dependency of bookType 🡪 listPrice. (a violation of 2NF). To transfrom the relation schema R3 to BCNF, we have to remove the partial dependency by splitting R3 into

**R4=( bookType, list price) and**

**R5(bookTitle, publisher)**

**In relational schema R4=**

**( bookType, list price),**

the minimal super key is (**bookType**),

and the relational shcema R have no partial dependency, transitive dependency and non-trivial dependency violations. Hence, the relationasl schema R4= **(bookType, list price**) is in BCNF.

**In relational schema R5 =**

**(bookTitle, publisher)**

the minimal super key is (**bookTitle**),

and the relational shcema R have no partial dependency, transitive dependency and non-trivial dependency violations. Hence, the relationasl schema R5= **(bookTitle, publisher**) is in BCNF.