CSCI235 – Database Systems
Assignment 1

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Task 2

A book is described by a bookTitle, authorName, bookType, listPrice, authorAffil, and publisher. authorAffil refers to the affiliation of author.

`BOOK (bookTitle, authorName, bookType, listPrice, authorAffil, publisher)`

Suppose the following dependencies exist:

`bookTitle → publisher, bookType`

`bookType → listPrice`

`authorName → authroAffil`

(i) Find all the minimal super keys of the relational table BOOK. List the derivations of all minimal keys.

(ii) Identify the highest normal form of the relational table BOOK. List the justifications for each highest normal form found.

(iii) Decompose the relational table BOOK into minimal number of relational tables in BCNF. List all relational tables obtained from the decompositions.

Ans i)

encode to ABC:

bookTitle = A
authorName = B
bookType = C
listPrice = D
authorAffil = E
publisher = F

R(A,B,C,D,E,F)

A -> FC
C -> D
B -> E

using closure:

A = AFCD

C = CD

B = BE

with A=ADCD,
using augmentation
AB -> ABCDF

using closure:

AB = ABCDEF

AB is MSK

decode back:
bookTitle, authorName is MSK

Ans ii)

normal form check:
(1NF) any multivalue attributes? - No
(2NF) any partial dependencies? - Yes

R is in 1NF because it's MSK AB has a partial dependency B -> E

Ans iii)

(2NF) remove partial FDs by decomposing
R1(AFCD) PK= A
R2(BE) PK= B

normal form check:
(2NF) any partial FDs? - No
(3NF) any transivitive FDs? - Yes
A -> FC
C -> D

(3NF) remove transivitive FDs
R1(AF) PK=A
R2(CD) PK=C
R3(BE) PK=B

normal form check:
(3NF) any transivitive FDs? - No
(BCNF) are all determinents candidate keys? - Yes