CSCI235 – Database Systems
Assignment 1

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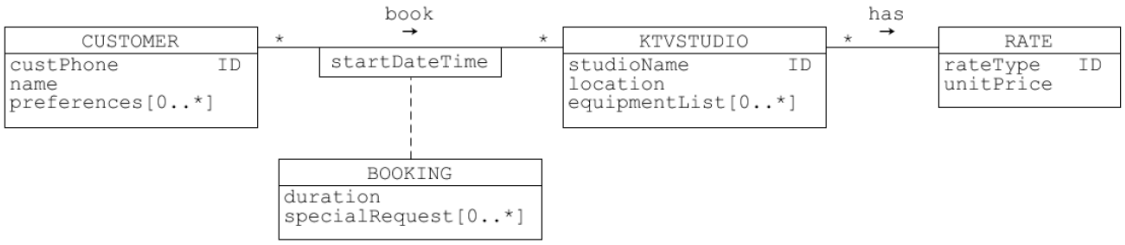
Task 1




```
CUSTOMER(custPhone, name, preferences)
KTVSTUDIO(studioName, location, equipmentList, rateType)
BOOKING(custPhone, studioName, startDateTime, duration, specialRequest)
RATE(rateType, unitPrice)
```

i) Find all functional and multivalued dependencies in the relational schemas CUSTOMER, KTVSTUDIO, BOOKING, and RATE.

ii) Find all minimal keys in the relational schemas CUSTOMER, KTVSTUDIO, BOOKING, and RATE. List the derivations of all minimal keys.

iii) For each one of the relational schemas find the highest normal form a schema is in. List the justifications for each highest normal form found.

iv) Decompose all relational schemas that are not in 4nF into 4NF. List all relational schemas obtained from the decompositions. Remember to indicate the primary key and foreign keys (if any).

Ans i)

Functional dependencies:

custPhone → name

studioName → location, rateType

custPhone, studioName, startDateTime → duration

studioName → rateType, unitPrice

studioName → location

rateType → unitPrice

Multivalued dependencies:

custPhone ↠ preferences

studioName↠ equipmentList

custPhone, startDateTime, studioName ↠ special request

Ans ii)

MSK of following tables:

CUSTOMER : custPhone
(preferences to be decomposed to another table because it is a multi value attribute)

KTVSTUDIO : studioName
(equipmentList to be decomposed to another table because it is a multi value attribute)

BOOKING : custPhone, studioName, startDarteTime
(specialRequest to be decomposed to another table because it is a multi value attribute)

RATE : rateType

Ans iii)

Highest NF of following tables:

CUSTOMER : 0NF
preferences is a multi value atttribute

KTVSTUDIO : 0NF
equipmentList is a multi value atttribute

BOOKING : 0NF
specialRequest is a multi value atttribute

RATE : BCNF
- table RATE has no multi value attributess (1NF)
- table RATE has no partial dependencies (2NF)
- table RATE has no transivitive dependencies (3NF)
- in table RATE's all FDs' determinents are candidate keys. rateType determines unitPrice, is the only FD. rateType as a determinent, is also a candidate key (BCNF)

Ans iv)

`CUSTOMER(custPhone, name, preferences) PK=custPhone` *(customer is multi-value)*

Form new table to normalise multi-value attribute - `preferences`

`PREFERENCES(custPhone,preferences) PK=custPhone,preferences FK=custPhone <4NF tables created>`

`CUSTOMER(custPhone, name) PK=custPhone`

`KTVSTUDIO(studioName, location, equipmentList, rateType) PK=studioName` *(equipmentList is multi-value)*

Form new table to normalise multi-value attribute - `equipmentList`

`EQUIPMENTLIST(studioName, equipmentList) PK=studioName, equipmentList FK=studioName <4NF tables created>`

`KTVSTUDIO(studioName, location, rateType) PK=studioName`

`BOOKING(custPhone, studioName, startDateTime, duration, specialRequest)`

`PK=custPhone, studioName, startDateTime` *(specialRequest is multi-value)*

Form new table to normalise multi-value attribute - `specialRequest`

`SPECIALREQUEST(custPhone, studioName, startDateTime, specialRequest) <4NF tables created>`

`PK=custPhone, studioName, startDateTime, specialRequest FK=custPhone, studioName`

`BOOKING(custPhone, studioName, startDateTime, duration) PK=custPhone, studioName, startDateTime`