Database system

Implimentation 1 Task 2 Solution

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1 Highest Normal form

{courseCode}$^+$
={ courseCode, offeringDept, creditHours, courseLevel}

{roomNum,daysHours,semester,year}$^+$
={ roomNum,daysHours,semester,year,lectNum ,courseCode ,sessionNum,OfferingDept, creditHours,courseLevel}
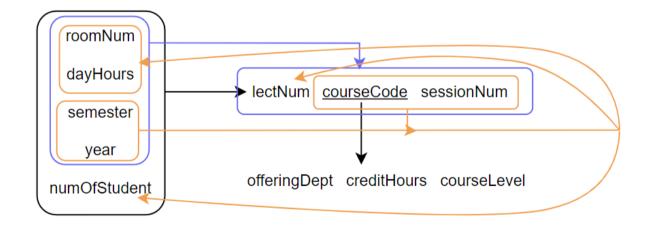(using courseCode→ offeringDept, creditHours, courseLevel)

roomNum,daysHours,semester,year → lectNum ,courseCode ,sessionNum,OfferingDept, creditHours,courseLevel is a valid Functional dependency.

NumOfStudent→ NumOfStudent is trival Functional dependency

Hence, the minimal super key is(roomNum,dayHours,semester,year, NumOfStudent).

Step 2: Find the highest Normal Form
Since, (roomNum,dayHours,semester,year, NumOfStudent) is the minimal super key. there exist a partial Functional dependency, **courseCode, sessionNum,semester,year→dayHours, roomNum, numOfStudent ,lectNum.** Which violates 2NF requirements.

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

2   Decompose the relational schema R 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, **courseCode, sessionNum,semester,year→dayHours, roomNum, numOfStudent ,lectNum,** and split it into three relational shcemas

R1=(roomNum,dayHours,semester,year, NumOfStudent),

R2=(roomNum,dayHours,semester,year,lectNum ,courseCode ,sessionNum,OfferingDept, creditHours,courseLevel)
and

R3= (semester,year, courseCode ,sessionNum, roomNum,daysHours, numOfStudent,lectNum)

In relational schema R1=
(roomNum,dayHours,semester,year, NumOfStudent **),**

the minimal super key is R **(** roomNum,dayHours,semester,year, NumOfStudent),

and the relational shcema R have no partial dependency, transitive dependency and non-trivial dependency violations. Hence, the relationasl schema R1= (roomNum ,dayHours ,semester,year, NumOfStudent) is in BCNF.

In relational schemaR2=
(roomNum,dayHours,semester,year,lectNum ,courseCode ,sessionNum,OfferingDept, creditHours,courseLevel**),**

the minimal super key is (roomNum,dayHours,semester,year),

and the relational shcema R have no partial dependency, transitive dependency and non-trivial dependency violations. Hence, the relationasl schema R2=(roomNum,dayHours,semester,year,lectNum ,courseCode ,sessionNum,OfferingDept, creditHours,courseLevel) is in BCNF.

In relational schema R3=

(courseCode ,offeringDept,creditHours,courseLevel**),**

the minimal super key is (courseCode),

and the relational shcema R have no partial dependency, transitive dependency and non-trivial dependency violations.

Hence, the relationasl schema R3=(courseCode , offeringDept,creditHours,courseLevel) is in BCNF.