201533661 이승수’s database homework#8 due date: 2016. 11.15.

**8.13 Show that the decomposition in Practice Exercise 8.1 is not a dependency preserving decomposition.**

A→BC CD→E B→D E→A

r1(A, B, C) r2(A, D, E)

at Exercise 8.1, functional dependency is devided into F1={A->BC,B->D}, F2={E->A}. functional dependency CD->E is disappeared, so dependency preserving is not formed while decomposition.

**8.21 Normalize the following schema, with given constraints, to 4NF.**

**books(accessionno, isbn, title, author, publisher)**

**users(userid, name, deptid, deptname)**

**F1: accessionno→isbn**

**F2: isbn→title**

**F3: isbn→publisher**

**F4: isbn→→author**

**F5: userid→name**

**F6: userid→deptid**

**F7: deptid→deptname**

From F1, we can hold below functional dependencies.

accessionno->isbn

isbn-> title, publisher, author(by transitivity,union of F1,F2,F3,F4).

Userid->name,deptid,deptname(by union,transitivity of F5,F6,F7).

There is no super key and not trivial. So we have to decompose the schema.

R1={accessionno,isbn} (in 4NF)

R2={accessionno,title,publisher,author,userid,name,deptid,deptname}

R3={userid,name,deptid,deptname} (in 4NF)

R4={acccessionno,title,publisher,author,userid}

R5={accessionno,title,publisher,author} (in 4NF)

R6={accessionno,userid} (in 4NF)

**8.27 Using the functional dependencies of Practice Exercise 8.6, compute B+.**

A→BC CD→E B→D E→A

B+ is closure of B.

B+: B->D

**8.29 Consider the following set F of functional dependencies on the relation schema r(A, B, C, D, E, F):**

**A→BCD, BC→DE, B→D, D→A**

**a. Compute B+.**

B+: B->ABCDE

Result= ABCDE.

**b. Prove (using Armstrong’s axioms) that AF is a super key.**

AF->BCDF (augmentation rule)

AF->BC, AF->DF (decomposition rule)

AF->BC, BC->DE : AF->BCDE (transitivity,union rule)

AF->BCDE, AF->AF : AF->ABCDEF (reflexivity,union rule)

So AF is a super key.

**c. Compute a canonical cover for the above set of functional dependencies F; give each step of your derivation with an explanation.**

A->BCD : A->B, A->C, A->D (decomposition rule)

BC->DE : BC->D, BC->E (decomposition rule)

B->D, D->A

**d. Give a 3NF decomposition of r based on the canonical cover.**

From canonical cover at c, R1={A,B}, R2={A,C}, R3={A,D}, R4={B,C,E}, R5={B,D}, R6={D,A}.

R3and R6 is duplicated. So 3NF decomposition of r is R1,R2,R3,R4,R5.

**e. Give a BCNF decomposition of r using the original set of functional dependencies.**

A→BCD, BC→DE, B→D, D→A

Candidate key set of functional dependency is {A,BC,CE,E}

Then we can decompose r into {B,D} and {B,A,C,E,F}. because set B is not a super key.

**f. Can you get the same BCNF decomposition of r as above, using the canonical cover?**

Yes. B->D is a one of functional dependency in canonical cover.