INF3100: Databasesystemer
Oppgavesett 3

Oppgave 3.2.9: Suppose we have relation *R(A,B,C,D,E)*, with some set of FD's, and we wish to project those FD's onto relation *S(A,B,C)*. Give the FD's that hold in S if the FD's for R are:

b) *BC—>DE, A—>E, D—>A, and E—>B*

Oppgave 3.3.1: For each of the following relation schemas and sets of FD's:

e) *R(A,B,C,D,E) with FD's AB—>C, C—>E, E—>A, and E—>D*

f) *R(A,B,C,D,E) with FD's AB—>C, DE—>C, and B—>E*

i) Indicate all the BCNF violations. Do not forget to consider FD's that are not in the given set, but follow from them. However, it is not necessary to give violations that have more than one attribute on the right side.

ii) Decompose the relations, as necessary, into collections of relations that are in BCNF.

Oppgave 3.6.1: Suppose we have a relation *R(A,B,C)* with an *MVD B->>C*.

If we know that the tuples *(a1,b,c1)*, *(a2,b,c2)*, and *(a3,b,c3)* are in the current instance of R, what other tuples do we know must also be in R?

Oppgave 3.6.3: Suppose we have a relation in which we want to record for each person their name, Social Security number, and birthdate. Also, for each child of the person, the name, Social Security number, and birthdate of the child, and for each automobile the person owns, its serial number and make. To be more precise, this relation has all tuples

(n,s,b,cn,cs,cb,as,am)

such that

1. *n* is the name of the person with Social Security number *s*.

2. *b* is *n's* birthdate.

3. *cn* is the name of one of *n's* children.

4. *cs* is *cn's* Social Security number.

5. *cb* is *cn's* birthdate.

6. *as* is the serial number of one of *n's* automobiles.

7. *am* is the make of the automobile with serial number *as*.

For this relation:

a) Tell the functional and multivalued dependencies we would expect to hold.

b) Suggest a decomposition of the relation into 4NF.

Oppgave 3.x.1: Betrakt følgende to mengder med FDer: $F = \{A{\longrightarrow}C, AC{\longrightarrow}D, E{\longrightarrow}AD, E{\longrightarrow}H\}$ og $G = \{A{\longrightarrow}CD, E{\longrightarrow}AH\}$. Sjekk om de to mengdene er ekvivalente.

Oppgave 3.x.5: Avgjør for hvert av følgende problemer om den angitte (tapsfrie) dekomposisjonen kan ha støyinstanser. Hvis den kan det, gi et eksempel på støyinstanser.

  (a) $R(A,B,C)$ med FDer $A{\longrightarrow}C$ og $B{\longrightarrow}C$, dekomposisjonen $\{AB, BC, AC\}$.
  (b) $S(A,B,C,D)$ med FDer $A{\longrightarrow}B$, $B{\longrightarrow}C$ og $C{\longrightarrow}D$, dekomposisjonen $\{AB, BC, CD\}$.
  (c) $T(A,B,C,D)$ med FDer $AB{\longrightarrow}D$ og $AC{\longrightarrow}D$, dekomposisjonen $\{ABC, ABD, ACD\}$.

Oppgave 5.2.1: Here are two relations:
$R\,(A, B)$: $\{(1,2), (3,4), (1,2), (3,5), (4,5)\}$
$S\,(B, C)$: $\{(1,2), (3,5), (3,6), (4,5), (1,3), (4,5)\}$

Compute the following:
a) $\pi_{A^2, B^2, A+B}(R)$;

b) $\pi_{B-1,C+1}(S)$;

c) $\tau_{A,B}(R)$;

d) $\tau_{C,B}(S)$;

e) $\delta(R)$;

f) $\delta(S)$;

g) $\gamma_{A, AVG(B)}(R)$;

h) $\gamma_{B, SUM(C)}(S)$;

(ekstraoppgaver)

!i) $\gamma_A(R)$;

!j) $\gamma_{A, MAX(C)}(R{\bowtie}S)$;

k) $R \bowtie_R S$;

l) $R \bowtie_L S$;

m) $R \bowtie S$;

n) $R \bowtie_{R.B<S.B} S$