

INF3100: Databasesystemer

Oppgavesett 2

Oppgave 3.2.2: Repeat Exercise 3.2.1 for the following schemas and sets of FD's:

- What are all the nontrivial FD's that follow from the given FD's? You should restrict yourself to FD's with single attributes on the right side.
- What are all the keys of R?
- What are all the superkeys for R that are not keys?

i) $S(A,B,C,D)$ with FD's $A \rightarrow B$, $A \rightarrow C$, and $C \rightarrow D$.

ii) $T(A,B,C,D)$ with FD's $A \rightarrow B$, $B \rightarrow C$, $C \rightarrow D$, and $D \rightarrow A$.

iii) $U(A,B,C,D)$ with FD's $AD \rightarrow B$, $AB \rightarrow C$, $BC \rightarrow D$, and $CD \rightarrow A$.

Oppgave 3.2.6: Show that each of the following are not valid rules about FD's by giving example relations that satisfy the given FD's (following the "if") but not the FD that allegedly follows (after the "then").

a) If $AB \rightarrow C$, then $A \rightarrow C$ or $B \rightarrow C$

b) If $A \rightarrow B$ then $B \rightarrow A$

c) If $AB \rightarrow C$ and $A \rightarrow C$, then $B \rightarrow C$

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

b) $R(A,B,C,D)$ with FD's $BC \rightarrow D$, $D \rightarrow A$, and $A \rightarrow B$

c) $R(A,B,C,D)$ with FD's $A \rightarrow B$ and $A \rightarrow C$

MERK! Gjør spørsmålene i) og ii) for både EKNF og BCNF

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 3.3.3: We mentioned in Section 3.3.4 that we would exercise our option to expand the right side of an FD that is a BCNF violation if possible. Consider a relation R whose schema is the set of attributes $\{A, B, C, D\}$ with FD's $A \rightarrow B$ and $A \rightarrow C$. Either is a BCNF violation, because the only key for R is $\{A, D\}$. Suppose we begin by decomposing R according to $A \rightarrow B$. Do we ultimately get the same result as if we first expand the BCNF violation to $A \rightarrow BC$? Why or why not?

Oppgave 3.5.2: Verify, using the chase, that the decomposition of example 3.27 has a lossless join.

$R(ABCDE)$

$D = \{ABC, AD, ABE\}$

FD's:

$AB \rightarrow C, C \rightarrow B, \text{ and } A \rightarrow D$