Database Management System (DBMS)

Lecture-37

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Exercise

(1) Consider R = (A, B, C, D, E, F, G) and
F= $\{A \rightarrow B, BC \rightarrow F, BD \rightarrow EG, AD \rightarrow C, D \rightarrow F, BEG \rightarrow FA\}$
Calculate the following:-
(a) $(A)^+$
(b) $(ACEG)^+$
(c) $(BD)^+$

(2) Consider R = (A, B, C, D, E) and
F= $\{A \rightarrow B, BC \rightarrow E, ED \rightarrow A\}$
(a) List all the candidate keys for R. (b) Is R in third normal form?
(c) Is R in BCNF?

Relational database design

(3) Consider R = (A, B, C, D, E, F) and
F= $\{AB \rightarrow C,\ C \rightarrow B,\ ABD \rightarrow E,\ AD \rightarrow C,\ F \rightarrow A\}$
The decomposition of R is
D=$\{R_1(B, C),\ R_2(A, C),\ R_3(A, B, D, E),\ R_4(A, B, D, F)\}$
Check whether the decomposition is lossless or lossy.

(4) Consider R = (V, W, X, Y, Z) and
F= $\{Z \rightarrow V,\ W \rightarrow Y,\ XY \rightarrow Z,\ V \rightarrow WX\}$
Sate whether the following decomposition of schema R is lossless join decomposition. Justify your answer.
(i) R_1 = (V,W,X) and R_2 = (V,Y,Z)
(ii) R_1 = (V,W,X) and R_2 = (X,Y,Z)

Relational database design

(5) Consider R = (A, B, C, D, E, F, G, H, I, J) and
F= $\{AB \rightarrow C, A \rightarrow DE, B \rightarrow F, F \rightarrow GH, D \rightarrow IJ\}$
Is R in 2NF? If not, then decompose it into 2NF.

(6) Consider R = (A, B, C, D, E) and
F= $\{A \rightarrow BC, CD \rightarrow E, B \rightarrow D, E \rightarrow A\}$
(i) List all the candidate keys for R.
(ii) Compute the canonical cover.

(7) Consider R = (A, B, C, D, E) and
F= $\{A \rightarrow\rightarrow BC,\ B \rightarrow\rightarrow CD,\ E \rightarrow\rightarrow AD\}$
Is R in 4NF? If not, then decompose it into 4NF.

(8) Consider R = (A, B, C, D, E, F, G, H) and
F= $\{AB \rightarrow C,\ BC \rightarrow D,\ E \rightarrow F,\ G \rightarrow F,\ H \rightarrow A,\ FG \rightarrow H\ \}$
Is the decomposition of R into $R_1(A, B, C, D)$, $R_2(A, B, C, E, F)$, $R_3(A, D, F, G, H)$ lossless? Is it dependency preserving?

Relational database design

(9) Define partial functional dependency. Consider the following two sets of functional dependencies F = A →C, AC →D, E →AD, E →H and G = A →CD, E →AH. Check whether or not they are equivalent.

(10) Define Minimal Cover. Suppose a relation R (A,B,C) has FD set F = A → B, B →C, A → C, AB → B, AB → C, AC → B convert this FD set into minimal cover.

(11) Write the difference between 3NF and BCNF. Find normal form of relation R(A,B,C,D,E) having FD set F= A→B,BC→E,ED→A.