Z5102175
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COMP9311 Ass2q23

Q2
(1)Fm={AB->C, AB->E, E->B, E->D, D->A, D->G, CD->E}

Explain:
According the algorithm 16.2 on book
F'={AB->C, AB->D, ABC->D, ABC->E, E->A, E->B, E->D, D->A, D->G, ACD->B, ACD->E}
AB->C,
A^+={A}, thus A->C is not inferred by F'
B^+={B}, thus B->C is not inferred by F'
Thus, AB->C cannot be replaced
AB->D
Similarly AB->D cannot be replaced
ABC->D,
AB^+={A,B,C,D,E}, AB->D is inferred by F' ; thus ABC->D can be replaced by AB->D,
ABC->E,
AB^+={A,B,C,D,E}, AB->E is inferred by F' ; thus ABC->E can be replaced by AB->E,
ACD->B,
CD^+={A,B,C,D,E}, CD->B is inferred by F' ; thus CD->B can be replaced by CD->B,
ACD->E,
CD^+={A,B,C,D,E}, CD->E is inferred by F' ; thus ACD->E can be replaced by CD->E,

∴ F''={AB->C, AB->D, AB->E, E->A, E->B, E->D, D->A, D->G, CD->B, CD->E}
∵ AB->E->D, ∴ remove AB->D
∵ E->D->A, ∴ remove E->A
∵ CD->E->B, ∴ remove CD->B

∴ Fm={AB->C, AB->E, E->B, E->D, D->A, D->G, CD->E}

(2)R1(A,B,C,E), R2(E,B,D), R3(D,A,G), R4(C,D,E), R5(E,H) which are 3NF, meanwhile the decomposition is dependency-preserving and lossless-join

Explain:
According to the algorithm 16.6 on book
Design X: R1(A,B,C,E), R2(E,B,D), R3(D,A,G), R4(C,D,E) accoding to Fm
∵ X relation schema does not contains H of R
∴ create R5{E,H}

R1(A,B,C,E), R2(E,B,D), R3(D,A,G), R4(C,D,E), R5(E,H)
None of which can be considered as redundant,
all FDs in original set F are preserved and lossless-joi,

Q3

(1)The database could roll back Trans3 using old data value and redo the changes made by Trans2.

(2)undo Trans3 and redo Trans 2

(3)Yes

(4)It does not exist. For Transaction1 it just use X, so it cannot have deadlock. For T2 and T3, both R2(Y) and R2(X) are started before R3(X) and R3(Y). it cannot become a deadlock.