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Course Code: MCA-108

Course Name: Database Management Systems

Assignment 3

(Based on Unit-IV)

- Q 1. Consider a relation $R=(A,B,C,D,E,F,G,H,I,J)$ and the set of functional dependencies $F=\{AB\rightarrow C, BD\rightarrow EF, AD\rightarrow GH, A\rightarrow I, H\rightarrow J\}$.
Compute the key for R.
And decompose R into highest normal form.
- Q 2. Consider the relation schema $R=(U,V,W,X,Y,Z)$. The FDs defined over R are given by the set $F=\{Z\rightarrow U, V\rightarrow Y, XY\rightarrow Z, U\rightarrow VX\}$. Determine whether the following decomposition of R is lossless or not. Decomposed relations are:
 $R_1 = (U,V,X)$ and
 $R_2 = (U,Y,Z)$
- Q 3. Consider a given relation $R=(P,Q,R,S)$ with following set of FDs:
 $PQ\rightarrow R$
 $PS\rightarrow Q$
 $QS\rightarrow P$
 $PR\rightarrow Q$
 $S\rightarrow R$
Find the minimal set of FDs from the above set.
- Q 4. Consider a relation
 $R=(A,B,C,D,E,F,G,H)$
and a set of FDs,
 $F=\{BCH\rightarrow ADEFG, BCF\rightarrow ADE\}$.
Normalize this relation into BCNF.
- Q 5. Suppose that we decompose the schema $R=(A,B,C,D,E)$ into $R_1(A,B,C)$ and $R_2(A,D,E)$. Show that this decomposition is a lossless decomposition, if the following set of FDs hold:
 $A\rightarrow BC$
 $CD\rightarrow E$
 $B\rightarrow D$
 $E\rightarrow A$
- Q 6. Consider the following two transactions:
T1: read A
 read B
 if $A=0$ then $B=B+1$
 write B
T2: read B

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read A
if B=0 then A=A+1
write A

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Add lock and unlock statements into these transactions, T1 and T2 so that they observe 2PL protocol. Can the execution of these transactions result in a deadlock?

Q 7. For the following set of transactions T1, T2 and T3, apply the timestamp ordering algorithm for the given schedule:

Transaction T1	Transaction T2	Transaction T3
	Read Z	
	Read Y	
	Write Y	
Read X		Read Y
Write X		Read Z
		Write Y
	Read X	Write Z
Read Y		
Write Y		
	Write X	

Also, determine whether the above given schedule is conflict serializable?