

CS430/630 - Homework 6

50 points

Due May 08 BEFORE CLASS

Seonhong Hwang

Instructions: Please submit paper copies (either typeset or hand-written copies are fine, as long as the hand writing is clear).

Question 1 (15 points)

Suppose you are given a relation R with four attributes $ABCD$ and the following set of FDs:

$AB \rightarrow C, BC \rightarrow D.$

a. Identify the candidate key(s) for R (recall that keys must be *minimal*)

$$[AB]^+ = ABCD$$

Therefore, the candidate key is $[AB]$

b. Determine if R is in BCNF, 3NF, or none of the above. If it is not in BCNF, decompose it into a set of BCNF relations.

R is in none of the above.

$[ABC], [BCD]$

Question 2 (15 points)

Suppose you are given a relation R with four attributes $ABCD$ and the following set of FDs:
 $BC \rightarrow A, AB \rightarrow C, C \rightarrow DA.$

a. Identify the key(s) for R (recall that keys must be *minimal*)

$$[AB]^+ = ABCD$$

$$[BC]^+ = BCAD$$

Therefore, the candidate keys are $[AB]$ and $[BC]$

b. Determine if R is in BCNF, 3NF, or none of the above. If it is not in BCNF, decompose it into a set of BCNF relations.

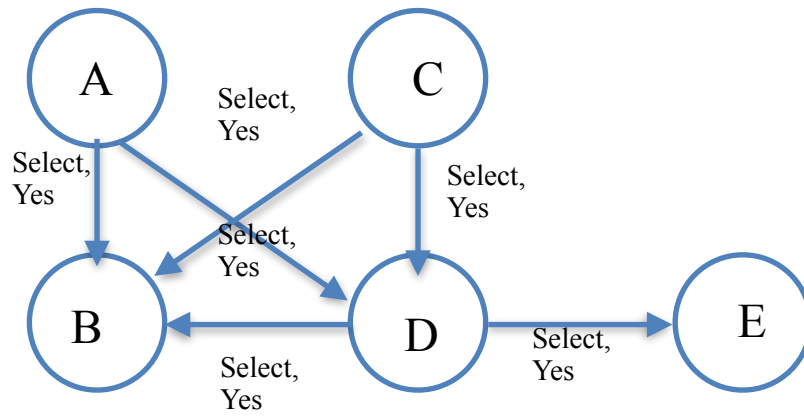
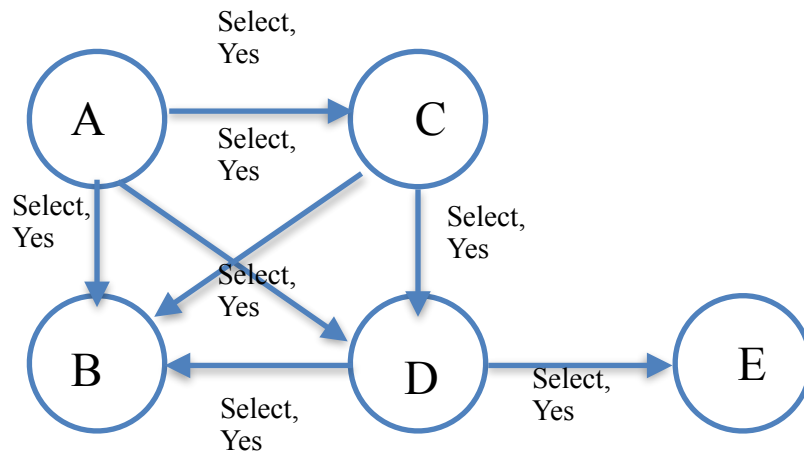
R is in 3NF but not in BCNF. $ABCD$ is not in BCNF since $C \rightarrow DA$ and C is not a superkey.

$[BCA], [CDA], [BC]$

Note: For both questions, recall that it is not sufficient to consider the set of FDs that are given, but also its closure.

Question 3 (20 points)

Show the grant diagrams after steps 7 and 8 of the sequence of actions below, where A owns the relation on which the privilege p is assigned. Can C still exercise privilege p after step 8? What about E ?



C cannot be accessed after step 8 because there are no edges to C

E can be accessed even step 8 executes because E can be accessed through the edge D to E