CS250/219 Database Systems: Ex 7

2008/09 Exam

Consider the following relation:

R(A,B,C,D,E,F,G,H)
with the following functional dependencies:
A,B,C→G,D
A,B→H,E
B→F
G→D

Problem 1. Draw the functional dependency diagram.

Problem 2. Identify the primary key and indicate how you have chosen it.

Problem 3. Create a third normal form version of the database. For each relation note each functional dependency and any foreign key references.

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Problem 4. Consider the following relations. Each relation has the attributes and functional dependencies as listed. Each relation has a problem which results in it being not in n normal form (n ∈ {1st, 2nd, 3rd, BCNF, 4th, 5th}, but n may not take all values in this question). For each question find the candidate key(s), and state which (is the lowest) normal form the relation does not satisfy (e.g. Rx is not in 3rd normal form):

(i) R1(A,B,C)
A→B,C
B→C

(ii) R2(A,B,C,D,E)
A,B→C,D,E
B→C

(iii) R3(A,B,C,D,E)
A,B→C,D,E
C,D→E

(iv) R4(A,B,C)
A,B→C
C→B

(v) R5(A,B,C,D,E,F)
A,B,C→D
B,C→E,F
E→F

Note that we only teach up to BCNF. You can ignore 4th and 5th normal form.

Problem 5. Using the information given for relation R5 above (question 4 (v)), try normalise R5, and provide the primary keys, functional dependencies preserved and, if appropriate, foreign keys, for the resulting normalised relations.