Normalization

1. Relation R has eight attributes ABCDEFGH. Fields of R contain only atomic values. F = {CH -> G, A -> BC, B -> CFH, E -> A, F -> EG} is a set of functional dependencies (FDs) so that F+ is exactly the set of FDs that hold for R. How many candidate keys does the relation R have?

2. Consider the relation scheme R = {E, F, G, H, I, J, K,L, M,N} and the set of functional dependencies {{E, F} -> {G}, {F} -> {I, J}, {E, H} ->{K, L}, K -> {M}, L -> {N} on R. What is the key for R?

3. Suppose you are given a relation R={A,B,C,D,E} with the following functional dependencies :{CE->D , D->B , C->A}.

a. Find all candidate keys.

b. Identify the normal form that R satisfies.

4. You are given the following set of functional dependencies for a relation R(A,B,C,D,E,F).

{ABC->D , ABD->E , CD->F , CDF->B , BF->D}

a. What are the keys of this relation?

b. Is this relation in 3NF? Is it 2NF ? Explain your answers.

5. The best normal form of relation scheme R(A, B, C, D) along with the set of functional dependencies F = {AB → C, AB → D, C → A, D → B} is

Solutions

1. A+ is ABCEFGH which is all attributes except D. B+ is also ABCEFGH which is all attributes except D. E+ is also ABCEFGH which is all attributes except D. F+ is also ABCEFGH which is all attributes except D. So there are total 4 candidate keys AD, BD, ED and FD

2. {EF}+ = {EFGIJ}

   {EFH}+ = {EFGHIJKLMN} = R (Candidate Key)

   {EFHKL}+ = {EFGHIJKLMN} = R But it is not minimal key

   and for candidate key it should be minimal Super Key.

3. a.) Key - CE

   b.)The relation is in 1NF

4. a. Keys {ABC,ACD}

   b. It is not in 3NF .Counterexample ABD->E and ABD is not a superkey and E is not prime attribute.

   It is not in 2NF. CD->F (partial dependency)

5. The relation is in 3NF.