Name - Lokesh Ghosh

Roll - 30001220008

Subject - DBMS (~~assignment~~ Exam)

Reg - 203001001210008

Answer sheet

1. The candidate key is AC

Prove:

the attribute closure of the FDis

A += AB

B += B

C += CD

D += DE

Any attribute that only appears on the right side in a trivial dependency must be in the candidate key.

So, AC += (A, BC, D, E, F)

∴ The candidate key is AC

(3)

Step-1

As the relation $(PR)+ = (P,Q,R,S,T)$, but not a singel of its subset can be determine all of relation. so PR will be candidate key. For R can't be derived from any other attribute of the relation. So there will be only one candidate key (PR).

Step-2

As the relation $(PR)+ = (P,Q,R,S,T)$ is given, but not a single of its subset can determine all attributes of relation. So,

(a). The attributes which are part of candidate key (P,R) are prime attributes.

(b) The other will be non-prime (Q,R,S)

Step-3

A relational Database Management System does not enable multi-valuld or composite attributes.

So, the relation R(P,Q,R,S,T) is in 1st normal form.

Because QR→S in the 2nd Normal form (QR is not a proper subset of candidate key PR) and PR→QT is in 2nd Normal form (PR is candidate key) and Q→T is in 2nd normal form [Q is not a proper subset of candidate key PR). So, the leation is in 2nd normal form.

Because in QR->S (neither QR is a super key nor S is a prime attributes) and in Q->T (neither Q is a super key nor T is prime attributes) but to satisfy 3rd Normal form, either LHS of a functional Dependency should be super key or RHS should be prime attribute. So, the relation is not in 3rd normal form.

So, the higest Normal form of Relation will be 2nd Normal form.

(4). step->1

As the relation $(PR)+ = (P, Q, R, S, T)$ is given, Q will be a candidate key, Q can be derived from PR using PR->Q (Decomposing PR->QT to PR->Q and PR->T). So, PR will be super key but $(R)+ = \{R\}$ and $(P)+ = \{P, R, Q, S, T\}$

So P(subset of PR) will be a candidate key.

So, ther will be two candidate key (P, Q).

Step->2

a. The attributes which are part of candidate key (P, Q)
b. The other will be not-prime attributes (R, S, T).

step-3

A Relational DBMS does not enable multi-valued or composite attribute.

So, the relation R(P, Q, R, S, T) is in 1st normal form.

The relation is in 2nd normal form because Q->P is in 2nd Normal form (Q is a super key) and P->R is in 2nd normal form (P is superkey) and QR->S is in 2nd normal form (QR is a super key) and PRJQT is in 2nd normal form (PR is a superkey)

Because LHS of all function dependencies are Super keys, the relation is in 3rd normal form.

The relation is in BCNF of all LHS of all FD are Super key.

So, the highest Normal form is BCNF.

(2).

step 1:

- Determine all essential attributes of the given relation.
- Essential attributes of the relation are C and E.
- So, attributes C and E will definitely be a part of every candidate key.

Step-2

- To check we find the colosure of CE.

we have, -

{CE}+
=) {C, E}
=) {C, E, F} (using C->F)
=) {A, C, E, F} (using E->A)
=) {A, B, C, D, E, F} (using A->B)

∴ Total, only one candidate key CE is possible.

∴ Total super key. is 16