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Experiment - 4

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FUNCTIONAL DEPENDENCIES -

1. Consider a relation R having attributes as R(ABCD), functional dependencies are given below:

AB->C, C->D, D->A

Identify the set of candidate keys possible in relation R. List all the set of prime and non prime attributes.

Sol.
B is missing on the right-side of given functional dependencies , so it is sure that it will be the part of our candidate key so taking C**losures**-
B(+) - B (Not determines all the attributes so use it by combining with other attributes)
BA(+) - BACD
BC(+) - BCDA
BD(+) - BDAC

Candidate keys :- (BA,BC,BD) Prime

attributes are - A,B,C,D
Non-prime attributes are - 0

NORMAL FORM: 3NF .

2. Relation R(ABCDE) having functional dependencies as :
A->D, B->A, BC->D, AC->BE

Identify the set of candidate keys possible in relation R. List all the set of prime and non prime attributes.
Sol.
C is missing on right-side so it will be our candidate key or a part of it.
Closures-
C(+) - C
AC(+) - ACBED
BC(+) - DBCAE
DC(+) - DC

Candidate keys :- (AC,BC) Prime
Attributes are - A,B,C
Non-prime Attributes are – D,E

NORMAL FORM: 1NF .

3. Consider a relation R having attributes as R(ABCDE), functional dependencies are given below:
B->A, A->C, BC->D, AC->BE

Identify the set of candidate keys possible in relation R. List all the set of prime and non prime attributes.

Sol.
Closures -
B(+) - BACDE
A(+) - ACBED
C(+) - C
D(+) - D

Candidate keys :- (A,B)

Prime attributes are - A,B
Non-prime attributes are – C,D,E
NORMAL FORM: BCNF .

4. Consider a relation R having attributes as R(ABCDEF), functional dependencies are given below:
A->BCD, BC->DE, B->D, D->A

Identify the set of candidate keys possible in relation R. List all the set of prime and non prime attributes.

Solution
Closures-
F(+) - F
AF(+) - AFBCDE
BF(+) - BFDACE
CF(+) - CF
DF(+) - DFABCE
EF(+) - EF

(AF,BF,DF) Prime attributes are -
A,B,D,F
Non-prime attributes are – C,E
NORMAL FORM: 1 NF .

5. Designing a student database involves certain dependencies which are listed below:

X ->Y
WZ ->X
WZ ->Y
Y ->W
Y ->X
Y ->Z

Identify the set of candidate keys possible in student database. List all the set of prime and non prime attributes.

Sol.

Closures-
X(+) - XYWZ
Y(+) - YXWZ
Z(+) - Z
WZ(+) - YXWZ

Candidate keys :- (X,Y,WZ)
Prime attributes are X,Y,W,Z

NORMAL FORM: BCNF .

6. Debix Pvt Ltd needs to maintain database having dependent attributes ABCDEF. These attributes are functionally dependent on each other for which functionally dependency set F given as:
{A -> BC, D -> E, BC -> D, A -> D}

Consider a universal relation R1(A, B, C, D, E, F) with functional dependency set F, also all attributes are simple and take atomic values only. Find the highest normal form along with the candidate keys with prime and non-prime attribute.

Sol.
A and F are missing so they will be considered as a part of the candidate key.
AF(+) - AFBCDE
B(+) - B
A(+) - ABCDE (F is still missing)

Candidate key is := (AF)

Prime attributes are A,F.
Non-prime attributes are B,C,D,E
NORMAL FORM: 1NF .