

Course Name: A Level (1st Sem)

Subject : Introduction to DBMS

Topic: FD – Finding Candidate Key (Part 11)

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Functional Dependency – Finding Candidate Key

The candidate key can be determined from given set of functional dependency in a relation.

It is an attribute or minimal set of attributes whose closure is set of all attributes in a relation.

For e.g. Suppose R (A, B, C, D) is a given relational schema, **if AB is a candidate key then AB^+ must hold the all attributes of R i.e. $AB^+ = ABCD$.**

$$(\text{Key})^+ = R$$

Q 1. Suppose a relational schema R(w x y z), and set of functional dependency as followings

$$F : \{ wx \rightarrow yz, \\ y \rightarrow w, \\ z \rightarrow x \}$$

Find the candidate keys in above relation.

Solution:

$$\begin{array}{ll} w^+ = w & wx^+ = w x y z \\ x^+ = x & wy^+ = w y \\ y^+ = y w & wz^+ = w z x y \\ z^+ = z x & xy^+ = x y z w \\ & xz^+ = x z \\ & yz^+ = y z w x \end{array}$$

If don't know about how to find closure of attributes, then first refer to lecture notes of closure of attribute.

Therefore **wx, wz, xy, yz** are the candidate keys in this relation because the closure of these have all the attributes of relation.

Q 2. Suppose a relational schema $R(a, b, c, d, e)$, and set of functional dependency as following

$$F : \{ ab \rightarrow cd, \\ d \rightarrow a, \\ bc \rightarrow de \}$$

Find the candidate keys in above relation.

Solution:

$$b^+ = b$$

$$ab^+ = a b c d e$$

$$bc^+ = b c d e a$$

$$bd^+ = b d a c e$$

$$bd^+ = b e$$

Therefore **ab, bc bd** are the candidate keys in this relation because the closure of these have all the attributes of relation.

Important!

Since, attribute 'b' is not at the right side of any functional dependencies, so it is the most probable chance that b should be there in the candidate key.

Exercise:

Suppose following relational schemas and set of functional dependencies for each relations:

R1 (A B C D)

FD : { A \rightarrow B,

B \rightarrow C,

C \rightarrow A }

R2 (w x y z)

FD : { wx \rightarrow yz,

z \rightarrow w }

R3 (P Q R S T U)

FD : { PQ \rightarrow R,

R \rightarrow S,

Q \rightarrow PT }

Find the all candidate keys available in R1, R2 and R3.

