FUNCTIONAL DEPENDENCY

➢ It requires that the value for a certain set of attributes determines uniquely the value for another set of attributes.

➢ In a given relation R, X and Y are attributes. Attributes Y is functionally dependent on attribute X if each value of X determines exactly one value of Y, which is represented as

$$X \rightarrow Y$$

$$X \rightarrow Y \text{ does not imply } Y \rightarrow X$$

$$\text{Marks} \rightarrow \text{Grade, Reg.No} \rightarrow \text{Name}$$

Closure set of Functional Dependency

➢ The closure set is a set of all functional dependencies implied by a given set F.

➢ It is denoted by F^+.

Closure set of Functional Dependency

➢ Armstrong's Axioms:

R. No	Name	Marks	Dept	Couse
1	A	78	CS	C1
2	B	60	EE	C1
3	A	78	CS	C2
4	B	60	EE	C3
5	C	80	IT	C2
6	D	80	EC	C4

Closure set of Functional Dependency

➢ Armstrong's Axioms:

➢ Reflection: if X Y, then X → Y

➢ Augmentation: if X → Y, then XZ → YZ

➢ Transitivity: if X → Y and Y → Z, then X → Z

➢ Decomposition: If X → YZ, then X → Y and X → Z

➢ Union: If X → Y and X → Z, then X → YZ

➢ Pseudotransitivity: If X → Y and WY → Z, then WX → Z

Closure set of Functional Dependency

➢ Compute the closure of the following set of functional dependencies for a relation schema R(A, B, C, D, E), F = {A->BC, CD->E, B->D, E->A} and Find the candidate key.

FUNCTIONAL DEPENDENCY

➢ Closure Dependencies:

- ➢ F – Functional Dependencies

- ➢ F^+ - Closure Functional Dependencies

- ➢ X – Attributes of F

- ➢ X^+ - Attributes of F^+

- ➢ F covers G, if $G^+ \subset F^+$

- ➢ F and G are equivalent if $F^+ = G^+$

FUNCTIONAL DEPENDENCY

➢ Minimal Cover – a set of F of FD is a set of G of FD such that:

   ➢ Every dependencies in G is of the form X -> A, where a is a single attribute.

   ➢ The closure F+ is equal to the closure G+.

FUNCTIONAL DEPENDENCY

➢ Types:

　➢ Full functional dependency

　➢ Partial functional dependency

　➢ Transitive functional dependency

FUNCTIONAL DEPENDENCY

➤ Types - Full functional dependency

  ➤ In a relation R, X and Y are attributes. X functionally determines Y. Subset of X should not functionally determine Y.

  ➤ Marks cannot be determined either by student_no or course_no alone. It can be determined only using student_no and course_no together.

  ➤ Marks is fully functionally dependent on {student_no, course_no}

  ➤ RegisterNo. -> Name

FUNCTIONAL DEPENDENCY

➢ Types - Partial functional dependency

  ➢ Attribute Y is partially dependent on the attribute X only if it is dependent on a subset of attribute X.

  ➢ For example course_name, Instructor_name are partially dependent on composite attributes {student_no, course_no} because course_no alone defines course_name, Instructor_name.

  ➢ (RegisterNo., Gender) -> Name

FUNCTIONAL DEPENDENCY

➤ Types - Transitive Dependencies functional dependency

   ➤ X, Y and Z are 3 attributes in the relation R.

    X -> Y,   Y -> Z, X -> Z

   ➤ For example, grade depends on marks and in turn mark depends on {student_no course_no}, hence Grade depends fully transitively on {student_no & course_no}.

FUNCTIONAL DEPENDENCY

➢ Types - Transitive Dependencies functional dependency

   ➢ X, Y and Z are 3 attributes in the relation R.

     X -> Y,   Y -> Z, X -> Z

   ➢ RegisterNo. -> HoD,

   ➢ RegisterNo. -> Deptid,

   ➢ Deptid -> HoD

FUNCTIONAL DEPENDENCY

➢ Uses:

➢ Test relations to see if they are legal under a given set of functional dependencies.

➢ Specify constraints on the set of legal relations

➢ A specific instance of a relation schema must satisfy a functional dependency even if the functional dependency does not hold on all legal instances.

Conn...

Thank You.......