COMPUTER SCIENCE

Database Management System

FD's & Normalization

Lecture_06

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01 Membership Set

02 Equality between FD Set

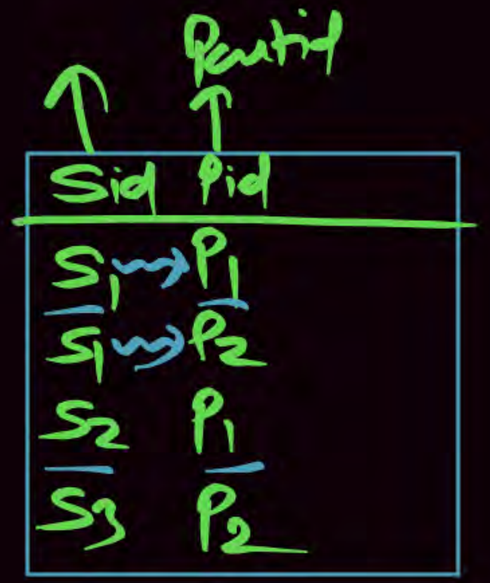
- RDBMS Concept
- FD Concept
- FD type
  - (i) Trivial FD ← Always Valid
  - (ii) Non Trivial FD
  - (iii) Semi Non Trivial FD
- Attribute closure

keys Concept

- Super key
  - Candidate key
    - 1 select → Primary key
    - Remaining → Alternative/ Secondary key.

Finding Multiple C.K

GATE PYQ's



S_1 P_1

S_1 P_2

S_2 P_1

S_3 P_2

Membership set :

F : [_ _ _ _ _ _]

Let F be the given FD. Any X → y FD is a member of FD Set F iff X → y Logically implied in F.

- X → y Logically implied means from the Closure of X determine y.

$[X]^+ = [\ldots y]$ X → y Logically implied / Member / Valid FD

Membership set :

Q

F: $(A \to B,\ B \to C)$

Check $A \to C$ member / Valid FD / implied or NOT ?

$(A)^+ = [ABC]$

$A \to C$ is member / Logically implied / Valid FD of FD Set F.

Q. $F: [AB \to C,\ C \to D,\ D \to E,\ E \to G]$

Check (i) $A \to C$ $[A]^+ = [A]$

✓ (ii) $C \to G$ $[C]^+ = [CDEG]$

✓ (iii) $AB \to G$ $[AB]^+ = [ABCDEG]$

✗ (iv) $B \to E$ $[B]^+ = [B]$

Q) F: [AB→C, A→DE, B→F, F→GH, D→IJ]

(i) A→I $(A)^+ = [ADEIJ]$

(ii) B→I $(B)^+ = [BFGH]$

(iii) B→GH $(B)^+ = [BFGH]$

(iv) D→EF $(D)^+ = [DIJ]$

(v) F→J $(F)^+ = [FGH]$

(vi) AB→F $(AB)^+ = [ABCDEFGHIJ]$

(i) (iii) & (vi) are implied/member/valid FD for this FD set.

Q. In a schema with attributes A, B, C, D and E following set of functional dependencies are given

$A \to B$
$A \to C$
$CD \to E$
$B \to D$
$E \to A$

A	B	C	D	E
1	5	8	9	1
2	6	9	5	5
3	5	1	5	1
4	7	5	4	1
5	9	4	3	1

ⓒ $(CD)^+ = (CDEAB)$

ⓓ $(BC)^+ = (BCDEA)$

ⓐ $(BD)^+ = (BD)$

ⓑ $(AC)^+ = (ACBDE)$

Which of the following functional dependencies is NOT implied by the above set

[MCQ: GATE - 2M] ISRO:

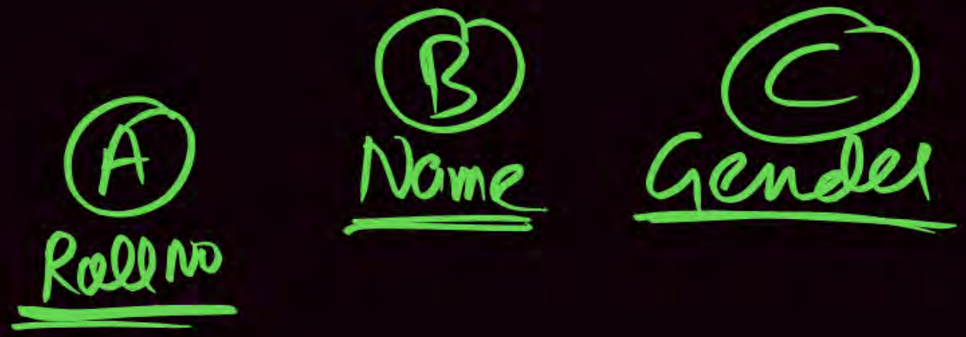
(C) Implied $CD \to AC$

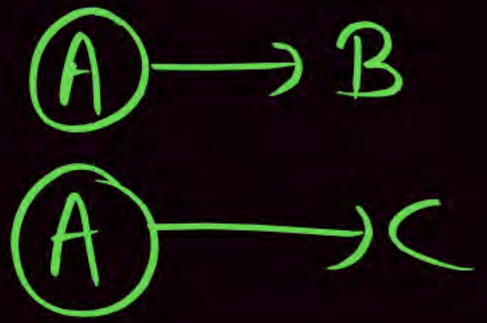
(A) $BD \to CD$

(D) Implied $BC \to CD$

(B) Implied $AC \to BC$

Ans (A)


A
Roll no
B
Name
C
Gender


A
B
A
C

Q.

Suppose the following functional dependencies hold on a relation U with attributes P, Q, R, S and T:

$$\begin{cases} P \rightarrow QR \\ RS \rightarrow T \end{cases}$$

Which of the following functional dependencies can be inferred/implied from the above functional dependencies?

[MSQ: 2021 - 2M]

A. $PS \rightarrow T$ $(PS)^+ = [PSQRT]$

B. $R \rightarrow T$ $(R)^+ = [R]$

C. $P \rightarrow R$ $(P)^+ = [PQR]$

D. $PS \rightarrow Q$ $(PS)^+ = [PSQRT]$

Ans (A, C, D)

Equality btw 2 FD set

Let There are 2 FD set [F & G] are given

F: [_ _ _ _ _ _ _] G: [_ _ _ _ _ _ _]

F & G are equals only if

iff F Cover G : True.

G Cover F : True.

$(F)^+ \equiv (G)^+$

F Cover G : F Covers All the FD's of G FD Set.

(OR)

ALL 'G' FD's Should be Logically implied in 'F' FD Set.

G cover F : G Cover All the FD of F FD Set.

(OR)

ALL F FD's Should be Logically implied in G FD Set.

F Cover G :	True	False	True	False
G Cover F :	False	True	True	False
	$F \supset G$	$G \supset F$	$F \equiv G$	Uncomparable

Q

$\therefore F: [AB \xrightarrow{①} CD,\ B \xrightarrow{②} C,\ C \xrightarrow{③} D]$

$G: [AB \xrightarrow{a} C,\ AB \xrightarrow{b} D,\ C \xrightarrow{c} D]$

F Cover G

a) ~~$AB \to C$~~ $[AB]^+ = [ABCD]$

b) ~~$AB \to D$~~ $[AB]^+ = [ABCD]$

c) ~~$C \to D$~~ $[C]^+ = [CD]$

True

$F \supseteq G$

G Cover F

① ~~$AB \to CD$~~ $[AB]^+ = [ABCD]$

② ~~$B \to C$~~ $[B]^+ = [B]$

③ ~~$C \to D$~~ $[C]^+ = [CD]$

False

Q.

Consider relation schema A(P Q R S) with two set of FD's

F : [P → Q, PQ → R, PR → S, Q → R, Q → P]

G : [PQ → S, PR → Q, Q → S, QS → R]

Which of the following is correct?

A. F Cover G

B. G Cover F

C. F and G are equivalent

D. None of these

Ans (A)

F: [P→Q PQ→R, PR→S Q→R Q→P]

G: [PQ→S PR→Q, Q→S. QS→R]

F Cover G

~~PQ→S~~ $(PQ)^+ = [PQRS]$

~~PR→Q~~ $(PR)^+ = [PRQS]$

~~Q→S~~ $(Q)^+ = [QRPS]$

~~QS→R~~ $(QS)^+ = [QSPR]$

True

G Cover F

X P→Q $(P)^+ = [P]$

~~PQ→R~~ $(PQ)^+ = [PQRS]$

~~PR→S~~ $(PR)^+ = [PRQS]$

~~Q→R~~ $(Q)^+ = [QSR]$

X Q→P. $(Q)^+ = [QSR]$

False.

F ⊃ G.

Q.

Consider relation schema R(A C D E H) with two set of FD's

[MSQ]

F : [A →C, AC → D, E → AD, E → H]

G : [A → CD, E → AH]

Which of the following is correct?

A. F Cover G

B. G Cover F

C. F and G are equivalent

D. None of these

Any Doubt ?

THANK YOU!