COMPUTER SCIENCE



Database Management System

FD's & Normalization



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Minimal Cover



Equality between 2 FD set

F Cover G: True

G Cover F: True.

(X = 2)

(Redundant FD.



Extraneous Attribute: Extraneous Attribute is a Attribute 16 he Remove Delete that Attorbute

then After Removal of that Attrobute Not affect the Power of FD Set.





Bis extra) (Rez A-)c)

(B) F: [AB->C, A->C]



1) Lets Assume A is Extra Attribute Lets Assume B is Extra Attribute

G: [B-C, A-C]

G: [A -> C]

F Cover G

 $B \rightarrow C (B)^{-}(B)$

A>C

: A is Not-Extra

F Coven G ASC (A)=(AC)

FEG

G Covel F LAB - (AB)= (ABC) A -> C (A) = [AC]

Bis extrapheous Attribute.

(Q.2)
$$[AB \rightarrow C, A \rightarrow B]$$

Lets Assume A is extog.

G: (B-)(, A-)B)

FCover G

A>B

Falge

: A is Not Extra Attribute true



lets Assume B is extra.

G: (A>C, A>R)

F Cover G

LASC (A)=(ABC)
LASS (A)=(ABC)

FEG

G Cover F

AB=C (AB)=(ABC)
A=B (A)=(ABC)

Ive.

[A-X,A->B]

.: B is extraneous

Alternate (AB->C, A->B)
Approach
Papproach

AB->C

A is extra it (B) t Contain A

B is extra it [A) t Contain B.

(B)= (B); A is Not extra.

(A)= [ABC]; B is extra Attribute)

B is exton

[A>C, A>B]

F Gover G

True

FEG

G Gover F

true

F: [MZ -W, y-Z, X-y]

y & z is extrag. Attrobute.

G Cover F

(Myz) = (Myzw) (X) - (YZ) (かないりまかり







- Sets of functional dependencies may have redundant dependencies that can be inferred from the others
 - For example: $A \rightarrow C$ is redundant in: $\{A \rightarrow B, B \rightarrow C, A \rightarrow C\}$

Q.

 $AB \rightarrow C$, $D \rightarrow E$, $E \rightarrow C$ is a minimal cover for the set of functional dependencies $AB \rightarrow C$, $D \rightarrow E$, $AB \rightarrow E$, $E \rightarrow C$.



Given the following two statements:



S1: Every table with two single-valued attributes is in 1NF, 2NF, 3NF and BCNF.

S2: AB → C, D → E, E → C is a minimal cover for the set of functional dependencies AB → C, D → E, AB → E, E → C.
 Which one of the following is CORRECT? [MCQ: 2014: 2M]

- A S1 is TRUE and S2 is FALSE.
- B Both S1 and S2 are TRUE.
- C S1 is FALSE and S2 is TRUE.
- Both S1 and S2 are FALSE.



Procedure to find Minimal Cover:

Stepl: Split the FD Such that R.H.S Contain Single Attribute. (left Hand side)

Step 2: Find the Redundant (Extra) Attribute on LHS & Delete them

From FD Set. A is extra is (B) Contain A; (B)=[...A] AB->C; A Extra 16(B)=(... A) B is extra is [A] + Contain B; [A] + [...B] BEXTOR 16 (A)*(....8)



Steps: Final the Redundant FD & Delete them FROM FD Set

(B) [ABR, BBC, ABC); ABC is exten FD

So [A>B, B>c]



Procedure to find minimal set

Step (1)

Split the FD such that RHS contain single Attribute.

Ex.
$$A \rightarrow BC$$
, $\Rightarrow A \rightarrow B$ and $A \rightarrow C$

Step (2)

Find the redundant attribute on L.H.S and delete them.

Ex.
$$AB \rightarrow C$$
,

B can be delete if A^+ contain 'B' $[A]^+=[...B]$





(3)

Find the redundant FD and delete them from the set

Ex.
$$\{A \rightarrow B, B \rightarrow C, A \rightarrow C\}$$

 $\{A \rightarrow B, B \rightarrow C\}$

Example 1:



$$[AB \rightarrow CD, A \rightarrow E, E \rightarrow C]$$

Stepl (R.M.S): AB -> C, AB -> D, A -> E, E -> C.

Step2 (L.H.S) Check Extogre

SEP3 (Redundant FD)

Example 2:



(A) $[A \rightarrow C, AC \rightarrow D, E \rightarrow AD, E \rightarrow H]$

Step L: Split the FD Such that R.H.S Contain Single Attribute.

A>C, AC>D, E>A, E>D, E>H

Step2: Find the Redundant Attribute on L.M.S & Delete them FROM FD Set

AC -D: A is extra & (c) Contain A

C is extra & (A) Contain C

(c) = [c]: A is Not Extra Bcz(c) + Not Contain A.

(A) += (AC...) C is extra Bcz(A) + Contain C.

[A-D]

OAOC OAOD GEOR GEOR Step 3: Find the Redundant FD & Delete them FRom FD Set. O A>C PAD EAD EAD EAD EAD [A] = [AD] (A) = [AC] (E) = [EDH] (E) = [EHACD] (E) = [EACD] E-D is extra. A-C, A-D, E-A, E-H Minimal

A-CD, E-AH

Cover

1

Procedure to find Redundant FD Directly.

Assume we want to check A-B is Redundant FD @ Not in Given FD Set.

First Hide that $(A \rightarrow B) FD$, then take the Closure of A in all the Remaining FD set. is from $(A)^{+}$ we getting B from all other FD then we can say $A \rightarrow B$ is Gxtrap FD.

A > c is Extoa FD

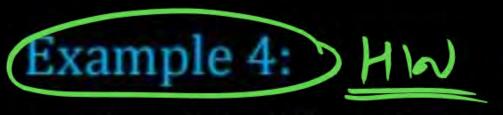
Example3:



$$[B \rightarrow A, D \rightarrow A, AB \rightarrow D]$$

 $B \rightarrow A, D \rightarrow A, AB \rightarrow D$

$$(R)^{\ddagger}(R)$$
 (A) $(R)^{\ddagger}(R)$ (B) $(R)^{\ddagger}(R)$ (B) $(R)^{\ddagger}(R)$ (B) $(R)^{\ddagger}(R)$ (B) $(R)^{\ddagger}(R)$ (B) $(R)^{\ddagger}(R)$





 $[A \rightarrow BC, CD \rightarrow E, E \rightarrow C, D \rightarrow AEH, ABH \rightarrow BD, DH \rightarrow BC]$



Given the following two statements:



51: Every table with two single-valued attributes is in 1NF, 2NF, 3NF and BCNF.

S2: AB → C, D → E, E → C is a minimal cover for the set of functional dependencies AB → C, D → E, AB → E, E → C.
 Which one of the following is CORRECT? [MCQ: 2014: 2M]

- A S1 is TRUE and S2 is FALSE.
- B Both S1 and S2 are TRUE.
- C S1 is FALSE and S2 is TRUE.
- Both S1 and S2 are FALSE.



The following functional dependencies hold true for the relational schema R{V, W, X, Y, Z}:



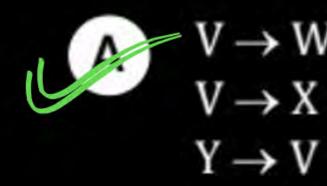
$$V \rightarrow W$$

$$VW \rightarrow X$$

$$Y \rightarrow VX$$

$$Y \rightarrow Z$$

Which of the following is irreducible equivalent for this set of functional dependencies? [MCQ:2017]



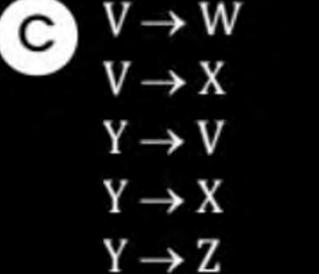
 $Y \rightarrow Z$

$$V \to W$$

$$W \to X$$

$$Y \to V$$

$$Y \to Z$$



$$D V \rightarrow W$$

$$W \rightarrow X$$

$$Y \rightarrow V$$

$$Y \rightarrow X$$

 $Y \rightarrow Z$

(SER XNEWN XEMN MEN) V-W, VW-X, d-V, H-X, d-Z Sepl (w)= (w) vic Not Extra
(v)= (v)= (v) wis extra vw→x VYW $(v)^{\pm}(vx)$ $(v)^{\pm}(vw)$ $(y)^{\pm}(yxz)$ $(y)^{\pm}(yxz)$ $(y)^{\pm}(yxz)$ $(y)^{\pm}(yxz)$ WK B

*



Minimal Cover May (or) May Not be Unique. ie More than one Minimal Cover is possible.



Consider the following FD Set:



 $\{P \rightarrow QR, Q \rightarrow PR, R \rightarrow PQ\}$ which of the following is/are the minimal cover for the above FD set?



$$P \rightarrow Q, Q \rightarrow R, R \rightarrow P$$



$$P \rightarrow R, Q \rightarrow R, R \rightarrow PQ$$



$$Q \rightarrow P, P \rightarrow R, R \rightarrow Q$$



$$P \rightarrow QR, Q \rightarrow P, R \rightarrow P$$



[Home Work]

