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Database I

Homework 6.

2/2

A decomposition (r_1, r_2) is a lossless-join decomposition if $R1 \cap R2 \rightarrow R_1$

or $R1 \cap R2 \rightarrow R_2$.

we have $r_1 = (A, B, C)$

$r_2 = (A, D, E)$

$r_1 \cap r_2 = A$

$\{A^+\} = ABCDE \Rightarrow A$ is candidate key

$\Rightarrow r_1 \cap r_2 \rightarrow r_1$

$\Rightarrow r_1, r_2$ is a lossless-join decomposition

8.6

$\{A^+\} = ABCDE$

$\{B^+\} = BD$

$\{E^+\} = EABCD$

$\{BC^+\} = BCDEA$

$\{CD^+\} = CDEAB.$

$\Rightarrow$ candidatey key are A, BC, CD, E

Step 1.

$\{A\}^+ = \{ABCDE\}$ candidate key

$\{CD\}^+ = \{CDEAB\}$ candidate key

$\{B\}^+ = \{BD\}$

$\{E\}^+ = \{EABCD\}$ candidate key.

$B \rightarrow D$ D is part of CD

$R' = \{(A, B, C), (C, D, E), (B, D), (E, A)\}$ are not redundant.

~~&~~ & the rchema is already in 3NF. So we don't need apply the algorithm to decomposition.

28.

(A, B, C)

(C, D, E)

A	B	C	D	E
a	b	c	~~d~~ d (B → D)	~~e~~ e (cd → e)
~~a~~ a (c → a)	~~b~~ b (a → bc)	c	d	e

it is not a lossless - join decompositon

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$r(A, B, C, D, E)$

$A \rightarrow BCD$

$BC \rightarrow DE$

$B \rightarrow D$

$D \rightarrow A$

a) $\{B^+\} = \{BDACE\}$

b)

$A \rightarrow BCD.$

$A \rightarrow ABCD$

$BC \rightarrow DE$

$ABCD \rightarrow ABCDE$

$A \rightarrow ABCDE$

$AF \Rightarrow ABCDF$

$\Rightarrow AF$ is a superkey

c) We have D is extraneous in dep. 1, 2 and 3. Remove it we have new dep.

$A \rightarrow BC$

$BC \rightarrow E$

$B \rightarrow D$

$D \rightarrow A.$

We have (B^+) is ABCDE, the FD $B \rightarrow E$ can be determined from this set. The attribute C is extraneous in the third dependency. Removing this attribute and combining with FD we have:

$A \rightarrow BC$

$B \rightarrow DE$

$D \rightarrow A$

$\Rightarrow$ no attribute is extraneous in any FD

we have.

$r_1 (\underline{A}, B, C)$

$r_2 (\underline{B}, D, E)$

$r_3 (\underline{D}, A)$

now F is not dependent on any attribute.

⇒ it must be a part of supper key. but none of ~~them~~ relations in the shema have F. ⇒ create one. with a supper key

$r_4 (A, F)$

e) we have

$r (A, B, C, D, E)$

$r (A, B, C, D)$ $r_2 (A, E, F)$

now we not that $A \to E$ is and FD ~~also~~ in F+, and causes r_2 to violate BCNF.

⇒ ~~r_1~~ (A, B, C, D) (A, E) (A, F) new schema.

f. if we use the FD in the preceding canonical cover directly, we cannot get the above decompositio. Hovever, we can infer the original dependencies from the canonical cover and use those for BCNF. we have same results