

Database HW5 Chp 15, 21

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15.27

A B C D E

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A, B is not a candidate key.

\therefore candidate key must be functionally determine values of all attributes of a relation. But A, B can't determine D.

A, B, D is a candidate key.

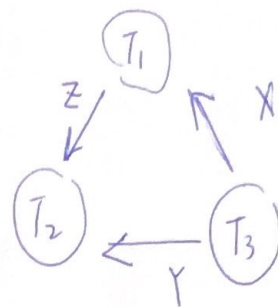
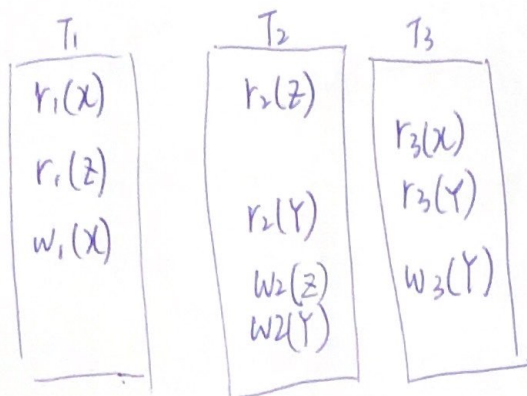
first we discover $AB \rightarrow C$

then, $C, D \rightarrow E$

\therefore all attributes values can be determined.

21.23

① r for read, w for write



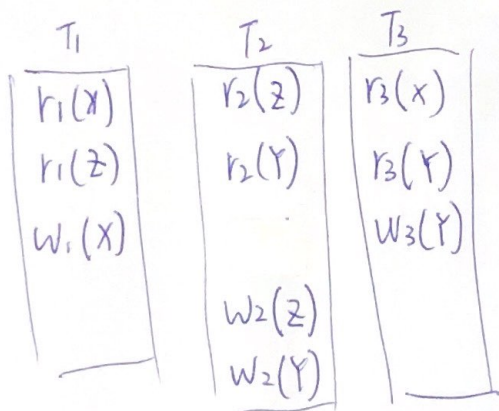
∴ there is no cycle.

$$r_3(x) \rightarrow w_1(x)$$

$$r_3(y) \rightarrow w_2(y) \quad w_3(y) \rightarrow w_2(y)$$

$$r_1(z) \rightarrow w_2(z)$$

Equivalent serial schedule :



$$T_3 \rightarrow T_1 \rightarrow T_2$$

②

$$r_1(z) \rightarrow w_2(z)$$

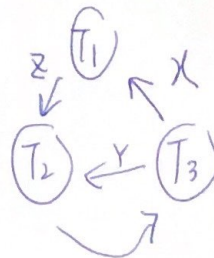
$$r_3(x) \rightarrow w_1(x)$$

$$r_2(y) \rightarrow w_3(y)$$

$$r_3(y) \rightarrow w_2(y)$$

$$w_3(y) \rightarrow w_2(y)$$

cycle, can't be serializable



15.24

relation $R = \{A, B, C, D, E, F, G, H, I, J\}$

We know $AD \rightarrow GH$, so $ABD \rightarrow ABDGH$

\therefore we know $A \rightarrow I$, $\therefore ABD \rightarrow ABDI$

We can also know $AB \rightarrow C$, $ABD \rightarrow ABCD$

$BD \rightarrow EF$, $ABD \rightarrow ABDEF$

$AD \rightarrow GH$, $AD \rightarrow H \therefore H \rightarrow J$, $\therefore AD \rightarrow J$, $\therefore ABD \rightarrow ABDJ$

$\therefore ABD \rightarrow ABCDEFGHIJ$ $\therefore ABD$ is key

Decompose R into 2NF = $R_1 (A, B, C)$

$R_2 (B, D, E, F)$

$R_3 (A, D, G, H, J)$

$R_4 (A, I)$

3NF = $R_1 (A, B, C)$

$R_2 (B, D, E, F)$

$R_{3.1} (A, D, G, H)$

$R_4 (A, I)$

$R_{3.2} (H, J)$