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Tutorial - 10

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Normalization

Q1 FD's

a)

$$B \rightarrow C$$

$$D \rightarrow A$$

BD candidate key

b)

$$AB \rightarrow C$$

$$C \rightarrow A$$

$$C \rightarrow D$$

ABC Primary key

c)

$$A \rightarrow B$$

$$A \rightarrow C$$

$$C \rightarrow D$$

$$C \rightarrow D$$

Primary
AC

d)

$$A \rightarrow B$$

$$B \rightarrow C$$

$$C \rightarrow D$$

Primary key $\Rightarrow A$
 $\Rightarrow A \rightarrow B$
 $A \rightarrow C$
 $A \rightarrow D$

e)

$$A \rightarrow B$$

$$B \rightarrow C$$

$$C \rightarrow D$$

Primary key $\Rightarrow A$
 $\Rightarrow A \rightarrow B$
 $A \rightarrow C$
 $A \rightarrow D$

Q2

a)

FD1

$$A \rightarrow B$$

$$B \rightarrow C$$

$$AB \rightarrow D$$

FD2

$$A \rightarrow B$$

$$B \rightarrow C$$

$$A \rightarrow C$$

$$A \rightarrow D$$

FD1 \subseteq FD2 and
FD2 \subseteq FD1
FD1 and FD2 are equivalent.

b)

F

$$A \rightarrow C$$

$$AC \rightarrow D$$

$$E \rightarrow AD$$

$$E \rightarrow H$$

G

$$A \rightarrow CD$$

$$E \rightarrow AH$$

$$F \subseteq G$$

$$\text{and } G \subseteq F$$

$$F \simeq G$$

F and G are equivalent.

$$ACD^+ = E, G, A, C, D, B$$

 FREEMIND

$$CQ^+ = C, G, A, B, G, E$$

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Q3

Step 2

$$AB \rightarrow C$$

$$AB \rightarrow C$$

$$AB \rightarrow C$$

$$C \rightarrow A$$

$$C \rightarrow A$$

$$C \rightarrow A$$

$$BC \rightarrow D$$

$$BC \rightarrow D$$

$$BC \rightarrow D$$

$$ACD \rightarrow B$$

$$D \rightarrow E$$

$$D \rightarrow E$$

$$D \rightarrow E$$

$$D \rightarrow G$$

$$D \rightarrow G$$

$$D \rightarrow G$$

$$BE \rightarrow C$$

$$BE \rightarrow G$$

$$BE \rightarrow G$$

$$CE \rightarrow G$$

$$CE \rightarrow G$$

$$CQ \rightarrow B$$

$$Cq \rightarrow D$$

$$CE \rightarrow A$$

$$CE \rightarrow G$$

Q4

empcode	aname	street	city	state	pincode
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empcode	name	pincode	pincode	street	city	state
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Q5

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

a)

 $R_1 (A, C, B, D, E)$
 $A \rightarrow B$
 $C \rightarrow D$
 $\left. \begin{array}{l} A \rightarrow B \\ C \rightarrow D \end{array} \right\} \text{key} \Rightarrow \{AC\}$
 $R_2 (A, B, F)$
 $AC \rightarrow E$
 $B \rightarrow F$
 $\left. \begin{array}{l} AC \rightarrow E \\ B \rightarrow F \end{array} \right\} \text{key} \Rightarrow \{ACB\}$

c) BCNF

d) BCNF

e) BCNF

Q6

a)

$$key = \{CB\}$$

R is in 2NF

 $C \rightarrow D$ and $C \rightarrow A$ both violate BCNF

decompose into: AC, BC and CD

b)

$$key: BD$$

R is in 1NF but not 2NF

 $B \rightarrow C$ and $D \rightarrow A$ violate BCNF

c)

$$\text{Candidate key: } ABC, BD$$

R is in 1NF but not 2NF

d)

$$\text{Candidate key: } A$$

R is in 2NF but not in 3NF

e)

$$AB, BC, CD, AD$$

R is in 3NF not in BCNF.