Tutorial 2 – IDB – 5172501B – Group 8

Problem 1: ① "ID + Name of customers who own an account in a branch in their city"

$$\{ x, y \mid \exists z \; \text{customer}(x, y, z) \wedge \exists x', y' \; \text{Account}(x', z, x, y') \}$$

② "ID and name of customers who do not own any account"

$$\{ x, y \mid \exists z \; \text{customer}(x, y, z) \wedge (\forall x', y', z', w' \; \text{Account}(x', y', z', w') \rightarrow \neg(\exists x'' \; \text{Account}(x'', z, x, w')) \}$$

③ "ID and name of customer who own an account with a balance which is no less than the balance of any other account"

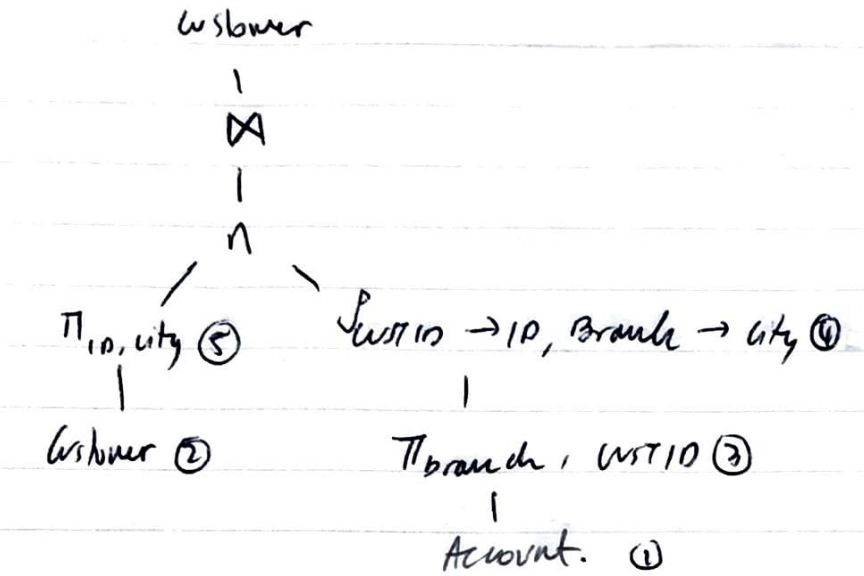
$$\{ x, y \mid \exists z \; \text{Customer}(x, y, z) \wedge (\exists n, b \; \text{Account}(n, b, x', bal \leq bal') \wedge x = x')) \}$$

Problem 2: Could not solve it. Since it has not been covered yet.

Problem 3:

$$\text{CUSTOMER} \bowtie (\Pi_{ID, city}(\text{Customer}) \cap \rho_{CustID \to ID, BRANCH \to CITY}(\Pi_{branch, CUSTID}(\text{Account})))$$

let $\eta = \{ ID \mapsto x, Name \mapsto y, City \mapsto z, Number \mapsto a, branch \mapsto b, custID \mapsto c, balance \mapsto d \}$



① Account → Account (a, b, c, d)
② Customer → Customer (x, y, z)
③ $\exists$ a, d Account (a, b, c, d)
④ $\exists$ a, d Account (a, z, x, d)
⑤ $\exists$ y Customer (x, y, z)
⑥ $\cap \Rightarrow R \cap S = R - (R - S) = \rho_R \wedge \neg(\rho_R \wedge \neg \rho_S)$
$= \rho_R \wedge (\neg \rho_R \vee \rho_S)$

where R = ⑤ S = ④

$\therefore \cap \Rightarrow \exists y$ Customer $(x, y, z) \wedge \neg (\exists y$ Customer $(x, y, z) \wedge \neg (\exists a, d$ Account $(a, z, x, d))$

$= \exists y$ Customer $(x, y, z) \wedge (\forall y$ Customer $\vee \exists a, d$ Account $(a, z, x, d))$

We are left with Customer ⋈ ⑥

$A \bowtie B = \pi_{XUY} (\sigma_{ID = ID'} (A \times \rho_{CustID = ID'} B)$

① $\rho_{WSTID=ID'} B$ where $B = ⑥$

Add $\{ID' = x'\}$ to η

$B = \exists y\ Wsbner(x', y, z) \wedge (\forall y\ Wsbner(x', y, z) \vee \exists a, d\ Acount(a, z, x, d))$

② $A \times B = A \bowtie B$

③ $\sigma_{ID=ID'}(A \wedge B) = A \cap B \cap x = x'$

④ $\Pi_{UVY}(A \cap B \cap (x = x'))$

$\exists x'\ A \cap B \cap x = x'$

$\therefore \{ x, y, z, a, b, c, d \mid \exists x'\ A \cap B \cap x = x' \}$

where $A = Customer(x, y, z)$
$B = \exists y\ Wsbner(x', y, z) \wedge (\forall y\ Wsbner(x', y, z) \vee \exists a, d\ Acount(a, z, x, d))$

Problem 4:

$\{ x, z \mid R(x) \wedge \neg \exists y\ S(y, z) \}$

R over A S over A, B

$R(x)$ $\rho_{A \to Az}(R)$

$S(y, z)$ $\rho_{A \to Ay,\ B \to Bz}(S)$

$\exists y\ (\rho_{A \to Ay,\ B \to Bz}(S)) \to \Pi_{Az}(\rho_{A \to Ay,\ B \to Bz}(S))$

$\neg(\exists y\ S(y, z)) \to Adom_{Ax} \times Adom_{Ay} - \Pi_{Az}(\rho_{A,B}(S))$

∴ we have:

$$\rho_{A \to A_x}(R) \times \left(\text{Adom}_{A_y} \times \text{Adom}_{A_z}\right) - \pi_{A_7}\left(\rho_{A,B}(S)\right)$$

↓ NOT SURE HOW TO CALCULATE THIS.