דף שער

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$\rho(mr, massuer), \rho(ms, massage), \rho(c, client)$ |No| (1

$\rho(MTB, \sigma_{mr.MID=ms.MID, mr.role='temp', mr.expertise='back'}(ms \times mr))$ ← massuese with back expertise and gave a temp massage

$\rho(SMTB, MTB), \rho(BMTB, MTB)$

$\rho(maxType, (\pi_{MTB.type, MTB.price}(MTB) - \pi_{MTB.type, MTB.price}(BMTB \bowtie_{BMTB.price > LMTB.price} SMTB)))$ ← find most expensive one.

$\rho(Mclient, \pi_{c.cname, MTB.type, MTB.price}(\sigma_{MTB.cID=C.cID}(MTB \times C)))$

$\rho(solQ_1, \pi_{Mclient.cname, Mclient.type}(Mclient \bowtie_{Mclient.type = MaxType.type \wedge Mclient.price = MaxType.price} MaxType))$

$\boxed{solQ_1}$

2

$\rho(ms, Massage), \rho(MS1(mID \to mID1, expertise \to expertise1), ms)$

$\rho(MS2(MID \to mID2, expertise \to expertise2), ms)$

take out all clients who spent less than 150 on a massage

$\rho(Over150, \pi_{CID}(massage) - \pi_{CID}(\sigma_{ms.price<150}(ms)))$

Find all types of massages ever given then return which client took all of them

$\rho(mType, \pi_{type}(ms))$

will return all distinct types of massages given

$\rho(cmtype, \pi_{CID}(massage \div mtype))$

$\rho(Mdates, (ms1 \bowtie_{ms1.date = ms2.date, ms1.CID = MS2.CID} MS2))$

$\rho(mMatch1, mdates \bowtie_{mdates.mID1 = Masseur.mID} Masseur)$

$\rho(MatchBoth, mMatch1 \bowtie_{mMatch1.mID2 = Masseur.MID} Masseur)$

$\rho(BothDiff, \pi_{matchBoth.CID}(\sigma_{matchBoth.expertise1 != matchBoth.expertise2}(matchBoth)))$

$\rho(MeetConditions, BothDiff \cap Over150 \cap cmType)$

$\rho(solQ2, \pi_{client.CID, client.cname}(MeetConditions \bowtie_{MeetConditions.CID = Client.CID} Client))$

$\boxed{solQ2}$

$$\sigma_{R_1.A=R_2.A=\ldots=R_n.A}\left(R_1 \times R_2 \times R_3 \ldots \times R_n\right)$$ $\Leftarrow$: 3)

נוכיח ע"פ ההגדרה של מכפלה קרטזית:

$\Rightarrow$

$$(*)\quad R_1 \times R_2 \Rightarrow t \in R_1 \times R_2 : r_1 \| r_2 \wedge r_1 \in R_1 \wedge r_2 \in R_2 : t[R_1]=r_1 \wedge t[R_2]=r_2$$

$$(R_1 \times R_2) \times R_3 \Rightarrow t \in ((R_1 \times R_2) \times R_3) \overset{(*)}{:} r_1 \| r_2 \| r_3 \wedge r_1 \in R_1 \wedge r_2 \in R_2 \wedge r_3 \in R_3 : t[R_1]=r_1 \wedge t[R_2]=r_2 \wedge t[R_3]=r_3$$

נמשיך כך בצורה אינדוקטיבית כך שנגיע ל- R_n

$$R_1 \times R_2 \times \ldots \times R_n \Rightarrow t \in R_1 \times R_2 \times \ldots \times R_n : r_1 \| \ldots \| r_n \wedge r_1 \in R_1 \wedge \ldots \wedge r_n \in R_n \mid t[R_1]=r_1 \wedge \ldots \wedge t[R_n]=r_n$$

נסמן $R = R_1 \times R_2 \times \ldots \times R_n$

נבצע גם כעת Selection על הביטוי: $\sigma_{R_1.A=R_2.A=\ldots=R_n.A}(R)$

מההגדרה נקבל כי $t \in \sigma_{R_1.A=R_2.A=\ldots=R_n.A}(R) \Rightarrow t[R_1.A]=t[R_2.A]=\ldots$
$= t[R_n.A]$

ולכן נחבר נקבל:
$$\{t \mid \exists r_1 \in R_1, r_2 \in R_2, \ldots, r_n \in R_n \mid t[R_1]=r_1 \wedge \ldots \wedge t[R_n]=r_n \wedge t[R_1.A]=\ldots=t[R_n.A]\}$$

הגדרה של MultiJoin

$$= \mathrm{MultiJoin}_{\{R_1.A=R_2.A=\ldots=R_n.A\}}(R_1, R_2, \ldots, R_n)$$

$$\mathrm{MultiJoin}_{\{R_1.A=R_2.A=\ldots=R_n.A\}}(R_1, R_2, \ldots, R_n) =$$ $\Rightarrow$:

$$\{t \mid \exists r_1 \in R_1, r_2 \in R_2, \ldots, r_n \in R_n \mid t[R_1]=r_1 \wedge \ldots \wedge t[R_n]=r_n \wedge t[R_1.A]=\ldots=t[R_n.A]\}$$

$$= \{t \mid \exists r_1 \in R_1, r_2 \in R_2, \ldots, r_n \in R_n \mid t[R_1]=r_1 \wedge \ldots \wedge t[R_n]=r_n\} \cap$$

הפרדה ומיזוג בין 2 קבוצות

$$(*)\{t \mid \exists r_1 \in R_1, r_2 \in R_2, \ldots, r_n \in R_n \mid t[R_1.A]=\ldots=t[R_n.A]\}$$

$$= \{t \mid \exists r_1 \in R_1, r_2 \in R_2, \ldots, r_{n-1} \in R_{n-1} \mid t[R_1] = r_1 \wedge \ldots \wedge t[R_{n-1}] = r_{n-1}\} \times R_n \wedge \circledast$$

נ'קח

אותו דבר לפי ההגדרה

$$= \ldots = R_1 \times R_2 \times \ldots \times R_n \wedge \circledast = \sigma_{R_1.A = R_2.A = \ldots = R_n.A}(R_1 \times R_2 \times \ldots \times R_n)$$

נמשיך בצורה אינדוקטיבית

הגדרה של selection על $R_1, R_2, \ldots, R_n$

קיבלנו הכלה דו כיוונ' ולכן,

$$\sigma_{R_1.A = R_2.A = \ldots = R_n.A}(R_1 \times R_2 \times \ldots \times R_n) = \mathrm{MultiJoin}_{\{R_1.A = R_2.A = \ldots = R_n.A\}}(R_1, R_2, \ldots, R_n)$$

■