CS 353 HW 1

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Q1. a)

$$\Pi_{s\text{-name, nationality}}\left(\sigma_{\text{birth-year} > 1988}(\text{singer}) \bowtie \sigma_{\text{year} = 2022}(\text{Album})\right)$$

b)

$$t \leftarrow (\sigma_{\text{year} = 2022 \wedge \text{rating} > 4.0}(\text{Album}))$$

$$\Pi_{s\text{-title, written-by}}((t \bowtie \text{SongInAlbum}) \bowtie \text{Song})$$

c) $\Pi_{s\text{-name}}\left(\sigma_{\text{nationality} = \text{"Turkish"}}(\text{singer}) \bowtie \sigma_{\text{year} \neq 2022}(\text{Album})\right)$

d)

$$t_1 \leftarrow \sigma_{\text{year} = 2022}(\text{Album})$$

$$t_2 \leftarrow \mathcal{G}^{(t1)}_{\max(\text{rating}) \text{ as rating}}$$

$$\Pi_{a\text{-title, singer}}(t_1 \bowtie t_2)$$

e)

$$t_1 \leftarrow \sigma_{\text{year} = 2022}(\text{Album})$$

$$t_2 \leftarrow a\text{-title } \mathcal{G}^{(\text{SongInAlbum})}_{\text{count}(s\text{-title}) \text{ as song-number}}$$

$$\Pi_{a\text{-title}}\left(\sigma_{\text{song-number} > 10}(t_1 \bowtie t_2)\right)$$

a-title	song-number
A	5
B	10
C	11

f)

$$t_1 \leftarrow \sigma_{a\text{-title} = \text{"ABC"}}(\text{Album})$$

$$t_2 \leftarrow (t_1 \bowtie \text{SongInAlbum}) \bowtie \text{Song}$$

$$t_3 \leftarrow s\text{-title } \mathcal{G}^{(t_2)}_{\min(\text{length}) \text{ as shortest}}$$

$$\Pi_{s\text{-title, track-number}}(t_3 \bowtie t_2)$$

t_1:

s-title	a-title	track-nu
b	ABC	1
	ABC	2

Q2.

a) $\pi_{name, price}(\sigma_{company = "Pfizer" \wedge production\text{-}year = 2022}(Drug))$

b) $\pi_{name, TCK}(\sigma_{date = 27.02.2023}(prescription) \bowtie_{(doctor\text{-}TCK = primary\text{-}doctor\text{-}TCK) \wedge (prescription.patient\text{-}TCK = patient.TCK)} patient)$

c) $t \leftarrow \sigma_{date = 27.02.2023}(prescription) \bowtie_{(Prescription.id = DrugInPrescription.presc\text{-}id} DrugInPrescription$

$\pi_{name, company}(t \bowtie_{t.drug\text{-}name = Drug.name} Drug)$

d) $t \leftarrow \sigma_{date = 27.2.2023}(prescription) \bowtie_{Prescription.Doctor\text{-}TCK = Docktor.TCK} \sigma_{city = "Ankara"}(Doctor)$

$\pi_{TCK, name}(\sigma_{birthyear < 1953}(Patient) \bowtie_{Patient.TCK = t.patient\text{-}TCK} t)$

e) $t_1 \leftarrow {}_{production\text{-}year}\mathcal{G}_{max(price)\ as\ price}(drug)$

t : production-year	price
2022	10
2010	20

$\pi_{name, company}(t_1 \bowtie Drug)$

f) $t_1 \leftarrow \sigma_{date = 27.02.2023}(Prescription \bowtie_{Prescription.id = DrugIn Prescription.presc\text{-}id} DrugIn\ Prescription)$

$t_2 \leftarrow {}_{Presc.id}\mathcal{G}_{count(drug\text{-}name)\ as\ drug\text{-}num}(t_1)$

$t_3 \leftarrow {}_{presc.id}\mathcal{G}_{max(drug\text{-}num)\ as\ drug\text{-}num}(t_2)$

$\pi_{id, doctor\text{-}TCK}(t_3 \bowtie_{presc.id = id} t_1)$

Q2)

g) $t_1 \leftarrow \sigma_{date = 27.02.2023}^{(Prescription)}$

$t_2 \leftarrow t_1 \bowtie_{id = presc\text{-}id} DrugInPrescription$

$t_3 \leftarrow {}_{drug\text{-}name}\mathcal{G}_{count(drug\text{-}name)\, as\, drug\text{-}num}^{(t_2)}$

$\Pi_{name, company}\left(\sigma_{drug\text{-}num \geq 100}^{(t_3)} \bowtie_{drug\text{-}name = name} Drug\right)$

h) $t_1 \leftarrow {}_{patient\text{-}TCK}\mathcal{G}_{count(patient\text{-}TCK)\, as\, count}^{(Prescription)}$

$t_2 \leftarrow \sigma_{count \geq 100}^{(t_1)}$

$oldest \leftarrow {}_{TCK}\mathcal{G}_{min(birthyear)\, as\, birthyear}^{(Patient)}$

$t_3 \leftarrow oldest \bowtie_{TCK = patient\text{-}TCK} t_2$

$\Pi_{TCK, name}(t_3)$