CS 353 Fall 2022
Homework 1 Solutions

Q.1

(a)

$\prod_{\text{s-id, s-name}} (\sigma_{\text{dept = "CS"}} (\text{student}) \bowtie \text{take} \bowtie \sigma_{\text{dept = "EE"} \wedge \text{credits = 3}} (\text{course}))$

(b)

$\prod_{\text{s-id, s-name, c-id}} (\sigma_{\text{dept = "CS"} \wedge \text{year = 4}} (\text{student}) \bowtie \text{take}) \div \prod_{\text{c-id}} (\sigma_{\text{dept = "MATH"} \wedge \text{credits = 4}} (\text{course}))$

(c)

$\prod_{\text{s-id, s-name}} (\sigma_{\text{dept = "CS"}} (\text{student}) \bowtie \sigma_{\text{grade = "A"}} (\text{take}) \bowtie \sigma_{\text{p-id = "CS101"}} (\text{prereq}))$

(d)

$\prod_{\text{s-id, s-name}} (\sigma_{\text{dept = "CS"}} (\text{student}) \bowtie \sigma_{\text{grade = "A"}} (\text{take}) \bowtie_{\text{take.c-id = prereq.p-id}} \sigma_{\text{c-id = "CS353"}} (\text{prereq}))$

(e)

$\text{T1} \leftarrow \sigma_{\text{c-id = "CS353"}} (\text{take})$

$\text{T2} \leftarrow \sigma_{\text{c-id = "CS342"}} (\text{take})$

$\prod_{\text{s-id, s-name}} (\sigma_{\text{dept = "CS"} \wedge \text{year = 3}} (\text{student}) \bowtie \prod_{\text{s-id}} (\text{T1} \bowtie_{\text{T1.s-id = T2.sid} \wedge \text{T1.grade > T2.grade}} \text{T2}))$

(f)

$\prod_{\text{s-id, s-name}} ((\prod_{\text{s-id}} (\text{student}) - \prod_{\text{s-id}} (\sigma_{\text{grade < "C"}} (\text{take}))) \bowtie (\sigma_{\text{dept = "CS"} \wedge \text{year = 1}} (\text{student})))$

(g)

$\mathcal{G}_{\text{count(*)}} \sigma_{\text{c-id = "CS353"} \wedge \text{grade = "A"}} (\text{take})$

(h)

$\text{Temp} \leftarrow \text{c-id} \, \mathcal{G}_{\text{count(*) as prereq\_cnt}} (\text{prereq})$

$\prod_{\text{c-id}} (\sigma_{\text{prereq\_cnt > 2}} (\text{Temp}))$

(i)

$\text{Temp1} \leftarrow \text{c-id} \, \mathcal{G}_{\text{count(*) as prereq\_cnt}} (\text{prereq})$

$\text{Temp2} \leftarrow \mathcal{G}_{\text{max(prereq\_cnt) as prereq\_cnt}} (\text{Temp1})$

$\prod_{\text{c-id}} (\text{Temp1} \bowtie \text{Temp2})$

Q.2

(a)

$\prod_{\text{home-team}}(\sigma_{\text{away-team = “Anadolu Efes” } \wedge \text{ home-points > away-points}}(\text{game}))$

(b)

$\prod_{\text{p-id,pname}}(\prod_{\text{away-team}}(\sigma_{\text{home-team = “Anadolu Efes” } \wedge \text{ home-points < away-points}}(\text{game})) \bowtie_{\text{away-team = tname}}(\text{player}))$

(c)

$\prod_{\text{tname}}(\text{team}) - \prod_{\text{home-team}}(\sigma_{\text{home-points < away-points}}(\text{game}))$

(d)

$\text{tname } \mathcal{G}_{\text{min(age)}}(\sigma_{\text{city = “İstanbul”}}(\text{team}) \bowtie \text{player})$

(e)

$\text{Temp} \leftarrow \text{tname } \mathcal{G}_{\text{min(age) as age}}(\sigma_{\text{city = “İstanbul”}}(\text{team}) \bowtie \text{player})$

$\prod_{\text{team, p-id, pname}}(\text{player} \bowtie \text{Temp})$

(f)

$\text{Temp1} \leftarrow \prod_{\text{home-team}}(\sigma_{\text{away-team = “Anadolu Efes” } \wedge \text{ home-points > away-points}}(\text{game}))$

$\text{Temp2} \leftarrow \mathcal{G}_{\text{min(budget) as budget}}(\text{team} \bowtie_{\text{tname = home-team}} \text{Temp1})$

$\prod_{\text{tname}}(\text{team} \bowtie \text{Temp2})$

Q.3

We can disprove that by providing an example (instance for each of *R, S*) that shows:

$\sigma_{\Theta}(R \cup S) \neq \sigma_{\Theta}(R) \cup S$

R

A	**B**
a1	b1

S

A	**B**
a2	b2

$\sigma_{A=a1}(R \cup S)$:

A	**B**
a1	b1

$\sigma_{A=a1}(R)$ U S:

A	**B**
a1	b1
a2	b2