ADC

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Assignment 2

Q2.

1]

$$\Pi_{a.cui}\left(\sigma_{b.cui\ IS\ NULL}\left(\left(\rho_a(mrconso) \bowtie_{a.cui=b.cui \wedge a.aui \neq b.aui} \rho_b(mrconso)\right)\right)\right)$$

2]

$$\Pi_{cui,aui,tty,str}\left(\sigma_{str\ LIKE\ '\%teeth\%' \wedge sab='MSH'}(mrconso)\right)$$

3]

$$\Pi_{rela}\left(\sigma_{sab='MSH'}(mrrel)\right) \cap \Pi_{rela}\left(\sigma_{sab='SNOMEDCT\_US'}(mrrel)\right)$$

4] This will be solved in 3 steps:

Step 1:

$$Alzcui \leftarrow \Pi_{cui}\left(\sigma_{str='Alzheimer's\ disease'}(mrconso)\right)$$

Step 2:

$$Alzsyn \leftarrow \Pi_{aui,str,sab}\left(\sigma_{cui \in (\Pi_{cui}(Alzcui))}(mrconso)\right)$$

Step 3:

$$Alzrelation \leftarrow \Pi_{*}\left(\sigma_{cui1 \in (\Pi_{cui}(Alzcui)) \vee cui2 \in (\Pi_{cui}(Alzcui))}(mrrel)\right)$$

Q3. Optimize the R.A.

1]

$\Pi_{t.aui, t.str}(\sigma_{r.aui2 = co.aui} \wedge (co.sab \neq 'MSH') \wedge (r.cui = 'C0013455')$ (mrrel × mrconso))

By Selection Pushdown,

$\Pi_{t.aui, t.str}(\sigma_{r.aui2 = co.aui}(\sigma_{co.sab \neq 'MSH'}(\sigma_{r.cui = 'C0013455'}$ (mrrel × mrconso))))

$= \Pi_{t.aui, t.str}(r \bowtie_{r.aui2 = co.aui}(co \bowtie_{co.sab \neq 'MSH'} \sigma_{r.cui = 'C0013455'}(r)))$

$= \Pi_{t.aui, t.str}$ (mrrel $\bowtie_{r.aui2 = co.aui}$ (mrconso $\bowtie_{co.sab \neq 'MSH'}$ $\sigma_{r.cui = 'C0013455'}$ (mrrel)))

By Projection Pushdown,

$= \Pi_{aui, str}(\Pi_{aui, str}(\sigma_{r.aui2 = co.aui}(\Pi_{aui2, cui}(\sigma_{r.cui = 'C0013455'}$ (mrrel)))))

$\bowtie \Pi_{aui, str}(\sigma_{co.sab \neq 'MSH'}$ (mrconso))

2]

$\delta(\Pi_{aui, cui}(\sigma_{co.aui = h.aui} \wedge h.paui = 'A0743536' \wedge co.cui = s.cui \wedge s.sty = 'Hazardous or Poisonous substance'$ (mrconso $\times$ mrhier h $\times$ mrsty s)))

By Selection Pushdown.

$\delta(\pi_{aui,cui}(\sigma_{co.aui = h.aui}(\sigma_{h.paui = 'A0743536'}(\sigma_{co.cui = s.cui}(\sigma_{s.sty = 'Hazardous or Poisonous Substance'}(co \times h \times s))))))$

By Projection Pushdown.

$\pi_{aui,cui}(h \bowtie_{h.aui = co.aui}(\sigma_{h.paui = 'A0743536'}(co \bowtie_{co.cui = s.cui}(\sigma_{s.sty = 'Hazardous or Poisonous Substance'}(s)))))$

$= \pi_{aui,cui}(h \bowtie_{h.cui = s.cui}(\sigma_{h.paui = 'A0743536'}(\sigma_{sty = 'Hazardous or Poisonous substance'}(s))))$

$= \pi_{aui,cui}(\pi_{aui,cui,paui}(\sigma_{h.paui = 'A0743536'}(h))) \bowtie_{h.cui = s.cui}(\pi_{cui,sty}(\sigma_{sty = 'Hazardous or Poisonous substance'}(s)))$

SQL Query

```
SELECT co.aui , co.cui
FROM ( SELECT aui, cui FROM mrhier h
       WHERE h.paui = 'A0743536' ) co
       WHERE co.cui IN ( SELECT s.cui FROM mrsty s
                         WHERE s.sty = 'Hazardous or
                         Poisonous substance)
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3]

$\delta(\Pi_{c.aui, c.str}(\sigma_{c.aui = h.paui \wedge c.str\ LIKE\ '\%heart'}(e_c\ mrconso \times e_h\ mrhier)))$

By selection Pushdown,

$\Pi_{c.aui, c.str}(\sigma_{c.str\ LIKE\ '\%heart'}(c) \bowtie_{c.aui = h.paui} (h))$

By Projection Pushdown,

$\Pi_{aui, str}((\Pi_{aui, str}(\sigma_{str\ LIKE\ '\%heart'}(c))) \bowtie_{c.aui = h.paui} (\Pi_{paui}(h)))$