B461 Assingment 4

by Matthew Ploetz

1

Q: Find the bookno of each book that is cited by at least one book that cost cost less than $50.

$$\pi_{\text{CitedBookNo}}(\text{Book} \bowtie_{C.\text{BookNo}=B.\text{BookNo} \wedge B.\text{Price}<50} \text{Cites})$$

2

Q: Find the bookno and title of each book that was bought by a student who majors in CS and in Math.

Expression Name	RA Expression
E_1	$\pi_{M.\text{Sid}}(\text{Major}\ \sigma_{M.\text{Major}='\text{Math}'})$
E_2	$\pi_{M.\text{Sid}}(\text{Major}\ \sigma_{M.\text{Major}='\text{CS}'})$
E_3	$\pi_{B.\text{BookNo},B.\text{Title}}(\sigma_{S.\text{Sid}=M.\text{Sid}}(E_1)_{\wedge S.\text{Sid}=M.\text{Sid}}(E_2)$ $_{\wedge S.\text{Sid}=\text{Buy.Sid} \wedge \text{Buy.BookNo}=B.\text{BookNo}}\text{Book} \times \text{Student} \times \text{Buy})$
F	$\pi_{\text{BookNo}o}(E_3)$

3

Q:Find the sid-bookno pairs (s, b) pairs such student s bought book b and such that book b is cited by at least two books that cost less than $50.

Expression Name	RA Expression
E_1	$\pi_{\text{Sid,BookNo}}(\text{Buys})$
E_2	$\pi_{\text{CitedBookNo}}(\sigma_{B.\text{BookNo}=C.\text{BookNo} \wedge B.\text{Price}<50 \wedge B.\text{BookNo}!=B2.\text{BookNo} \wedge C.\text{CitedBookNo}=C2.\text{CitedBookNo} \wedge B2.\text{Price}<50}(\text{Book}\ B \times \text{Cites}\ C \times \text{Book}\ B2 \times \text{Cites}\ C2))$
E_3	$\pi_{E_1.\text{Sid},E_1.\text{BookNo}}(E_1 \bowtie \sigma_{E_1.\text{BookNo}=E_2.\text{CitedBookNo}} E_2)$
F	$\pi_{\text{Sid,BookNo}}(E_3)$

4

Q: Find the sid of each student who bought all books that cost more than $50.

Expression Name	RA Expression
E_1	$\pi_{\text{BookNo}}(\sigma_{\text{Price}>50}(\text{Book}))$
E_2	$\pi_{\text{Buys.Sid},E_1.\text{BookNo}}(\text{Buys} \times E_1)$
E_3	$\pi_{\text{Sid,BookNo}}(\sigma_{\text{BookNo}=E_1.\text{BookNo}}(\text{Buys} \times E_1))$
E_4	$E_2 - E_3$
E_5	$\pi_{\text{Sid}}(E_3 - E_4)$
F	$\pi_{\text{Sid}}(E_5)$

5

Q: Find the Bookno of each book that was not bought by any student who majors in CS.

Expression Name	RA Expression
E_1	$\pi_{\text{BookNo}}(\text{Book})$
E_2	$\pi_{\text{Buy.BookNo}}(\sigma_{\text{Major}='\text{CS}'\wedge\text{Buy.Sid}=M.\text{Sid}}(\text{Major} \times \text{Buys}))$
E_3	$E_1 - E_2$
F	$\pi_{\text{BookNo}}(E_3)$

6

Q: Find the Bookno of each book that was not bought by all students who majors in CS.

Expression Name	RA Expression
E_1	$\pi_{B.\text{BookNo}}(\sigma_{\text{Buy.Sid}=M.\text{Sid}\wedge M.\text{Major}='\text{CS}'}(\text{Book}\, B \times \text{Major} \times \text{Buys}))$
E_2	$\pi_{B.\text{BookNo}}(\sigma_{M.\text{Major}!='\text{CS}'\wedge\text{Buy.Sid}=M.\text{Sid}}(\text{Book B} \times \text{Major}\, M \times \text{Buys}))$
E_3	$E_1 \cap E_2$
F	$\pi_{\text{BookNo}}(E_3)$

7

Q: Find sid-bookno pairs (s, b) such that not all books bought by student s are books that cite book b.

Expression Name	RA Expression
E_1	$\pi_{B.\text{Sid},B.\text{BookNo},B2.\text{BookNo AS bno}}(\text{Buys}\, B \times \text{Book}\, B2)$
E_2	$\pi_{B.\text{Sid},B.\text{BookNo},C.\text{CitedBookNo AS bno}}(\text{Buys}\, B \bowtie_{C.\text{BookNo}=B.\text{BookNo}} \text{Cites}\, C)$
E_3	$E_1 - E_2$
F	$\pi_{E_3.\text{Sid},E_3.\text{BookNo}}(E3)$

8

Q: Find sid-bookno pairs (s, b) such student s only bought books that cite book b.

Expression Name	RA Expression
E_1	$\pi_{B.\text{Sid}, B.\text{BookNo}, B2.\text{BookNo AS bno}}(\text{Buys } B \times \text{Book } B2)$
E_2	$\pi_{B.\text{Sid}, B.\text{BookNo}, C.\text{CitedBookNo AS bno}}(\text{Buys } B \bowtie_{C.\text{BookNo}=B.\text{BookNo}} \text{Cites } C)$
E_3	$E_1 - E_2$
E_4	$\pi_{S.\text{Sid}, B.\text{BookNo AS bno}}(\text{Students } S \times \text{Book } B)$
E_5	$E_4 - \pi_{E3.\text{Sid}, E3.\text{bno}}(E_3)$
F	$\pi_{E_5.\text{Sid}, E_5.\text{bno AS BookNo}}(E_5)$