

B461 A6

BY MATTHEW PLOETZ

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A)

$\pi_{S.Sid, B1.BookNo}(\sigma_{S.Sid=b1.Sid \text{ AND } S.Sid=B2.Sid \text{ AND } B1.BookNo \neq B2.BookNo \text{ AND } S.Sname='Eric' \text{ AND } b1.BookNo \neq 2010}(S \times B1 \times B2))$

B)

SELECT DISTINCT b.bookno, b.title FROM book b, student s WHERE b.price = SOME(select b1.price from buys t, book b1 where b1.price > 50 and s.sid = t.sid and t.bookno = b1.bookno);

SOME(select b1.price from buys t, book b1 where b1.price > 50 and s.sid = t.sid and t.bookno = b1.bookno)

→

Exists(select b1.price from buys t, book b1 where b1.price > 50 and s.sid = t.sid and t.bookno = b1.bookno)

→

$\pi_{B1.Price}(\sigma_{B1.Price > 50 \text{ AND } S1.Sid=T.Sid \text{ AND } T.BookNo=B1.BookNo}(T \times B1 \times S1))$

→

$(S \times B \bowtie (\pi_{S1.Sname, S1.Sid}(\sigma_{B1.Price > 50 \text{ AND } S1.Sid=T.Sid \text{ AND } T.BookNo=B1.BookNo}(T \times B1 \times S1))))$

→

$\pi_{B.BookNo, B.Title}(\pi_{B1.Price=B1.Price}(\pi_{B2.Price}(\pi_{S1.Sname, S1.Sid}(\sigma_{B1.Price > 50 \text{ AND } S1.Sid=T.Sid \text{ AND } T.BookNo=B1.BookNo \text{ AND } B2.Price=B1.Price}(T \times B1 \times S1 \times B2))))))$

C)

SELECT b.bookno FROM book b WHERE b.bookno IN (SELECT b1.bookno FROM book b1 WHERE b1.price > 50) UNION (SELECT c.bookno FROM cites c);

→

select b.bookno from book b where exists(select b1.bookno from book b1 where b1.price > 50 and b.bookno = b1.bookno) union (select c.bookno from cites c)

→

Sub1:

$\pi_{B1.BookNo}(\sigma_{B1.Price > 50 \text{ AND } B.BookNo=B1.BookNo}(B1))$

Sub2:

$\pi_{C.BookNo}(C)$

→

$\pi_{B1.BookNo}(\sigma_{B1.Price > 50 \text{ AND } B.BookNo=B1.BookNo}(B1)) \cup \pi_{C.BookNo}(C)$

→

$B \bowtie \pi_{B1.BookNo}(\sigma_{B1.Price > 50 \text{ AND } B.BookNo=B1.BookNo}(B1)) \cup \pi_{C.BookNo}(C)$

→

$(B \ltimes (\pi_{B2.BookNo, B2.Price, B2.Title}(\sigma_{B1.Price > 50 \text{ AND } B2.BookNo = B1.BookNo}(B1 \times B2)) \cup (\pi_{C.BookNo}(C))))$

→

$\pi_{B.BookNo}$

$(B \ltimes (\pi_{B2.BookNo, B2.Price, B2.Title}(\sigma_{B1.Price > 50 \text{ AND } B2.BookNo = B1.BookNo}(B1 \times B2)) \cup (\pi_{C.BookNo}(C))))$

D)

SELECT b.bookno FROM book b WHERE b.price >= 80 and NOT EXISTS(SELECT b1.bookno FROM book b1 WHERE b1.Price > b.Price);

→

$\pi_{B1.BookNo}(\sigma_{B1.Price > B2.Price}(B2 \times B1))$

→

$\pi_{B2.BookNo, B2.Title, B2.Price}(\sigma_{B1.Price > B2.Price}(B2 \times B1))$

→

$\pi_{B.BookNo}(\sigma_{B.Price \geq 80 \text{ and } (B)}) \pi_{B2.BookNo, B2.Title, B2.Price}(\sigma_{B1.Price > B2.Price}(B2 \times B1))$

→

$\pi_{B.BookNo}(\sigma_{B.Price \geq 80 \text{ and } (B \bar{\ltimes} (\pi_{B2.BookNo, B2.Title, B2.Price}(\sigma_{B1.Price > B2.Price}(B2 \times B1))))$

→

$\pi_{B.BookNo}(\sigma_{B.Price \geq 80}(B)) -$

$(\pi_{B.BookNo}(\sigma_{B.Price \geq 80})(B \ltimes (\pi_{B2.BookNo, B2.Title, B2.Price}(\sigma_{B1.Price > B2.Price}(B2 \times B1))))$

E)

SELECT s.sid FROM Student s WHERE EXISTS(SELECT 1 FROM Book b WHERE b.price > 50 AND b.bookno IN (SELECT t.bookno FROM Buys t WHERE s.sid = t.sid AND s.sname = 'Eric'))

SELECT s.sid FROM Student s WHERE EXISTS(SELECT 1 FROM Book b WHERE b.price > 50 AND EXISTS(SELECT t.bookno FROM Buys t WHERE s.sid = t.sid AND s.sname = 'Eric' and b.bookno = t.bookno))

Sub3:

$\pi_{t.BookNo}(\sigma_{S1.Sid=t.Sid \text{ and } s1.Sname='Eric'}(S1 \times T))$

$\pi_{t.BookNo}(\sigma_{S1.Sid=t.Sid \text{ and } s1.Sname='Eric' \text{ and } B1.BookNo}(S1 \times T \times B1))$

$(S \times B) \ltimes \pi_{t.BookNo}(\sigma_{S1.Sid=t.Sid \text{ and } s1.Sname='Eric' \text{ and } B1.BookNo}(S1 \times T \times B1))$

Sub2:

$\pi_{S1.Sid, S1.Sname}(\sigma_{B.Price > 50 \text{ and } B.BookNo}(B) \ltimes \mathcal{E})$

→

$\pi_{S.Sid}(S) \ltimes S1.Sid=S.Sid (\pi_{S1.Sid, S1.Sname}(\sigma_{B.Price > 50 \text{ and } B.BookNo}(B) \ltimes \mathcal{E}))$

F)

SELECT s1.sid, s2.sid FROM student s1, student s2 WHERE s1.sid < s2.sid AND NOT EXISTS(SELECT 1 FROM Buys t1 WHERE t1.sid = s1.sid AND t1.bookno NOT IN (SELECT t2.bookno FROM Buys t2 WHERE t2.sid = s2.sid));

SELECT s1.sid, s2.sid FROM student s1, student s2 WHERE s1.sid = s2.sid AND NOT EXISTS(SELECT 1 FROM Buys t1 WHERE t1.sid = s1.sid AND NOT EXISTS (SELECT t2.bookno FROM Buys t2 WHERE t2.sid = s2.sid and t1.bookno = t2.bookno));

$T1 \bar{\bowtie} \pi_{t2.BookNo}(\sigma_{t2.Sid=S2.Sid \text{ and } t1.BookNo=t2.BookNo}(T2))$

→

$(T1 \times S2) \bowtie \pi_{t2.BookNo}$

$(\sigma_{t2.Sid=S3.Sid \text{ and } t3.BookNo=t2.BookNo}(T2 \times T3 \times S3) - \sigma_{t2.Sid=S2.Sid \text{ and } t3.BookNo=t2.BookNo}(T2 \times T3 \times S3))$

→

$\pi_{s1.Sid, S2.Sid}(\sigma_{S1.Sid \neq S2.Sid}(S1 \times S2) - (S1 \times S2) \bowtie \pi_{t1.Sid, T1.BookNo}(\sigma_{t1.Sid=s1.Sid}(S1 \times T1))) \bowtie \mathcal{E}$

2

A)

$\pi_{S.Sid, B1.BookNo}(\sigma_{S.Sid=b1.Sid \text{ AND } S.Sid=B2.Sid \text{ AND } B1.BookNo \neq B2.BookNo \text{ AND } S.Sname='Eric' \text{ AND } b1.BookNo \neq 2010}(S \times B1 \times B2))$

→

Take out cross of buys and join them

$\pi_{B1.Sid, B1.BookNo}(\sigma_{B1.BookNo \neq '2010'}(B1)) \bowtie_{B1.BookNo \neq B2.BookNo \text{ and } B1.Sid=B2.Sid} \pi_{B2.Sid, B2.BookNo}(B2)$

→

$\pi_{S.Sid, B1.BookNo}(\sigma_{S.Sname='Eric'}(S))$

→

$\pi_{S.Sid, B1.BookNo}(\sigma_{S.Sname='Eric'}(S)) \bowtie_{S.Sid=B1.Sid \text{ and } S.Sid=B2.Sid} \pi_{B1.Sid, B1.BookNo}$

$(\sigma_{B1.BookNo \neq '2010'}(B1)) \bowtie_{B1.BookNo \neq B2.BookNo \text{ and } B1.Sid=B2.Sid} \pi_{B2.Sid, B2.BookNo}(B2)$

B)

$\pi_{B.BookNo, B.Title}(\pi_{B1.Price=B1.Price}(\pi_{B2.Price}(\pi_{S1.Sname, S1.Sid}(\sigma_{B1.Price>50 \text{ AND } S1.Sid=T.Sid \text{ AND } T.BookNo=B1.BookNo \text{ and } B2.Price=B1.Price}(T \times B1 \times S1 \times B2))))))$

→

Pull out books

$\pi_{B1.BookNo, B1.Price}(\sigma_{B1.Price>50}(B1))$

$\pi_{T.Sid, B1.Price}(T) \bowtie_{T.BookNo=B1.BookNo} (\pi_{B1.Price, B1.BookNo}(\sigma_{B1.Price>50}(B1)))$

→

Combine B1,T and S1

$\pi_{B1.Price}(\sigma_{S1.Sid}(S1)) \bowtie_{S1.Sid=T.Sid} \pi_{T.Sid, B1.Price}(T) \bowtie_{T.BookNo=B1.BookNo} (\pi_{B1.BookNo, B1.Price}(\sigma_{B1.Price>50}(B1)))$

→

Reducing

Same Books bought

$\pi_{B.\text{BookNo}, B.\text{Title}}(B) \bowtie_{B.\text{Price}=B1.\text{Price}} (\pi_{B1.\text{Price}}(T) \bowtie_{T.\text{BookNo}=B1.\text{BookNo}} (\pi_{B1.\text{BookNo}, B1.\text{Price}} (\sigma_{B1.\text{Price}>50}(B1))))$
C)

$\pi_{B.\text{BookNo}}$

$(B \bowtie (\pi_{B2.\text{BookNo}, B2.\text{Price}, B2.\text{Title}} (\sigma_{B1.\text{Price}>50 \text{ AND } B2.\text{BookNo}=B1.\text{BookNo}} (B1 \times B2))) \cup (\pi_{C.\text{BookNo}}(C)))$

\longrightarrow

$\pi_{B1.\text{BookNo}}(\sigma_{B1.\text{Price}>50}(B1))$

\longrightarrow

$\pi_{C.\text{BookNo}}(C)$

\longrightarrow

Reducing to less Union

$\pi_{B.\text{BookNo}}(\pi_{B1.\text{BookNo}}(\sigma_{B1.\text{Price}>50}(B1)) \cup \pi_{C.\text{BookNo}}(C))$

D)

$\pi_{B.\text{BookNo}}(\sigma_{B.\text{Price} \geq 80}(B)) -$

$(\pi_{B.\text{BookNo}}(\sigma_{B.\text{Price} \geq 80})(B \bowtie (\pi_{B2.\text{BookNo}, B2.\text{Title}, B2.\text{Price}} (\sigma_{B1.\text{Price}>B2.\text{Price}} (B2 \times B1))))$

\longrightarrow

$\pi_{B.\text{BookNo}}(\sigma_{B.\text{Price} \geq 80}(B)) \cap (\pi_{B2.\text{BookNo}, B2.\text{Title}, B2.\text{Price}} (\sigma_{B1.\text{Price}>B2.\text{Price}} (B2 \times B1)))$

\longrightarrow

$\pi_{B.\text{BookNo}}(\sigma_{B.\text{Price} \geq 80}(B)) -$

$\pi_{B.\text{BookNo}}(\sigma_{B.\text{Price} \geq 80}(B)) \cap (\pi_{B2.\text{BookNo}, B2.\text{Title}, B2.\text{Price}} (\sigma_{B1.\text{Price}>B2.\text{Price}} (B2 \times B1)))$

\longrightarrow

Which is same as saying $\emptyset \cup \mathcal{E}$ so we can say

$\pi_{B.\text{BookNo}}(\sigma_{B.\text{Price} \geq 80}(B)) -$

$\pi_{B2.\text{BookNo}}(B1) \bowtie_{B1.\text{Price}>B2.\text{Price}} (B2)$

3

A)

WITH

E1 AS (SELECT S.Sid FROM Student S WHERE S.Sname = 'Eric'),

E2 AS (SELECT B1.BookNo, B1.Sid FROM Buys B1 WHERE B1.BookNo != '2010'),

E3 AS (SELECT E2.BookNo, E2.Sid FROM E2 INNER JOIN Buys B ON (E2.Sid = B.Sid AND E2.BookNo != B.BookNo)),

E4 AS (SELECT E3.Sid, E3.BookNo FROM E3 INNER JOIN E3 ON (E3.Sid = E1.Sid))

SELECT * FROM E4;