Assignment 4
Computer Science
Fall 2017
B461

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Answers

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

$$\pi_{C.CitedBookno}(\sigma_{B.Price\ <\ 50}\ (Cites \bowtie_{C.CitedBookno=B.Bookno} Book))$$

2. Find the bookno and title of each book that was bought by a student who majors in CS and in Math. Let Major1 be a copy of Major with schema $(sid, major)$.

$$\pi_{B.Bookno,B.Title}(\sigma_{M.Major=Math\ \wedge\ M1.Major=CS}(Student \bowtie (Major \bowtie Major1))) \bowtie Buys \bowtie Book)$$

3. 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. Let Cites1 be a copy of Cites with schema (Bookno, CitedBookNo).

$$\pi_{CitedBookno}(\sigma_{Price\ <\ 50}(\sigma_{C.CitedBookno=C1.CitedBookno\ \wedge\ C.BookNo\neq C1.BookNo}(Cites \times Cites1) \bowtie^{1} Book)) \bowtie Buys$$

[1] *Should be* $\bowtie_{CitedBookno=Book.Bookno}$ *but can't fit in one line*

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

$$\pi_{sid}(Student) - \pi_{sid}((Student\ \times\ (\pi_{bookno}(\sigma_{Price>50}(Book)))) - Buys)]$$

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

$$(\pi_{bookno}(Book) - \pi_{bookno}(Buys)) \cup (\pi_{bookno}(Book) - \pi_{bookno}(\sigma_{Major=CS}(Buys \bowtie Major)))$$

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

$$Let\ R = \pi_{bookno}(Book) - \pi_{bookno}(Buys)$$

$$\pi_{sid,bookno}(\pi_{sid}(\sigma_{Major=CS}(Major)) \times \pi_{bookno}(Book)) - \pi_{sid,bookno}(\sigma_{Major=CS}(Buys \bowtie Major)) \cup R$$

**I created a cartesian product of CS students and all possible books then did the set difference of that cartesian product with all the CS student's purchased books. Any book remaining from that list must not have been purchased by every student. I assigned R1 to fit everything on single lines.*

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

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