Assignment 5

Relation Algebra Expressions

1. Initial Query:

$$\pi_{s.sid,s.sname,b.bookno,b.title}(Student \times (Book \bowtie_{s.sname='Eric' \vee s.sname='Anna' \wedge s.sid=t.sid \wedge b.price>20 \wedge t.bookno=b.bookno} Buys)$$

Final Query:

$$\pi_{s.sid,s.sname,b.bookno,b.title}(\sigma_{s.sname='Eric' \vee s.sname='Anna'}(Student) \bowtie (Buys) \bowtie (\sigma_{b.price>20}(Book)))$$

2. Initial Query:

$$\pi_{s.sid}(Student \times (Book \bowtie_{s.sname='Eric' \vee s.sname='Anna' \wedge s.sid=t.sid \wedge b.price>20 \wedge t.bookno=b.bookno} Buys)$$

Final Query:

$$\pi_{s.sid}(\pi_{s.sid}(\sigma_{s.sname='Eric' \vee s.sname='Anna'}(Student)) \bowtie ((Buys) \bowtie \pi_{b.bookno}(\sigma_{b.price>20}(Book))))$$

3. Initial Query:

$$\pi_{s.sid,b1.price,b2.price}(\pi_{s.sid}(\sigma_{s.sname\neq'Eric'}(Student)) \times ((((Book_2) \bowtie_{b1.bookno\neq b2.bookno \wedge b1.price>60 \wedge b2.price>=50} (Book_1)) \bowtie_{t1.bookno=b1.bookno \wedge t1.sid=s.sid} (Buys_1)) \bowtie_{t2.bookno=b2.bookno \wedge t2.sid=s.sid} (Buys_2)))$$

Final Query:

$$\pi_{s.sid,b1.price,b2.price}(\pi_{s.sid}(\sigma_{s.sname\neq'Eric'}(Student)) \bowtie (\pi_{b2.bookno,b2.price}(\sigma_{b2.price>=50}(Book_2)) \bowtie (Buys_2)) \bowtie_{b1.bookno\neq b2.bookno \wedge t1.sid=s.sid} ((\pi_{b1.bookno,b1.price}(\sigma_{b1.price>60}(Book_1))) \bowtie (Buys_1)))$$

4. Initial Query:

$$\pi_{sid}((\pi_{s.sid,s.sname}(Student)) - (\pi_{s.sid,s.sname}((Student \bowtie_{s.sid=t.sid} Buys) \bowtie_{t.bookno=b.bookno \wedge b.price>50} Book)))$$

Final Query:

$$\pi_{s.sid}(Student)) - (Buys \bowtie (\pi_{b.bookno}(\sigma_{b.price>50}(Book))))$$

5. Initial Query:

$$\pi_{sid,sname}((\pi_{s.sid,s.sname,2007}(Student \times Book)) \cap (\pi_{s.sid,s.sname,b.bookno}((Student \times Book) \bowtie_{s.sid=t.sid \wedge t.bookno=b.bookno \wedge b.price<25} Buys))))$$

Final Query:

$$\pi_{s.sid,s.sname}(Student \bowtie Buys \bowtie (\pi_{b.bookno}(\sigma_{b.price<25 \wedge b.bookno=2007}(Book))))$$

6. Initial Query:

$$\pi_{q.bookno}((\pi_{s.sid,s.sname,b.bookno,b.title}(Student \times Book)) - (\pi_{s.sid,s.sname,b.bookno,b.title}((Student \times Book) \bowtie_{s.sid=t.sid \wedge t.bookno=b.bookno \wedge b.price<20} Buys)))$$

Final Query:

$$\pi_{bookno}((\pi_{s.sid,b.bookno}(\pi_{sid}(Student) \times \pi_{bookno}(Book))) - (\pi_{t.sid,b.bookno}(Buys \bowtie (\pi_{bookno}(\sigma_{b.price<20}(Book))))))$$

7. Initial Query:

$$\pi_{sid}(Student) - \pi_{s1.sid}((Student_1 \bowtie_{s1.sid\neq s2.sid} Student_2) \bowtie_{s1.sid=t1.sid} Buys_1) \cup \pi_{s1.sid}((((Student_1 \bowtie_{s1.sid\neq s2.sid} Student_2) \bowtie_{s.sid=t1.sid} Buys_1) \bowtie_{t1.bookno=t2.bookno \wedge t2.sid=s2.sid} Buys_2) \bowtie_{t2.bookno=b.bookno \wedge b.price=80} Book)$$

Final Query:

$$\pi_{s.sid}(Student) - \pi_{t.sid}(Buys)$$