CS 3431 – Homework 2

Przemek Gardias

Question 1.

Author(ID, dob, name, address, phones)
Writes(ID, ISBN)
    Foreign key: Writes.ID references Author.ID
    Foreign key: Writes.ISBN references Book.ISBN
Book(ISBN, title, type, numPages)
Novel(ISBN, title, type, numPages, sequel)
Textbook(ISBN, title, type, numPages, edition)
Publishes(ISBN, name, publishDate)
    Foreign key: Publishes.ISBN references Book.ISBN
    Foreign key: Publishes.name references Publisher.name
Publisher(name, startYear, phone, address)
P-Signs(name, contractID)
    Foreign key: P-Signs.name references Publisher.name
    Foreign key: P-Signs.contractID references Contract.contractID
Contract(contractID, numBooks, totalPayment, date)
Contains(contractID, lineNum)
    Foreign key: Contains.contractID references Contract.contractID
    Foreign key: Contains.lineNum references Contract-Lines.lineNum
Contract-Lines(lineNum, bookType, dueDate, partialPayment)
A-Signs(contractID, ID)
    Foreign key: A-Signs.contractID references Contract.contractID
    Foreign key: A-Signs.ID references Author.ID

Question 2.

1) $\pi_{name}(\sigma_{phone="1-555-444-7777"}(authors))$
2) $\pi_{book}(\sigma_{ISBN=111222333444}(books))$
3) $R1 \leftarrow \sigma_{date>\text{Jan-01-2007} AND\ date<Dec-31-2008\ AND\ totalPayment>100{,}000}(Contracts)$

   $\pi_{name,address}((R1 \bowtie P-Sign) \cap Publishers)$

   $\pi_{name,address}((R1 \bowtie A-Sign) \cap Authors)$

4) $R1 \leftarrow \gamma_{name,count(name)}(Publishes)$
   $\pi_{name}(R1 \bowtie_{count(name)>10} Publishers)$
5) $\pi_{pages}(\sigma_{title="\text{The Country}" \text{ AND edition}=3} Textbook)$
6) $R1 \leftarrow \gamma_{contractID,sum(partial\ payments)}(Contract-Lines \bowtie Contains)$
   $\pi_{contractID}(\sigma_{totalPayments \neq sum(partial\ payments)}(R1 \bowtie Contracts))$

Question 3.

1) $R1 \leftarrow \gamma_{title,year,name,count(ISBN)}(Book \bowtie WrittenBy)$
   $R2 \leftarrow \sigma_{name=\text{Mark Smith} AND\ count(ISBN)=2} R1$
   $\pi_{title,year} R2$
2) $R1 \leftarrow \big((ShoppingBasket \bowtie basketContains) \bowtie Customer\big)$
   $\pi_{email,sum(number)}(\gamma_{email,sum(number)} R1)$
3) $R1 \leftarrow \sigma_{year=2010}(\pi_{name,year}(WrittenBy \bowtie Book))$
   $R2 \leftarrow \sigma_{year=2011}(\pi_{name,year}(WrittenBy \bowtie Book))$
   $\pi_{name}(\delta(R1 \cap R2))$

Question 4.

1) Result:

V	X	B	C
1	1	2	5
1	1	2	7

2) Empty, since the join is done with the implicit condition that R.B = S.B and R.C = S.C and since R.B and S.B are different data types, no rows are joined.
3) Result:

A	C
3	5

4) Result: R – S = R due to no overlapping similar attributes

X	B	C
1	2	5
3	4	6
1	2	7

5) Result:

B_S	B_R	X	C	W	Z
β	4	3	6	40	3
α	2	1	7	1	7