

Dayu Liu

## Homework 1

0028021243

Note:  $\neq$  means  $\neq$  (not equal to)

### Question1

1. Find the snames of the students who registered in the course with cname "Database"

$$\textcircled{1} \pi_{\text{Sname}} \left( \left( \sigma_{\text{Cname} = \text{"Database"}}(\text{Courses}) \right) \bowtie \text{Students} \bowtie \text{Grades} \right)$$

$$\{ \langle S, N \rangle \mid \exists SS \left( \langle SS, S, N \rangle \in \text{Students} \wedge \exists GS, GC, GG \left( \langle GS, GC, GG \rangle \in \text{Grades} \wedge GS = SS \wedge \exists CC, CI, CN \left( \langle CC, CI, CN \rangle \in \text{Courses} \wedge CC = GC \wedge CN = \text{"Database"} \right) \right) \right) \}$$

2. Find the snames of students who got a ggrade "A" in all courses

$$\left\{ \text{Temp}, \pi_{\text{sid}, \text{cid}} \left( \sigma_{\text{ggrade} = \text{"A"}}(\text{Grades}) \right) / \pi_{\text{cid}}(\text{Courses}) \right\} \\ \pi_{\text{Sname}} \left( \text{Temp} \bowtie \text{Students} \right)$$

$$\{ \langle S, N \rangle \mid \exists SS \left( \langle SS, S, N \rangle \in \text{Students} \wedge \forall CC, CI, CN \left( \langle CC, CI, CN \rangle \in \text{Courses} \wedge \exists GS, GC, GG \left( \langle GS, GC, GG \rangle \in \text{Grades} \wedge CI = GC \wedge SS = GS \wedge GG = \text{"A"} \right) \right) \right) \}$$

3. Find the cids of courses taught by at least two different instructors

$$\textcircled{3} \pi_{cid} \left( \sigma_{i1 \neq i2} \left( \text{Course} \bowtie \text{Course} [cid, i1, i2, cname] \right) \right)$$

$$\{ CC | \exists CI1, CI2 (CI1 \neq CI2 \wedge CI1 \in \text{Courses} \wedge \exists C2I, C2N (CC, C2I, C2N \in \text{Courses} \wedge CI1 \neq C2I)) \}$$

4. Find the sids of students who never received a ggrade "D"

$$\textcircled{4} \rho \left( d\text{Students}, \pi_{sid} \left( \sigma_{ggrade = 'D'} (\text{Grades}) \right) \right)$$

$$\pi_{sid} \left( \text{Students} - \text{Students} \bowtie d\text{Students} \right)$$

$$\{ SS | \exists SN ( \langle SS, SN \rangle \in \text{Students} \wedge \neg \exists GC, GG ( \langle SS, GC, GG \rangle \in \text{Grades} \wedge GG = "D" ) ) \}$$

5. Find the sids of students who received the highest grade

$$\pi_{sid} \left( \text{Grades} \times \text{Grades} - \sigma_{ggrade < ggrade2} \left( \text{Grades} [sid, cid, ggrade1] \right. \right.$$

$$\left. \times \text{Grades} [sid, cid, ggrade2] \right)$$

$$\{ GS | \exists GC, GG ( \langle GS, GC, GG \rangle \in \text{Grades} \wedge \neg \exists G2S, G2C, G2G ( \langle G2S, G2C, G2G \rangle \in \text{Grades} \wedge G2G > GG ) ) \}$$

Question2

1. Find the name of the books which genres are fiction and prices are greater than 30 and publishers are Pottermore.

2. Find the pid of publisher who has a book that charges more than any other books published by other publishers.

3. Find the pid of publisher who has a book that charges less than any other books published by other publishers.

4. Find the pid of publisher who has a book that charges more than any other books published by other publishers.

5.

RA:

$\pi_{pname} (\sigma_{btitle='Gone with the Wind'} (Publishers \bowtie Catalog \bowtie Books))$

DRC:

$\{ \langle PN \rangle \mid \exists PP, PA (\langle PP, PN, PA \rangle \in Publishers \wedge \exists CB, CC (\langle CB, PP, CC \rangle \in Catalog \wedge \exists BT, BG (\langle CB, BT, BG \rangle \in Books \wedge BT = 'Gone With the Wind')))) \}$

$\{ t1.pname \mid \exists p1 \in Publishers (t1.pid = p1.pid \wedge \exists c1 \in Catalog (c1.pid = p1.pid \wedge \exists b1 \in Books (b1.bid = c1.bid \wedge b1.btitle = "Gone With the Wind"))) \}$