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CSCI 3287

Homework 1

2.4.1

a) $\pi_{model}(\sigma_{model \geq 3.00}(PC))$

SELECT model FROM PC WHERE speed >= 3.00;

Result: 1005, 1006, 1013

b) $\pi_{maker}(Product \bowtie \sigma_{hd \geq 100}(Laptop))$

SELECT maker FROM Laptop WHERE hd >= 100;

Result: E, A, B, F, G

c) $\pi_{model,price}(\sigma_{maker=B}(Product)) \bowtie (\pi_{model,price}(PC) \cup \pi_{model,price}(Laptop) \cup \pi_{model,price}(Printer))$

```
SELECT PC.model, price FROM PC, Product
WHERE maker='B' AND PC.model = Product.model
UNION ALL
SELECT Laptop.model, price FROM Laptop, Product WHERE maker='B' AND
Laptop.model = Product.model
UNION ALL
SELECT Printer.model, price FROM Printer, Product WHERE maker='B' AND
Printer.model = Product.model;
```

Result:

Model	Price
1004	649
1005	630
1006	1049
2007	1429

d) $\pi_{model}(\sigma_{type=laser \wedge color=true}(Printer))$

SELECT model FROM Printer WHERE type='laser' AND color='true';

Result: 3003, 3007

e) $\pi_{maker}(\sigma_{type=Laptop}(Product)) - \pi_{maker}(\sigma_{type=PC}(Product))$

(SELECT maker FROM Product WHERE type='laptop') MINUS
(SELECT maker FROM Product WHERE type='pc');

Result: F, G

f) $R1 := \rho_{R1}(PC)$
$R2 := \rho_{R2}(PC)$
$R3 := R1 \bowtie_{(R1.hd=R2.hd \text{ AND } R1.model<>R2.model)} R2$
$R4 := \pi_{R1.hd}(R3)$

SELECT hd FROM PC GROUP BY hd HAVING COUNT(model) >= 2;

Result: 250, 80, 160

2.4.5

Both joins have the same number of tuples, but the theta-join will have two copies of the attributes that both relations have in common. The theta-join will also be the cross product of R and S with all common attributes, but also two copies of each common attribute. The natural-join will have all the tuples of R and S, but the common attributes will be collapsed.

5.1.1

Set: {2.66, 2.1, 1.42, 2.8, 3.2, 2.2, 2.0, 1.86, 3.06}
Bag: {2.66, 2.1, 1.42, 2.8, 3.2, 3.2, 2.2, 2.2, 2.0, 2.8, 1.86, 2.8, 3.06}
Average as a set = 2.37
Average as a bag = 2.49