

DM 505 Week 6

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Exercise 2.4.1 a

Product(maker, model, type)

PC(model, speed, ram, hd, price)

Laptop(model, speed, ram, hd, screen, price)

Printer(model, color, type, price)

What PC models have a speed of at least 3.00?

Exercise 2.4.1 a

What PC models have a speed of at least 3.00?
 $PC(model, speed, ram, hd, price)$

$R1 := \sigma_{speed \geq 3.00}(PC)$

$R2 := \pi_{model}(R1)$

Exercise 2.4.1 b

Which manufacturers make laptops with a hard disk of at least 100GB?

Laptop(model, speed, ram, hd, screen, price)

Product(maker, model, type)

Exercise 2.4.1 b

Which manufacturers make laptops with a hard disk of at least 100GB?

Laptop(model, speed, ram, hd, screen, price)

Product(maker, model, type)

$R1 := \sigma_{hd \geq 100}(Laptop)$

$R2 := R1 \bowtie Product$

$R3 := \pi_{maker}(R2)$

Excercise 2.4.1 c

Product(maker, model, type)

PC(model, speed, ram, hd, price)

Laptop(model, speed, ram, hd, screen, price)

Printer(model, color, type, price)

Find the model number and price of all products (of any type) made by manufacturer B.

Exercise 2.4.1 c

Product(maker, model, type)

PC(model, speed, ram, hd, price)

Laptop(model, speed, ram, hd, screen, price)

Printer(model, color, type, price)

Find the model number and price of all products (of any type) made by manufacturer B.

$R1 := \sigma_{maker=B}(Product \bowtie PC)$

$R2 := \sigma_{maker=B}(Product \bowtie Laptop)$

$R3 := \sigma_{maker=B}(Product \bowtie Printer)$

Exercise 2.4.1 c

Product(maker, model, type)

PC(model, speed, ram, hd, price)

Laptop(model, speed, ram, hd, screen, price)

Printer(model, color, type, price)

Find the model number and price of all products (of any type)
made by manufacturer B.

$R4 := \pi_{model, price}(R1)$

$R5 := \pi_{model, price}(R2)$

$R6 := \pi_{model, price}(R3)$

$R7 := R4 \cup R5 \cup R6$

Exercise 2.4.1 d

Printer(model, color, type, price)

Find the model numbers of all color laser printers

Exercise 2.4.1 d

Printer(model, color, type, price)

Find the model numbers of all color laser printers

$R1 := \sigma_{color=True \text{ AND } type=laser}(Printer)$

$R2 := \pi_{model}(R1)$

Exercise 2.4.1 e

Product(maker, model, type)

Find those manufacturers that sell Laptops, but not PC 's.

Exercise 2.4.1 e

Product(maker, model, type)

Find those manufacturers that sell Laptops, but not PC 's.

$R1 := \sigma_{type=laptop}(Product)$

$R2 := \sigma_{type=PC}(Product)$

$R3 := \pi_{maker}(R1)$

$R4 := \pi_{maker}(R2)$

$R5 := R3 - R4$

Exercise 2.4.1 f

PC(model, speed, ram, hd, price)

Find those hard-disk sizes that occur in two or more PC's.

Exercise 2.4.1 f

PC(model, speed, ram, hd, price)

Find those hard-disk sizes that occur in two or more PC's.

$R1 := \rho_{PC1}(PC)$

$R2 := \rho_{PC2}(PC)$

$R3 := R1 \bowtie_{(PC1.hd=PC2.hd \text{ AND } PC1.model \neq PC2.model)} R2$

$R4 := \pi_{hd}(R3)$

Exercise 2.4.1 g

PC(model, speed, ram, hd, price)

Find those pairs of PC models that have both the same speed and RAM.

A pair should be listed only once; e.g., list (i, j) but not (j, i).

Exercise 2.4.1 g

PC(model, speed, ram, hd, price)

Find those pairs of PC models that have both the same speed and RAM.

A pair should be listed only once; e.g., list (i, j) but not (j, i).

$R1 := \rho_{PC1}(PC)$

$R2 := \rho_{PC2}(PC)$

$R3 := R1 \bowtie_{(PC1.speed=PC2.speed \text{ AND } PC1.ram=PC2.ram)}$

$\text{AND } PC1.model < PC2.model} R2$

$R4 := \pi_{PC1.model, PC2.model}(R3)$

Exercise 2.4.1 h

PC(model, speed, ram, hd, price)

Laptop(model, speed, ram, hd, screen, price)

Product(maker, model, type)

Find those manufacturers of at least two different computers (PC's or laptops) with speeds of at least 2.80.

Exercise 2.4.1 h

PC(model, speed, ram, hd, price)

Laptop(model, speed, ram, hd, screen, price)

Product(maker, model, type)

Find those manufacturers of at least two different computers (PC's or laptops) with speeds of at least 2.80.

$R1 := \pi_{model}(\sigma_{speed \geq 2.80}(PC)) \cup \pi_{model}(\sigma_{speed \geq 2.8}(Laptop))$

$R2 := \pi_{maker,model}(R1 \bowtie Product)$

$R3 := \rho R4(model2, speed2)(R2)$

$R4 := R2 \bowtie_{(maker=maker2 \text{ AND } model \neq model2)} R3$

$R5 := \pi_{maker}(R4)$

Exercise 2.4.1 i

PC(model, speed, ram, hd, price)
Laptop(model, speed, ram, hd, screen, price)
Product(maker, model, type)

Find the manufacturer(s) of the computer (PC or laptop) with the highest available speed.

Exercise 2.4.1 i

PC(model, speed, ram, hd, price)

Laptop(model, speed, ram, hd, screen, price)

Product(maker, model, type)

Find the manufacturer(s) of the computer (PC or laptop) with the highest available speed.

$R1 := \pi_{model, speed}(PC)$

$R2 := \pi_{model, speed}(Laptop)$

$R3 := R1 \cup R2$

$R4 := \rho_{R4(model2, speed2)}(R3)$

$R5 := \pi_{model, speed}(R3 \bowtie_{(speed < speed2)} R4)$

$R6 := R3 - R5$

$R7 := \pi_{maker}(R6 \bowtie Product)$

Exercise 2.4.1 j

PC(model, speed, ram, hd, price)

Find the manufacturers of PC 's with at least three different speeds.

Exercise 2.4.1 j

PC(model, speed, ram, hd, price)

Laptop(model, speed, ram, hd, screen, price)

Product(maker, model, type)

Find the manufacturers of PC 's with at least three different speeds.

$R1 := \pi_{maker, speed}(Product \bowtie PC)$

$R2 := \rho_{R2(maker2, speed2)}(R1)$

$R3 := \rho_{R3(maker3, speed3)}(R1)$

$R4 := R1 \bowtie_{(maker=maker2 \text{ AND } speed \neq speed2)} R2$

$R5 := R4 \bowtie_{(maker=maker3 \text{ AND } speed \neq speed3 \text{ AND } speed3 \neq speed2)} R3$

$R6 := \pi_{maker}(R5)$

Exercise 2.4.1 k

PC(model, speed, ram, hd, price)

Find the manufacturers who sell exactly three different models of PC.

Exercise 2.4.1 k

PC(model, speed, ram, hd, price)

Find the manufacturers who sell exactly three different models of PC.

$R1 := \pi_{maker, model}(Product \bowtie PC)$

$R2 := \rho_{R2(maker2, model2)}(R1)$

$R3 := \rho_{R3(maker3, model3)}(R1)$

$R4 := \rho_{R4(maker4, model4)}(R1)$

$R5 := R1 \bowtie_{(maker=maker2 \text{ AND } model \neq model2)} R2$

$R6 := R3 \bowtie_{(maker=maker3 \text{ AND } model3 \neq model2 \text{ AND } model3 \neq model)}$

$R5$

$R7 := R4 \bowtie_{(maker=maker4 \text{ AND } (model4=model \text{ OR } model4=model2 \text{ OR } model4=model3))} R6$

$R8 := \pi_{maker}(R7)$