

HW2 Solution

Exercise 2.4.1a

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

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

model
1005
1006
1013

Exercise 2.4.1b

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

$R2 := \text{Product} \bowtie (R1)$

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

maker
E
A
B
F
G

Exercise 2.4.1c

$R1 := \sigma_{\text{maker}=\text{B}} (\text{Product} \bowtie \text{PC})$
 $R2 := \sigma_{\text{maker}=\text{B}} (\text{Product} \bowtie \text{Laptop})$
 $R3 := \sigma_{\text{maker}=\text{B}} (\text{Product} \bowtie \text{Printer})$
 $R4 := \pi_{\text{model}, \text{price}} (R1)$
 $R5 := \pi_{\text{model}, \text{price}} (R2)$
 $R6 := \pi_{\text{model}, \text{price}} (R3)$
 $R7 := R4 \cup R5 \cup R6$

model	price
1004	649
1005	630
1006	1049
2007	1429

Exercise 2.4.1d

$R1 := \sigma_{\text{color}=\text{true} \text{ AND } \text{type}=\text{laser}} (\text{Printer})$
 $R2 := \pi_{\text{model}} (R1)$

model
3003
3007

Exercise 2.4.1e

$R1 := \sigma_{\text{type}=\text{laptop}} (\text{Product})$
 $R2 := \sigma_{\text{type}=\text{PC}} (\text{Product})$
 $R3 := \pi_{\text{maker}} (R1)$
 $R4 := \pi_{\text{maker}} (R2)$
 $R5 := R3 - R4$

maker
F
G

Exercise 2.4.1f

$R1 := \rho_{PC1}(PC)$
 $R2 := \rho_{PC2}(PC)$
 $R3 := R1 \bowtie_{(PC1.hd = PC2.hd \text{ AND } PC1.model \neq PC2.model)} R2$
 $R4 := \pi_{hd}(R3)$

hd
250
80
160

Exercise 2.4.1g

$R1 := \rho_{PC1}(PC)$
 $R2 := \rho_{PC2}(PC)$
 $R3 := R1 \bowtie_{(PC1.speed = PC2.speed \text{ AND } PC1.ram = PC2.ram \text{ AND } PC1.model < PC2.model)} R2$
 $R4 := \pi_{PC1.model, PC2.model}(R3)$

PC1.model	PC2.model
1004	1012

Exercise 2.4.1h

$R1 := \pi_{model}(\sigma_{speed \geq 2.80}(PC)) \cup \pi_{model}(\sigma_{speed \geq 2.80}(Laptop))$
 $R2 := \pi_{maker, model}(R1 \bowtie \text{Product})$
 $R3 := \rho_{R3(maker2, model2)}(R2)$
 $R4 := R2 \bowtie_{(maker = maker2 \text{ AND } model \neq model2)} R3$
 $R5 := \pi_{maker}(R4)$

maker
B
E

Exercise 2.4.1i

$R1 := \pi_{model, speed}(PC)$
 $R2 := \pi_{model, speed}(Laptop)$
 $R3 := R1 \cup R2$
 $R4 := \rho_{R4(model2, speed2)}(R3)$
 $R5 := \pi_{model, speed}(R3 \bowtie_{(speed < speed2)} R4)$
 $R6 := R3 - R5$
 $R7 := \pi_{maker}(R6 \bowtie \text{Product})$

maker
B