

CSCI 3278 Homework 1

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2.4.1 parts (a-e).

a) What PC models have a speed of at least 3.00?

$R(m, s, r, h, p) := \sigma_{speed \geq 3.00}(PC)$
 $Answer(model) := \pi_{model}(R)$

| model |
|-------|
| 1005 |
| 1006 |
| 1013 |

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

$R(m, s, r, h, p) := \sigma_{hd \geq 100}(Laptop)$
 $S := Product \bowtie (R)$
 $Answer(maker) := \pi_{maker}(S)$

| maker |
|-------|
| E |
| A |
| B |
| F |
| G |

c) Find the model number, price of all products made by manufacturer B.

$R(m) := \sigma_{maker=B}(Product)$
 $S(m, p) := \pi_{model,price}(PC) \cup \pi_{model,price}(Laptop) \cup \pi_{model,price}(Printer)$
 $Answer(model, price) := \pi_{model,price}(R \bowtie S)$

| model | price |
|-------|-------|
| 1004 | 649 |
| 1005 | 630 |
| 1006 | 1049 |
| 2007 | 1429 |

d) Find the model numbers of all color laser printers.

$R(m, c, t, p) := \sigma_{type=laser \wedge color=true}(Printer)$
 $Answer(model) := \pi_{model}(R)$

| model |
|-------|
| 3003 |
| 3007 |

e) Find the manufacturers that sell Laptops, but not PC's.

$R(m, m, t) := \sigma_{type=Laptop}(Product)$
 $S(m, m, t) := \sigma_{type=PC}(Product)$
 $Answer(maker) := \pi_{maker}(R) - \pi_{maker}(S)$

| maker |
|-------|
| F |
| G |

2.4.5

The natural join of R and S gives us all joined tuples of R and S with collapsed common attributes. In contrast, the theta join with condition C of R and S is in fact the cross product of R and S with selected tuples that satisfy condition C. Therefore, we will have two copies of tuples with common attributes, due to the fact that $S.A = R.A$ and $R.A = S.A$

2.4.7

a) $R \cup S$

| | Tuples | Reasoning |
|-----|--------------|---|
| max | $(m + n)$ | no common attributes, no attribute collapse |
| min | $\min(m, n)$ | all attributes the same, but $m < n$ or $n < m$ |

b) $R \bowtie S$

| | Tuples | Reasoning |
|-----|--------------|--|
| max | $\min(m, n)$ | all attributes the same where $m < n$ or $n < m$ |
| min | 0 | no common attributes |

c) $\sigma_C(R) \times S$, for some condition C

| | Tuples | Reasoning |
|-----|--------------|--|
| max | $m \times n$ | all attributes in R fulfill C, then cross product with S |
| min | 0 | no attributes in R fulfill C |

d) $\pi_L(R) - S$, for some list of attributes L.

| | Tuples | Reasoning |
|-----|--------|---|
| max | n | List of attributes condition fulfilled, but no elements of S are in $\pi_L(R)$ |
| min | 0 | List of attributes condition fulfilled, and all elements of S are in $\pi_L(R)$ |