

UNIVERSIDAD NACIONAL  
AUTÓNOMA DE MÉXICO

FUNDAMENTOS DE BASES DE  
DATOS

Tarea 4: Álgebra Relacional

Almeida Rodríguez Jerónimo  
418003815

Figuerroa Sandoval Gerardo Emiliano  
315241774

Ibarra Moreno Gisselle  
315602193



## Ejercicio 1

- a) Toda la información de los usuarios que tienen una página, pero no incluyen blog.

$$r = \pi_{\text{user, pagina, titulo\_blog}} (\text{Usuario} \bowtie \text{Página} \bowtie \text{Blog})$$

$$p = \text{user} \gamma_{\text{count(pagina)} \rightarrow \text{num\_p}} (r)$$

$$b = \text{user} \gamma_{\text{count(titulo\_blog)} \rightarrow \text{num\_b}} (r)$$

$$Q = p \bowtie b$$

$$t = \pi_{\text{user}} (\sigma_{\text{num\_b} = 0 \wedge \text{num\_p} > 0} (Q))$$

$$\pi_{i*} (\text{User} \bowtie t)$$

b)

c)

d)

e)

## Ejercicio 2

a)

- b) ¿Qué fabricantes producen computadoras portátiles con un disco duro de menos 100 GB?

Relax - relational algebra calculator 0.19.1

Database System:   
 Product: maker string, model number, type string   
 PC: model number, speed number, ram number, hd number, price number   
 Laptop: model number, speed number, ram number, hd number, screen number, price number   
 Printer: model number, color boolean, type string, price number

Algebra Relacional SQL

Query:  $\pi_{\text{maker}} (\sigma_{\text{hd} \leq 100} (\text{Product} \bowtie \text{Laptop}))$

Visual Query Plan:

```

  graph TD
    A["pi maker"] --> B["sigma (hd <= 100)"]
    B --> C["Product"]
    B --> D["Laptop"]
  
```

Result Table:

maker	model	speed	ram	hd	screen	price	type
A							
E							
F							

Sample Data from Database Systems The Complete Book 2nd Edition Exercise 2.4.1 Page 52-55

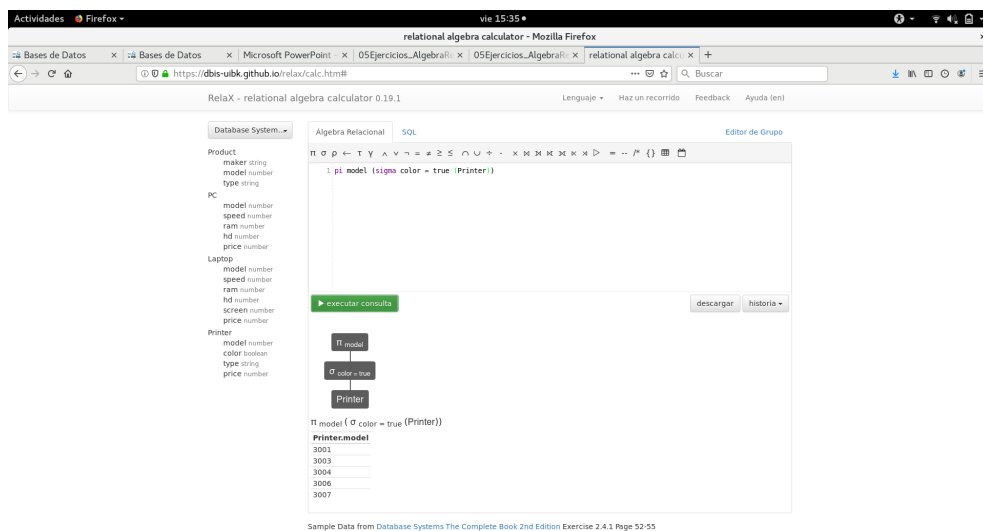
- c)  $r = \sigma_{\text{fabricante} = 'B'} (\text{Producto})$

$$s = \pi_{\text{modelo, precio}} (\text{Laptop}) \cup \pi_{\text{modelo, precio}} (\text{PC}) \cup \pi_{\text{modelo, precio}} (\text{Printer})$$

precio (Impresora)  
 $\pi$  modelo, precio ( $s \bowtie r$ )

d)

e) Encontrar los números de modelo de todas las impresoras láser a color.



f)  $r = \pi$  modelo, fabricante (Producto)  
 $s = \pi$  fabricante ( $\pi$  modelo (Laptop)  $\bowtie$   $r$ )  
 $t = \pi$  fabricante ( $\pi$  modelo (PC)  $\bowtie$   $r$ )  
 $s - t$

g)

h) Encontrar toda la información de las PCs que tienen la misma velocidad y RAM.

relational algebra calculator - Mozilla Firefox

1. tau speed, ram pi model, speed, ram, hd, price (PC)

ejecutar consulta

descargar historia

PC

PCmodel	PCspeed	PCram	PChd	PCprice
1003	1.42	512	80	478
1011	1.86	2048	160	959
1009	2	1024	250	650
1002	2.1	512	250	995
1007	2.2	1024	200	510
1008	2.2	2048	250	770
1001	2.66	1024	250	2114
1004	2.8	1024	250	649
1012	2.8	1024	160	649
1010	2.8	2048	300	770
1013	3.06	512	80	529
1005	3.2	512	250	630
1006	3.2	1024	320	1049

Sample Data from Database Systems The Complete Book 2nd Edition Exercise 2.4.1 Page 52-55

- i)  $r = \pi \text{ modelo } (\sigma \text{ velocidad} \geq 2.8 \text{ (PC)})$   
 $s = \pi \text{ modelo } (\sigma \text{ velocidad} \geq 2.8 \text{ (Laptop)})$   
 $\pi \text{ fabricante } ((r \cup s) \bowtie \text{Producto})$

j)

- k) Encontrar los fabricantes de PC con al menos tres velocidades diferentes.

relational algebra calculator - Mozilla Firefox

1. r = pi maker, speed (Product join PC)  
 2. s = gamma maker; count(speed) -> velocidades (r)  
 3. pi maker (sigma velocidades >= 3 (s))

ejecutar consulta

descargar historia

PC

Product

PC

Productmaker
A

Sample Data from Database Systems The Complete Book 2nd Edition Exercise 2.4.1 Page 52-55

- l)  $r = \pi \text{ modelo, fabricante (Producto} \bowtie \text{PC)}$   
 $s = Y \text{ fabricante; count(modelo)} \rightarrow \text{numproductos (r)}$

$\pi$  fabricante ( $\sigma$  numproductos = 3 (s))

m)

n) Crear un reporte que muestre por fabricante, el número de productos que tiene de cada tipo.

The screenshot shows a web-based relational algebra calculator. The query entered is:

```

1 r = pi maker, model, type (Product)
2 g = gamma maker, type: count(model) -> tipo (r)
3 pi maker, type: g

```

The result is a table with columns 'Product.maker', 'Product.type', and 'tipo'.

Product.maker	Product.type	tipo
A	pc	3
A	laptop	3
B	pc	4
C	pc	1
D	pc	3
D	printer	2
E	pc	3
E	laptop	3
E	printer	3
F	laptop	2
G	laptop	1
H	printer	2

Sample Data from Database Systems The Complete Book 2nd Edition Exercise 2.4.1 Page 52-55

ñ)  $r = \pi$  modelo ( $\sigma$  fabricante = 'E' (Producto))  $\bowtie$  Laptop

$s = \sigma$  hd < 200 (r)

$t = \pi$  modelo, velocidad, ram, hd\_nuevo  $\leftarrow$  hd \* 1.15, pantalla, precio (s)

t

o)

p) Borrar las impresoras de inyección de tinta.

Firefox browser window showing the Relational Algebra Calculator (RelaX) interface. The browser tabs include "relational algebra calculator" and "RelaX - relational algebra calculator". The address bar shows the URL: <https://dbis-ubik.github.io/relax/calc.htm#>.

The interface displays a query editor with the following SQL query:

```
1. pi model, color, type, price (Printer) - (sigma type = 'ink-jet' (Printer))
```

The query is executed, resulting in a tree diagram and a table of results.

**Tree Diagram:**

```
graph TD
    Root[pi model, color, type, price] --> L[Printer]
    Root --> R["sigma type = 'ink-jet' (Printer)"]
    L --> L1[Printer]
    R --> R1[Printer]
```

**Table of Results:**

Printer.model	Printer.color	Printer.type	Printer.price
3002	false	laser	239
3003	true	laser	899
3005	false	laser	120
3007	true	laser	200

Sample Data from Database Systems The Complete Book 2nd Edition Exercise 2.4.1 Page 52-55

q)