

UNIVERSIDAD NACIONAL  
AUTÓNOMA DE MÉXICO

FUNDAMENTOS DE BASES DE  
DATOS

Tarea 4: Álgebra Relacional

Almeida Rodríguez Jerónimo  
418003815

Figueroa 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.

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

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

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

$$Q = p \bowtie b$$

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

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

b)

c)

- d) Un reporte que muestre por usuario y por álbum (galería) el total de fotos que haya subido al sitio.

$$r = \pi_{\text{user}, \text{titulo\_galería}, \text{id\_fotografía}} (\text{Usuario} \bowtie \text{Galería} \bowtie \text{Fotografía})$$

$$s = \text{usuario}, \gamma_{\text{count}(\text{id\_fotografía}) \rightarrow \text{num\_fotos}} (\text{Fotografía})$$

$$\pi_{\text{user}, \text{titulo\_galería}, s} (\text{Usuario} \bowtie \text{Galería})$$

e)

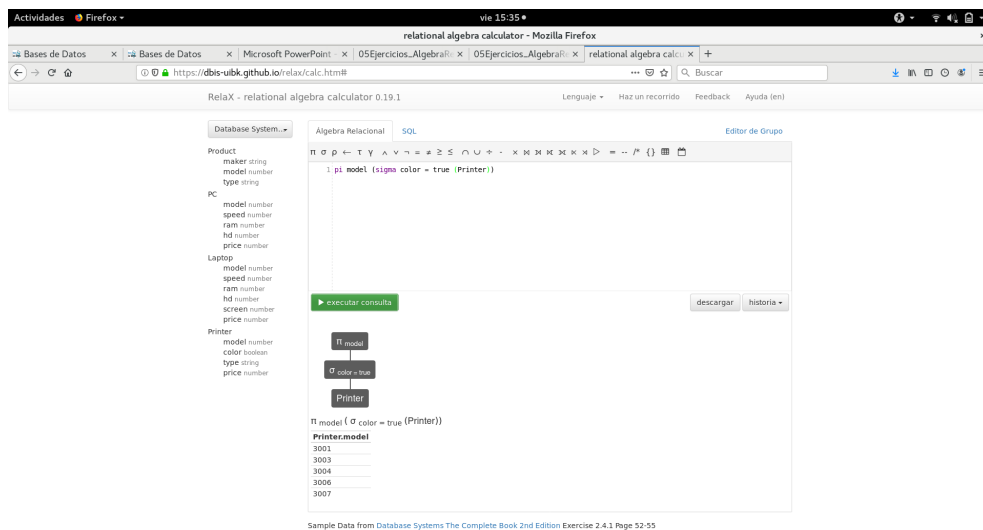
## Ejercicio 2

a)

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

The screenshot shows a web-based relational algebra calculator interface. The browser tabs include 'Bases de Datos', 'Microsoft PowerPoint', and 'relational algebra calculator - Mozilla Firefox'. The address bar shows 'https://dbis-ubk.github.io/relax/calc.html#'. The page title is 'RelaX - relational algebra calculator 0.19.1'. The interface has a sidebar on the left with a 'Database System' dropdown and a list of tables: Product, PC, Laptop, and Printer, each with its attributes. The main area has tabs for 'Algebra Relacional' and 'SQL'. The 'Algebra Relacional' tab is active, showing a query:  $\pi_{\text{maker}} (\sigma_{\text{hd} \leq 100} (\text{Product} \bowtie \text{Laptop}))$ . Below the query is a green 'ejecutar consulta' button. To the right are 'descargar' and 'historia' buttons. Below the query is a visual execution plan diagram showing the operations:  $\pi_{\text{maker}}$ ,  $\sigma_{\text{hd} \leq 100}$ , and  $\bowtie$  (join) connecting 'Product' and 'Laptop'. At the bottom, the final result is shown as  $\pi_{\text{maker}} (\sigma_{\text{hd} \leq 100} (\text{Product} \bowtie \text{Laptop}))$  with a table structure: Product.maker, A, E, F. At the very bottom, small text reads 'Sample Data from Database Systems The Complete Book 2nd Edition Exercise 2.4.1 Page 52-55'.

- c)  $r = \sigma \text{ fabricante} = 'B'$  (Producto)  
 $s = \pi \text{ modelo, precio (Laptop)} \cup \pi \text{ modelo, precio (PC)} \cup \pi \text{ modelo, precio (Impresora)}$   
 $\pi \text{ modelo, precio } (s \bowtie r)$
- d)
- e) Encontrar los números de modelo de todas las impresoras láser a color.



- f)  $r = \pi \text{ modelo, fabricante (Producto)}$   
 $s = \pi \text{ fabricante } (\pi \text{ modelo (Laptop)} \bowtie r)$   
 $t = \pi \text{ fabricante } (\pi \text{ modelo (PC)} \bowtie r)$   
 $s - t$
- g)
- h) Encontrar toda la información de las PCs que tienen la misma velocidad y RAM.

relational algebra calculator - Mozilla Firefox

Basos de Datos Microsoft PowerPoint 05Ejercicios.Algebra 05Ejercicios.Algebra relational algebra calcul relational algebra calcul RelAX - relational algebra calcul RelAX - relational algebra calcul

https://dbis-ubbk.github.io/relax/calc.html

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

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

ejecutar consulta

descargar historia

tau speed asc, ram asc

pi model, speed asc, ram, hd, price

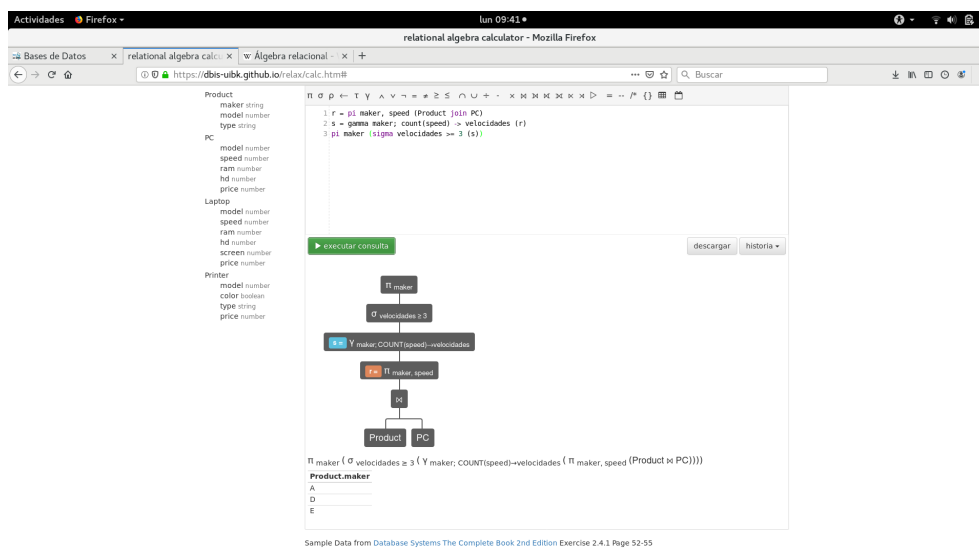
PC

tau speed asc, ram asc pi model, speed, ram, hd, price (PC)

PC	model	speed	ram	hd	price
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 52-53

- i)  $r = \pi$  modelo ( $\sigma$  velocidad  $\geq 2.8$  (PC))  
 $s = \pi$  modelo ( $\sigma$  velocidad  $\geq 2.8$  (Laptop))  
 $\pi$  fabricante ( $(r \cup s) \bowtie$  Producto)
- j)
- k) Encontrar los fabricantes de PC con al menos tres velocidades diferentes.



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

$\pi$  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, tipo. The data is as follows:

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.

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

Editor de Grupo

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

ejecutar consulta

descargar

historia

Diagrama de flujo de la consulta:

```
graph TD
    A[Printer] --> B[" $\sigma$  type = 'ink-jet' (Printer)"]
    B --> C[" $\pi$  model, color, type, price (Printer)"]
```

Printer: model, color, type, price (Printer) - ( $\sigma$  type = 'ink-jet' (Printer))

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)