

מכללה אקדמית הדסה

החוג למדעי המחשב

תרגיל בקורס: מסדי נתונים

בנושא: אלגברת היחסים ותחשיב שורות היחס

שימו לב לשמות המשתנים המשמעותיים בהם אני נוקט, ולעימוד, והקפידו גם אתם על כך.

שאלה #1

היחס:

products(branch_name, dept, product_name, price)

השאלות:

סעיף א'

\neq \cup σ π ρ ϵ \exists \neg \forall \blacktriangleright \blacktriangleleft

π milk.prod-name, mild.price (

($\sigma_{dept='milk'}$ ($\rho_{milk}(prod)$))

\blacktriangleright milk.price < meat.price \blacktriangleleft

($\sigma_{dept='meat'}$ ($\rho_{meat}(prod)$)))

{t | \exists milk ϵ prod \exists meat ϵ prod (

milk[dept]='milk' ^

meat[dept] = 'meat' ^

milk[price] < meat[price] ^

t[prod_name] = milk[prod_name] ^

t[price] = milk[price]) }

סעיף ב'

נגדיר שאילתת עזר שתקצר את השאילתה הראשית:

$\text{bash_milk} \leftarrow \Pi_{\text{prod-name, price}} \sigma_{\text{branch='bash' \wedge dept='milk'}} \text{prod}$

$\Pi_{\text{prod-name}} \text{bash-milk} -$

$\Pi_{\text{bm, prod-name}} ($
 $(\rho_{\text{bm1}} \text{bash_milk} \blacktriangleright \text{bm1.price} < \text{bm2.price} \blacktriangleleft \rho_{\text{bm2}} \text{bash_milk})$

$\{t \mid \exists \text{ most_expense} \in \text{prod} ($
 $\text{most_expense}[\text{branch}] = \text{'bash'} \wedge$
 $\text{most_expense}[\text{dept}] = \text{'milk'} \wedge$
 $\bigwedge \text{other_prod} ($
 $(\text{other_prod}[\text{branch}] = \text{'bash'} \wedge \text{other_prod}[\text{dept}] = \text{'milk'}) \rightarrow$
 $\text{other_prod}[\text{price}] \leq \text{most_expense}[\text{price}]) \wedge$
 $t[\text{prod_name}] = \text{most_expense}[\text{prod_name}]) \}$

סעיף ג'

$\Pi_{\text{prod-name, branch-name}} \text{products} -$

$\Pi_{\text{p1.prod-name, p1.branch-name}} ($
 $(\rho_{\text{p1}} \text{products})$
 $\blacktriangleright \text{p1.prod-name} = \text{p2.prod-name} \wedge \text{p1.branch-name} \neq \text{p2.branch-name} \blacktriangleleft$
 $(\rho_{\text{p2}} \text{products}))$

$\{t \mid \exists \text{ unique} \in \text{products} ($
 $\bigwedge \text{other} \in \text{products} ($
 $\text{other}[\text{prod_name}] = \text{unique}[\text{prod_name}] \rightarrow$
 $\text{other}[\text{branch_name}] = \text{unique}[\text{branch_name}])$

$t[\text{product_name}] = \text{unique}[\text{product_name}] \wedge$
 $t[\text{branch_name}] = \text{unique}[\text{branch_name}] \}}$

סעיף ד'

$\pi_{\text{branch_name}} \text{products} - \pi_{\text{branch_name}} \sigma_{\text{dept}='milk'} \text{products}$

$\{t \mid \exists \text{ no_milk_branch} \in \text{products} ($
 $\forall \text{ line} \in \text{products} ($
 $\text{line}[\text{dept}] = 'milk' \rightarrow$
 $\text{line}[\text{branch_name}] \neq \text{no_milk_branch}[\text{branch_name}] \wedge$
 $t[\text{branch_name}] = \text{no_milk_branch}[\text{branch_name}]) \}$

סעיף ה'

$\pi_{\text{branch_name}, \text{prod_name}} \div \pi_{\text{prod_name}} \sigma_{\text{dept}='milk'} \text{products}$

$\{t \mid \exists \text{ all-milk} \in \text{products} ($
 $\forall \text{ milk-product} \in \text{products} ($
 $\text{milk-product}[\text{dept}] = 'milk' \rightarrow$
 $\exists \text{ line} \in \text{products} ($
 $\text{line}[\text{product_name}] = \text{milk-product}[\text{product_name}] \wedge$
 $\text{line}[\text{branch_name}] = \text{all-milk}[\text{branch_name}]) \wedge$
 $t[\text{branch_name}] = \text{all-milk}[\text{branch_name}]) \}$

סעיף ו'

$\pi_{\text{product_name}, \text{branch_name}} \text{products} \div \pi_{\text{branch_name}} \text{products}$

$\{t \mid \exists \text{ all-branches} \in \text{products} ($
 $\forall \text{ branch} \in \text{products} ($
 $\exists \text{ line} \in \text{products} ($
 $\text{line}[\text{branch_name}] = \text{branch}[\text{branch_name}] \wedge$
 $\text{line}[\text{product_name}] = \text{all-branches}[\text{product_name}]) \wedge$
 $t[\text{product_name}] = \text{all-branches}[\text{product_name}]) \}$