HW2

Friday, February 11, 2022 4:26 PM

Information and Database Management Systems I

(CIS 4301)

Spring 2022

Instructor: Dr. Markus Schneider

TA: Kyuseo Park

Homework 2

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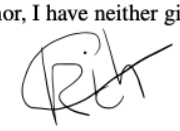
Pledge (Must be signed[1] according to UF Honor Code)

On my honor, I have neither given nor received unauthorized aid in doing this assignment.



Student signature

[1] Each student is obliged to print out this page, fill in the requested information in a handwritten and readable manner, make the *handwritten* signature, scan this page into PDF, and put this page as the first page of the PDF submission.

Q3

a) $\Pi_{studentID}(Enroll) - \Pi_{studentID}(\sigma_{Grade \neq A}(Enroll))$

b. $\rho_{LeeStu}(\Pi_{studentID}(Enroll \div \Pi_{coID}(\sigma_{lecturer='Lee'}(ClassOfferings))))$

$\Pi_{name, major}(Student \div LeeStu)$

c.

$\rho_{CODB}(\Pi_{coID}(ClassOffering \div \Pi_{classID}(\sigma_{name='DB'}(Class))))$

$\rho_{StuDB}(\Pi_{studentID}(Enroll \div CODB)$

$\Pi_{name}(\sigma_{major='CISE'}(Students - StuDB))$

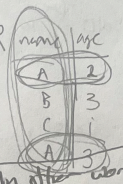
d. $\rho_{CPOffers}(\sigma_{O1.coID \neq O2.coID}(\rho_{O1}(ClassOfferings) \times \rho_{O2}(ClassOfferings)))$

$\rho_{multiLect}(\Pi_{lecturer}(\sigma_{O1.lecturer = O2.lecturer}(CPOffers)))$

$\Pi_{lecturer}(ClassOfferings - multiLect)$

Q4 a) No, this operation is not correct. Since the projections are made independently, the innermost projection only projects the nth attribute set (& removes duplicates), therefore the subsequent projection would be operating on a relation with 1 attribute & attempting to project a different attribute. A restriction to "make the statement true would be to project all attributes $a_1, \ldots, a_n$ in the same operation.

b) $\forall t \in$ $F = name = "A"$ $\pi_A(\sigma_F(R))$



In other words, the variables in the predicate

$F \subseteq A$

b. $\{\forall x \subseteq F \mid x \subseteq A \vee |A| = 0\}$; In other words, the variables in the predicate F must be a subset of the attribute A

c.

1) min: $A = C \wedge |A| = |C| = 1 \wedge |T| = 1 \wedge R \neq T$
$\Rightarrow min = 0$

max: $A \neq C \wedge |A| = |C| = r \wedge |T| = t \wedge (R \subseteq T \vee T \subseteq R)$
$\Rightarrow max = \min(R, T)$

2) min = 0, no similar B entries in relations S & R

max: $(R \subseteq S \vee S \subseteq R) \vee (|R.B| = |S.B| = 1$
$\Rightarrow max = \min(R, S)$

3) min:

Case 1: $R = S \rightarrow R.B \cup S.B = r$ $[r = s]$

Case 2: $R \subset S \rightarrow R.B \cup S.B = S$ $[r < s]$

Case 3: $S \subset R \rightarrow R.B \cup S.B = R$ $[s < r]$

Overall: min: $\max(r, s)$

max: $R \cap S = \emptyset \rightarrow R.B \cup S.B = r + s$
$\Rightarrow$ max: $r + s$