Quiz 3 for CSC 432: Database Management
100 points

Spring 1998

June 20, 2000

Instructions

If you finish early, please try to remain seated or move out discreetly so as not to disturb others.

This quiz is closed-book. However, a one-page crib sheet in addition to previous crib sheets may be used. Crib sheets may not be shared. Collusion or cheating of any form is forbidden. You can be asked to explain your solutions verbally.

There are no trick questions in this quiz. If you think there is some ambiguity, please make and state additional assumptions, but be prepared to justify why those assumptions were necessary. If you are unable to produce a formal answer, give an English description for partial credit.

1   Transactions

Consider the following schedule involving transactions T_1, T_2, and T_3, which access data items x and y, and immediately update them. Here $r_i(x)$ means T_i reads item x and $w_i(x)$ means T_i writes item x.

T_1	T_2	T_3	x	y
Initially			3	8
	$r_2(x)$		—	—
		$r_3(x)$	—	—
		$w_3(x)$		—
		$r_3(y)$	—	—
		$w_3(y)$	—	
$r_1(y)$			—	—
$w_1(y)$			—	
	$r_2(y)$		—	—
	$w_2(x)$			—
	$w_2(y)$		—	

1. (5 points) T_1 adds 10 to x and y; T_2 adds 20 to x and y; and T_3 adds 30 to x and y. Fill in the values of x and y after each w operation.

2. (10 points) What problem, if any, is apparent from the values in part **??**?

3. (25 points) Is the above schedule serializable? If so, show an equivalent serial schedule; if not, show why not. Use the definition of serializability. Do *not* argue based on the values.

2 Calculus to SQL

Consider the following tuple relational calculus expression on the *Dream Home* database.

$\{s.sno | \text{Staff}(s) \land (\forall p_1, p_2 : (\text{Property}(p_1) \land \text{Property}(p_2) \land p_1.sno = s.sno \land p_2.sno = s.sno) \rightarrow p_1.type = p_2.type)\}$

1. (20 points) Give an English translation of the above expression, e.g., "Find ..."

2. (20 points) Give an SQL query equivalent to the above expression—follow the formula, not the English translation.

3 Conceptual to Logical Model

You are given the entities Buyer, Property, and Realtor, and the ternary relationship *buys*: [Buyer buys Property from Realtor]. The cardinalities are Buyer (M), Property (1), and Realtor (M).

- (20 points) Convert the above conceptual model to a logical model (relational schema). Show (1) all the relations you need, (2) their keys, and (3) foreign keys, if any.