DBMSs - Practical Test

1p (of) will be added to the final grade.

1h + 10min

* This form will record your name, please fill your name.

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I 🔲

Consider relation Products[ProductID, Name, Price, SupplierID] and the interleaved execution below (in SQL Server). There are no indexes on Products and no other concurrent transactions.

Only one row in Products has ProductID 16. The value of Price for the product with ProductID 16 is 75 when T1 begins execution.

Choose the correct answer(s) for multiple choice questions 1 to 3.

T1	T2
BEGIN TRAN SELECT * FROM Products	
	BEGIN TRAN UPDATE Products SET Price = Price + 50 WHERE ProductID = 16
UPDATE Products SET Price = Price + 100 WHERE ProductID = 16	
	ROLLBACK TRAN
COMMIT TRAN	

time

1

T1 and T2 run under READ UNCOMMITTED. After the COMMIT TRAN statement in T1, the Price value for the product with ProductID 16 is:
(1 Point)

○ 225

○ 175

○ 125

○ 75

○ None of the above answers is correct.

2

T1 and T2 run under READ COMMITTED. After the COMMIT TRAN statement in T1, the Price value for the product with ProductID 16 is:
(1 Point)

○ 225

○ 175

○ 125

○ NULL

○ None of the above answers is correct.

T2 runs alone, in isolation under REPEATABLE READ (i.e., T1 doesn't appear in the execution above). Then:
(1 Point)

☐ T2 doesn't acquire an exclusive lock for its UPDATE statement.

☐ T2's changes are erased when the transaction is rolled back.

☐ After the ROLLBACK TRAN statement in T2, the Price value for the product with ProductID 16 is 125.

☐ An exclusive lock acquired by T2 for an UPDATE statement is released as soon as the UPDATE completes.

☐ None of the above answers is correct.

II

Create a database for a system that tracks transactions at a chosen set of ATMs in a small town. The entities of interest to the problem domain are: Banks, ATMs, Customers, Cards, and Transactions. A bank has a name, SWIFT code, website URL and the major shareholder's country. An ATM belongs to a bank; it has an address and a field indicating whether it accepts cash deposits. A customer has a name and type (natural / legal person). A card belongs to a customer, is issued by a bank and has a number and expiration date. A transaction involves an amount of money, withdrawn from or deposited to an ATM using a card; it also has a type (withdrawal or deposit), and the date and time.

a. Write an SQL script that creates the corresponding relational data model in 3NF.

b. Create a Master/Detail Form that allows one to display the transactions for a given card, to carry out operations on the transactions of a given card. The form should have a DataGridView named dgvCards to display the cards, a DataGridView named dgvTransactions to display all the transactions of the selected card, and a button for saving added / deleted / modified transactions. You must use the following classes: DataSet, SqlDataAdapter, BindingSource.

c. Create a scenario that reproduces the dirty read phenomenon on this database. Explain why the dirty read occurs, and describe a solution to prevent this concurrency problem. Don't use stored procedures.

Submit a pdf file named Group_LastName_FirstName.pdf (e.g., 929_Ionescu_Ana.pdf) that contains:

- the database diagram;
- the SQL script that creates the relational data model (a);

- the C# code that (b):
-- connects to the database;
-- fetches data into the application;
-- binds the DataGridViews such that whenever a different card is selected in dgvCards, dgvTransactions displays all its transactions;
-- sends changes operated through dgvTransactions back to the database;

- the SQL script that reproduces the dirty read phenomenon (c).

Send the file by email to sabina.surdu@UBBcluj.ro (mailto:sabina.surdu@ubbcluj.ro) AND sabinacsen@gmail.com (mailto:sabinacsen@gmail.com). Use your stud.ubbcluj.ro (http://stud.ubbcluj.ro) email address and sign your mail. Enter your first name, last name and group in the box below.

Due time: 5:10 PM.

Good luck!

a. 2p
b. 2p
c. 2p
(6 Points)

Microsoft Forms