DBMSs - Practical Test

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

1h + 10min

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

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 15. The value of Price for the product with ProductID 15 is 50 when T1 begins execution.

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

T1	T2
BEGIN TRAN UPDATE Products SET Price = Price + 50	
	BEGIN TRAN SELECT * FROM Products
UPDATE Products SET Price = Price + 50 WHERE ProductID = 15	
	COMMIT 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 15 is:
(1 Point)

○ 50

○ 100

○ 150

○ NULL

○ None of the above answers is correct.

2

T1 runs under READ COMMITTED and T2 runs under READ UNCOMMITTED. After the COMMIT TRAN statement in T1, the Price value for the product with ProductID 15 is:
(1 Point)

○ 50

○ 100

○ 150

○ 200

○ None of the above answers is correct.

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

☐ After the COMMIT TRAN statement in T1, the Price value for the product with ProductID 15 is 100.

☐ An exclusive lock acquired by T1 for an UPDATE statement is released as soon as the UPDATE completes.

☐ Exclusive locks acquired by T1 are held until T1 completes.

☐ The execution ends in a deadlock.

☐ None of the above answers is correct.

II

Create a database for a system that tracks student grades for lab assignments. The entities of interest to the problem domain are: Students, Groups, Assignments, Grades, and Comments. A student has a registration number, name, and email address. Students are organized into groups. Each group has a name and includes multiple students. A student belongs to one group. An assignment has a description and can be given to several students. A student can receive multiple assignments. For each assignment, the student earns a grade (at any given time, each student has 0 or 1 grades for each of his / her assignments). The grade can be associated with several comments written by the grading teacher; each comment consists of a text.

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 students for a given group, to carry out operations on the students of a given group. The form should have a DataGridView named dgvGroups to display the groups, a DataGridView named dgvStudents to display all the students of the selected group, and a button for saving added / deleted / modified students. You must use the following classes: DataSet, SqlDataAdapter, BindingSource.
* Tip – when deleting students: test the application with students that are not referenced from other tables; or use ON DELETE CASCADE.

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

Prepare 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 group is selected in dgvGroups, dgvStudents displays all its students;
-- sends changes operated through dgvStudents back to the database;

- the SQL script that reproduces the deadlock 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)