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 Courses[CourseID, Name, Credits, EnrolledStudents, StartDate, EndDate] and the interleaved execution below (in SQL Server). There are no indexes on Courses and no other concurrent transactions.

Only one row in Courses has CourseID 1. The value of EnrolledStudents for the course with CourseID 1 is 100 when T1 begins execution.

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

T1	T2
BEGIN TRAN SELECT * FROM Courses WHERE CourseID = 1	
	BEGIN TRAN UPDATE Courses SET EnrolledStudents = EnrolledStudents + 10 WHERE CourseID = 1 COMMIT TRAN
SELECT * FROM Courses WHERE CourseID = 1 UPDATE Courses SET EnrolledStudents = EnrolledStudents - 10 WHERE CourseID = 1 ROLLBACK TRAN	

time

1

T1 and T2 run under READ UNCOMMITTED. After the ROLLBACK TRAN statement in T1, the EnrolledStudents value for the course with CourseID 1 is:
(1 Point)

- 90
- 100
- 110
- NULL
- None of the above answers is correct.

2

T1 and T2 run under READ COMMITTED. After the ROLLBACK TRAN statement in T1, the EnrolledStudents value for the course with CourseID 1 is:
(1 Point)

- 70
- 80
- 90
- 100
- None of the above answers is correct.

3

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

- [ ] T1 doesn't need shared locks for SELECT statements.
- [ ] T1 acquires an exclusive lock for its UPDATE statement.
- [ ] A shared lock acquired by T1 for a SELECT statement is released as soon as the SELECT completes.
- [ ] An exclusive lock acquired by T1 is held until T1 completes.
- [ ] None of the above answers is correct.

II

Create a database to track tasks for all projects in a small software development company. The entities of interest to the problem domain are: Developers, Projects, Tasks, Task Types, and Task Priorities. The company has several developers, who may work at more than one project at a time. A developer has a first name and last name. A project has a start date and an end date. Tasks are defined per project; each task is immediately assigned to a single developer who is responsible for implementing that task. A task has a title, a description and:
- a task type (one of the following options: technical, bug or improvement);
- a status (one of the following options: started, in progress or closed);
- a task priority (critical, show-stopper, minor or trivial).
A task type has a name and description. A task priority has a name and description.

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 tasks for a given task type, to carry out operations on the tasks of a given task type. The form should have a DataGridView named dgvTaskTypes to display the task types, a DataGridView named dgvTasks to display all the tasks of the selected task type, and a button for saving added / deleted / modified tasks. You must use the following classes: DataSet, SqlDataAdapter, BindingSource.

c. Create a scenario that reproduces the non-repeatable read phenomenon on this database. Explain why the
non-repeatable read 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 task type is selected in dgvTaskTypes, dgvTasks displays all its tasks;
-- sends changes operated through dgvTasks back to the database;

- the SQL script that reproduces the non-repeatable 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)