Course title	Integration project 1 - Object-oriented programming Project 1
Project code	420-P11-ID v1-0 Project 1
Project title	ATM simulator
Pages	4 pages (plus cover page)
Publication date	October 15th 2020
Last update	October 15th 2020

Integration project 1 - Object-oriented programming

ATM simulator

INTRODUCTION

After successfully completing your studies, you have landed the job of your dreams with a consulting firm. Today is your first day on the job as a junior programmer. Your immediate supervisor gives you the responsibility to develop an application prototype that simulates the operation of an automatic teller machine (ATM). The client is running an older version and would like it updated. This is your opportunity to showcase your creative talents, and your analysis, design, coding, and testing abilities.

OBJECTIVES

The main objectives of this project are to:

- Interpret specifications and perform analysis.
- Design a solution based on the requirements and specifications.
- Design the logic required for an event-driven solution.
- Read and write to a database.
- Use debugging tools, and error-handling techniques.
- Validate the solution with test data.
- Integrate the knowledge acquired in your training.
- Create an object-oriented application while having fun.

TIME REQUIRED

You have 60 hours to complete this project.

REQUIREMENTS

- Before performing any transaction, the user must enter his or her client code and PIN (personal identification number) on an input screen. Since the operation of this input screen should simulate the normal operation of an ATM, the PIN should not appear on the screen. In addition to the message which appears after every unsuccessful attempt, if after three tries the PIN matching the client code has not been entered correctly, the application should display a message explaining that the client account has been blocked and that the client should contact his bank.
- The following information should be kept for each client:
    - Client code (unique and can be used as a primary key)
    - Full name
    - Phone
    - Email
    - NIP (4 number secret code)
- Every client can have multiple bank accounts. There is no limit to the amount of accounts a client can have. There are four types of accounts:
    - Checking (mandatory. The client cannot have other accounts if he doesn't have a checking account)
    - Savings
    - Mortgage
    - Line of credit (only one per client)
- Four different kinds of transactions can be carried out by clients:
    - A deposit in a checking, savings or mortgage account
    - A withdrawal from a checking or savings account
    - A transfer from a checking account to another account of any type
    - A bill payment from a checking account
- The line of credit is not like the other accounts. A balance of zero in this account indicates that the client has no debts. A balance greater than zero indicates that the client is in debt. The line of credit account is increased when an amount is withdrawn from an account that doesn't have enough money in it. In this case, the difference is added to the line of credit. The only way to reimburse the line of credit is to make a transfer from a checking account.
- For each transaction, the client must indicate the amount and the concerned accounts. Each transaction must be recorded so that the bank can have a transaction history in case of client complaints. It is not enough to only save the balance of an account; each individual transaction must be saved.
- When a bill is paid, a $1.25 fee is taken from the checking account.
- When a withdrawal is made, the amount must be a multiple of $10.
- It is not possible to withdraw more than $1000 per transaction.
- There must be a button or mechanism to allow the client to view the balance of any accounts at any time.
- When the balance is insufficient for a transaction and the system must draw on the line of credit, a message should be displayed to inform the client. If the client does not have a line of credit account, the transaction must be declined.

- The ATM must keep track of how much *paper* money it has. If this amount is insufficient for a withdrawal, the transaction must be declined. Note that only the withdrawals have an impact on the amount of paper money in the ATM. The deposits do not add to the amount of paper money.
- In addition to clients, an **administrator** may log into the system. The administrator should be able to perform the following actions:
    - Create a client
    - Create an account (of any type)
    - Display a transaction list by account
    - Block or unblock a client access to the system
    - Add *paper* money in the ATM (for security reasons, the ATM cannot contain more than $20 000)
    - Close the ATM (end the application)
    - Pay 1% of interest to all savings accounts by clicking a button
    - Withdraw any amount from a specific mortgage account. If the account does not have a sufficient balance, the difference will be taken from the client's line of credit if it exists. Otherwise, an error message will be displayed.
    - Increase by 5% all the line of credit accounts by clicking a button.

SPECIFICATIONS

After reading the requirements, start by planning your data model. If you want to use **Entity Framework**, then create your database model on paper first. In any case, be sure to have your model approved by your instructor who will play the role of the client during this project. Make sure you identify the primary keys and the relationships between the tables. These tables will become the classes of your project.

Then, design your interfaces and show them to your instructor. After your class / database model has been approved by your instructor, **he or she then becomes a normal client with no programming skills**. This being an integration project, you will need to do it without help from your instructor or other students. If help is absolutely necessary, you will be penalized during correction (see **Marking scheme** at the end of this document).

WHAT YOU HAVE TO HAND IN

Make sure to hand in the following items to your instructor:

- A backup of your database
- Your project
- The project specifications with the hand in date specified by your instructor

Correction scheme

You will be evaluated on the following points:

Project items	Points
• The client is able to connect with his code and his PIN	10
• The client can make transactions that affect the balance of his accounts	10
• Individual transactions are saved	10
• ATM balance is affected by withdrawal transactions	5
• The ATM rules are respected (maximum withdrawal, multiples of $10)	5
• The line of credit is used by transactions with insufficient balance	10
• It is possible for the client to display his account balances at any time	5
• The administrator can create clients	5
• The administrator can create accounts for clients	5
• The administrator can view client transaction lists	10
• The administrator can pay interest to checking accounts	5
• The administrator can charge interest to line of credit accounts	5
• The administrator can withdraw mortgage amounts	5
• The administrator can add real (paper) money in the ATM	5
• The administrator can close the ATM	5

The student carried out the project without help, independently (otherwise deduction up to 20 points)

- ____/20

Total **100**

PENALTIES

- 5 % for each day late.