**МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ**

**НАЦІОНАЛЬНИЙ УНІВЕРСИТЕТ “ЛЬВІВСЬКА ПОЛІТЕХНІКА”**

Інститут **ІКНІ**

Кафедра **ПЗ**



**ЗВІТ**

До лабораторної роботи №9

**На тему:** *“Принцип поліморфізму”*

**З дисципліни:** *“Об’єктно-орієнтоване програмування”*

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Львів-2020

**Тема:** Принцип поліморфізму.

**Мета:** Навчитись створювати списки об’єктів базового типу, що включать об’єкти похідних типів. Освоїти способи вирішення проблеми неоднозначності при множинному наслідуванні. Вивчити плюси заміщення функцій при множинному наслідуванні. Навчитись використовувати чисті віртуальні функції, знати коли варто використовувати абстрактні класи.

**Завдання для лабораторної роботи**

1. Розробити ієрархію класів відповідно до варіанту.

2. Використати множинне наслідування, продемонструвати вирішення проблеми з неоднозначністю доступу до членів базових класів за допомогою віртуального наслідування, за допомогою явного звертання до членів класу та за допомогою заміщення функцій в похідному класі (при потребі).

3. Створити списки об’єктів базового типу, в них помістити об’єкти похідного типу. Продемонстувати виклик функцій з об’єктів – елементів списку. Використати оператор dynamic\_cast (при потребі).

4. Створити абстрактний клас, використати чисто віртуальну функцію, що містить реалізацію в базовому класі.

5. Для вивільнення динамічної пам’яті використовувати віртуальні деструктори.

6. Сформувати звіт до лабораторної роботи. Відобразити в ньому діаграму наслідування класів.

**Індивідуальне завдання**

7. Банківський рахунок (звичайний, соціальний, ВІП).

**Код програми**

**MyForm.cpp**

#include "MyForm.h"

#include <Windows.h>

using namespace lab09;

int WINAPI WinMain(HINSTANCE, HINSTANCE, LPSTR, int)

{

Application::EnableVisualStyles();

Application::SetCompatibleTextRenderingDefault(false);

Application::Run(gcnew MyForm);

return 0;

}

**Classes.h**

#pragma once

class BankAccount

{

protected:

double moneyOnCard = 0;

public:

BankAccount();

BankAccount(double);

virtual double AddToCard(double, int) = 0;

virtual double SendToOtherCard(double) = 0;

virtual double SendToOtherCardWithPercent(double, int) = 0;

};

class StandartAcc :public BankAccount

{

puуblic:

StandartAcc();

StandartAcc(double);

double AddToCard(double, int) override;

double SendToOtherCard(double) override;

double SendToOtherCardWithPercent(double, int) override;

};

class SocialAcc :public StandartAcc

{

public:

double cashback = 0;

SocialAcc();

SocialAcc(double);

double SendToOtherCard(double);

double SendToOtherCardWithPercent(double, int);

void CashbackExit();

};

class VIPAcc :public SocialAcc

{

public:

VIPAcc();

VIPAcc(double);

};

**ClassesRealization.cpp**

#include "classes.h"

BankAccount::BankAccount()

{ }

BankAccount::BankAccount(double moneyToAdd)

{

moneyOnCard = moneyToAdd;

}

StandartAcc::StandartAcc() : BankAccount()

{ }

StandartAcc::StandartAcc(double moneyToAdd) : BankAccount(moneyToAdd)

{ }

double StandartAcc::AddToCard(double money, int percent)

{

int perc = 100 - percent;

money = money \* perc / 100;

moneyOnCard += money;

return moneyOnCard;

}

double StandartAcc::SendToOtherCard(double money)

{

moneyOnCard -= money;

return moneyOnCard;

}

double StandartAcc::SendToOtherCardWithPercent(double money, int percent)

{

int perc = 100 + percent;

money = money \* perc / 100;

moneyOnCard -= money;

return moneyOnCard;

}

SocialAcc::SocialAcc() : StandartAcc()

{ }

SocialAcc::SocialAcc(double moneyToAdd) : StandartAcc(moneyToAdd)

{ }

double SocialAcc::SendToOtherCard(double money)

{

moneyOnCard -= money;

cashback += money \* 3 / 100;

return moneyOnCard;

}

double SocialAcc::SendToOtherCardWithPercent(double money, int percent)

{

int perc = 100 + percent;

money = money \* perc / 100;

moneyOnCard -= money;

cashback += (money \* 5 / 100);

return moneyOnCard;

}

void SocialAcc::CashbackExit()

{

cashback = 0;

}

VIPAcc::VIPAcc() : SocialAcc()

{ }

VIPAcc::VIPAcc(double moneyToAdd) : SocialAcc(moneyToAdd)

{ }

**MyForm.h**

#pragma once

#include "Standart.h"

#include "Social.h"

#include "vip.h"

#include "classes.h"

namespace lab09 {

using namespace System;

using namespace System::ComponentModel;

using namespace System::Collections;

using namespace System::Windows::Forms;

using namespace System::Data;

using namespace System::Drawing;

/// <summary>

/// Сводка для MyForm

/// </summary>

public ref class MyForm : public System::Windows::Forms::Form

{

public:

MyForm(void)

{

InitializeComponent();

//

//TODO: добавьте код конструктора

//

}

protected:

/// <summary>

/// Освободить все используемые ресурсы.

/// </summary>

~MyForm()

{

if (components)

{

delete components;

}

}

private: System::Windows::Forms::Label^ label1;

private: System::Windows::Forms::Button^ standart;

private: System::Windows::Forms::Button^ social;

private: System::Windows::Forms::Button^ VIP;

protected:

private:

/// <summary>

/// Обязательная переменная конструктора.

/// </summary>

System::ComponentModel::Container^ components;

#pragma region Windows Form Designer generated code

/// <summary>

/// Требуемый метод для поддержки конструктора — не изменяйте

/// содержимое этого метода с помощью редактора кода.

/// </summary>

void InitializeComponent(void)

{

this->label1 = (gcnew System::Windows::Forms::Label());

this->standart = (gcnew System::Windows::Forms::Button());

this->social = (gcnew System::Windows::Forms::Button());

this->VIP = (gcnew System::Windows::Forms::Button());

this->SuspendLayout();

//

// label1

//

this->label1->AutoSize = true;

this->label1->Font = (gcnew System::Drawing::Font(L"Microsoft Sans Serif", 14));

this->label1->Location = System::Drawing::Point(161, 9);

this->label1->Name = L"label1";

this->label1->Size = System::Drawing::Size(259, 29);

this->label1->TabIndex = 0;

this->label1->Text = L"Оберіть ваш рахунок:";

//

// standart

//

this->standart->Location = System::Drawing::Point(12, 41);

this->standart->Name = L"standart";

this->standart->Size = System::Drawing::Size(555, 48);

this->standart->TabIndex = 1;

this->standart->Text = L"Звичайний";

this->standart->UseVisualStyleBackColor = true;

this->standart->Click += gcnew System::EventHandler(this, &MyForm::standart\_Click);

//

// social

//

this->social->Location = System::Drawing::Point(12, 95);

this->social->Name = L"social";

this->social->Size = System::Drawing::Size(555, 48);

this->social->TabIndex = 2;

this->social->Text = L"Соціальний";

this->social->UseVisualStyleBackColor = true;

this->social->Click += gcnew System::EventHandler(this, &MyForm::social\_Click);

//

// VIP

//

this->VIP->Font = (gcnew System::Drawing::Font(L"Microsoft Sans Serif", 14));

this->VIP->Location = System::Drawing::Point(12, 149);

this->VIP->Name = L"VIP";

this->VIP->Size = System::Drawing::Size(555, 48);

this->VIP->TabIndex = 3;

this->VIP->Text = L"|-->VIP<--|";

this->VIP->UseVisualStyleBackColor = true;

this->VIP->Click += gcnew System::EventHandler(this, &MyForm::VIP\_Click);

//

// MyForm

//

this->AutoScaleDimensions = System::Drawing::SizeF(8, 16);

this->AutoScaleMode = System::Windows::Forms::AutoScaleMode::Font;

this->ClientSize = System::Drawing::Size(579, 205);

this->Controls->Add(this->VIP);

this->Controls->Add(this->social);

this->Controls->Add(this->standart);

this->Controls->Add(this->label1);

this->Name = L"MyForm";

this->ShowIcon = false;

this->Text = L"Банківський рахунок";

this->ResumeLayout(false);

this->PerformLayout();

}

#pragma endregion

private: System::Void standart\_Click(System::Object^ sender, System::EventArgs^ e)

{

Standart^ newForm = gcnew Standart;

newForm->Show();

}

private: System::Void social\_Click(System::Object^ sender, System::EventArgs^ e)

{

Social^ newForm = gcnew Social;

newForm->Show();

}

private: System::Void VIP\_Click(System::Object^ sender, System::EventArgs^ e)

{

vip^ newForm = gcnew vip;

newForm->Show();

}

};

}

**Standart.h**

#pragma once

#include "classes.h"

namespace lab09 {

using namespace System;

using namespace System::ComponentModel;

using namespace System::Collections;

using namespace System::Windows::Forms;

using namespace System::Data;

using namespace System::Drawing;

/// <summary>

/// Сводка для Standart

/// </summary>

public ref class Standart : public System::Windows::Forms::Form

{

public:

Standart(void)

{

InitializeComponent();

//

//TODO: добавьте код конструктора

//

}

protected:

/// <summary>

/// Освободить все используемые ресурсы.

/// </summary>

~Standart()

{

if (components)

{

delete components;

}

}

private: System::Windows::Forms::Label^ label1;

protected:

private: System::Windows::Forms::RichTextBox^ yourMoney;

private: System::Windows::Forms::Label^ label2;

private: System::Windows::Forms::RichTextBox^ comision;

private: System::Windows::Forms::Label^ label3;

private: System::Windows::Forms::RichTextBox^ transactionHistory;

private: System::Windows::Forms::Label^ label4;

private: System::Windows::Forms::Label^ label5;

private: System::Windows::Forms::RichTextBox^ addMoney;

private: System::Windows::Forms::Button^ addToAcc;

private: System::Windows::Forms::Label^ label6;

private: System::Windows::Forms::RichTextBox^ cartNumber;

private: System::Windows::Forms::Label^ label7;

private: System::Windows::Forms::Label^ label8;

private: System::Windows::Forms::RichTextBox^ moneyToTransfer;

private: System::Windows::Forms::Button^ button1;

private: System::Windows::Forms::CheckBox^ checkBox1;

private:

/// <summary>

/// Обязательная переменная конструктора.

/// </summary>

System::ComponentModel::Container^ components;

#pragma region Windows Form Designer generated code

/// <summary>

/// Требуемый метод для поддержки конструктора — не изменяйте

/// содержимое этого метода с помощью редактора кода.

/// </summary>

void InitializeComponent(void)

{

this->label1 = (gcnew System::Windows::Forms::Label());

this->yourMoney = (gcnew System::Windows::Forms::RichTextBox());

this->label2 = (gcnew System::Windows::Forms::Label());

this->comision = (gcnew System::Windows::Forms::RichTextBox());

this->label3 = (gcnew System::Windows::Forms::Label());

this->transactionHistory = (gcnew System::Windows::Forms::RichTextBox());

this->label4 = (gcnew System::Windows::Forms::Label());

this->label5 = (gcnew System::Windows::Forms::Label());

this->addMoney = (gcnew System::Windows::Forms::RichTextBox());

this->addToAcc = (gcnew System::Windows::Forms::Button());

this->label6 = (gcnew System::Windows::Forms::Label());

this->cartNumber = (gcnew System::Windows::Forms::RichTextBox());

this->label7 = (gcnew System::Windows::Forms::Label());

this->label8 = (gcnew System::Windows::Forms::Label());

this->moneyToTransfer = (gcnew System::Windows::Forms::RichTextBox());

this->button1 = (gcnew System::Windows::Forms::Button());

this->checkBox1 = (gcnew System::Windows::Forms::CheckBox());

this->SuspendLayout();

//

// label1

//

this->label1->AutoSize = true;

this->label1->Font = (gcnew System::Drawing::Font(L"Microsoft Sans Serif", 14));

this->label1->Location = System::Drawing::Point(12, 9);

this->label1->Name = L"label1";

this->label1->Size = System::Drawing::Size(145, 29);

this->label1->TabIndex = 0;

this->label1->Text = L"Ваші гроші:";

//

// yourMoney

//

this->yourMoney->Location = System::Drawing::Point(164, 13);

this->yourMoney->Name = L"yourMoney";

this->yourMoney->ReadOnly = true;

this->yourMoney->Size = System::Drawing::Size(116, 25);

this->yourMoney->TabIndex = 1;

this->yourMoney->Text = L"0";

//

// label2

//

this->label2->AutoSize = true;

this->label2->Font = (gcnew System::Drawing::Font(L"Microsoft Sans Serif", 14));

this->label2->Location = System::Drawing::Point(286, 9);

this->label2->Name = L"label2";

this->label2->Size = System::Drawing::Size(105, 29);

this->label2->TabIndex = 2;

this->label2->Text = L"Комісія:";

//

// comision

//

this->comision->Location = System::Drawing::Point(397, 12);

this->comision->Name = L"comision";

this->comision->ReadOnly = true;

this->comision->Size = System::Drawing::Size(116, 25);

this->comision->TabIndex = 3;

this->comision->Text = L"2%";

//

// label3

//

this->label3->AutoSize = true;

this->label3->Font = (gcnew System::Drawing::Font(L"Microsoft Sans Serif", 14));

this->label3->Location = System::Drawing::Point(593, 13);

this->label3->Name = L"label3";

this->label3->Size = System::Drawing::Size(225, 29);

this->label3->TabIndex = 4;

this->label3->Text = L"Історія транзакцій";

//

// transactionHistory

//

this->transactionHistory->Location = System::Drawing::Point(571, 44);

this->transactionHistory->Name = L"transactionHistory";

this->transactionHistory->ReadOnly = true;

this->transactionHistory->Size = System::Drawing::Size(271, 238);

this->transactionHistory->TabIndex = 5;

this->transactionHistory->Text = L"";

//

// label4

//

this->label4->AutoSize = true;

this->label4->Font = (gcnew System::Drawing::Font(L"Microsoft Sans Serif", 14));

this->label4->Location = System::Drawing::Point(191, 63);

this->label4->Name = L"label4";

this->label4->Size = System::Drawing::Size(174, 29);

this->label4->TabIndex = 6;

this->label4->Text = L"Дії з рахунком";

//

// label5

//

this->label5->AutoSize = true;

this->label5->Font = (gcnew System::Drawing::Font(L"Microsoft Sans Serif", 14));

this->label5->Location = System::Drawing::Point(12, 112);

this->label5->Name = L"label5";

this->label5->Size = System::Drawing::Size(245, 29);

this->label5->TabIndex = 7;

this->label5->Text = L"Поповнити рахунок:";

//

// addMoney

//

this->addMoney->Location = System::Drawing::Point(263, 116);

this->addMoney->Name = L"addMoney";

this->addMoney->Size = System::Drawing::Size(116, 25);

this->addMoney->TabIndex = 8;

this->addMoney->Text = L"";

//

// addToAcc

//

this->addToAcc->Location = System::Drawing::Point(385, 116);

this->addToAcc->Name = L"addToAcc";

this->addToAcc->Size = System::Drawing::Size(128, 23);

this->addToAcc->TabIndex = 9;

this->addToAcc->Text = L"Поповнити";

this->addToAcc->UseVisualStyleBackColor = true;

this->addToAcc->Click += gcnew System::EventHandler(this, &Standart::addToAcc\_Click);

//

// label6

//

this->label6->AutoSize = true;

this->label6->Font = (gcnew System::Drawing::Font(L"Microsoft Sans Serif", 14));

this->label6->Location = System::Drawing::Point(12, 178);

this->label6->Name = L"label6";

this->label6->Size = System::Drawing::Size(266, 29);

this->label6->TabIndex = 10;

this->label6->Text = L"Надіслати на рахунок:";

//

// cartNumber

//

this->cartNumber->Location = System::Drawing::Point(449, 182);

this->cartNumber->Name = L"cartNumber";

this->cartNumber->Size = System::Drawing::Size(116, 25);

this->cartNumber->TabIndex = 11;

this->cartNumber->Text = L"";

//

// label7

//

this->label7->AutoSize = true;

this->label7->Font = (gcnew System::Drawing::Font(L"Microsoft Sans Serif", 14));

this->label7->Location = System::Drawing::Point(275, 178);

this->label7->Name = L"label7";

this->label7->Size = System::Drawing::Size(168, 29);

this->label7->TabIndex = 12;

this->label7->Text = L"Номер карти:";

//

// label8

//

this->label8->AutoSize = true;

this->label8->Font = (gcnew System::Drawing::Font(L"Microsoft Sans Serif", 14));

this->label8->Location = System::Drawing::Point(116, 226);

this->label8->Name = L"label8";

this->label8->Size = System::Drawing::Size(193, 29);

this->label8->TabIndex = 13;

this->label8->Text = L"Сума переводу:";

//

// moneyToTransfer

//

this->moneyToTransfer->Location = System::Drawing::Point(315, 230);

this->moneyToTransfer->Name = L"moneyToTransfer";

this->moneyToTransfer->Size = System::Drawing::Size(116, 25);

this->moneyToTransfer->TabIndex = 14;

this->moneyToTransfer->Text = L"";

//

// button1

//

this->button1->Location = System::Drawing::Point(437, 230);

this->button1->Name = L"button1";

this->button1->Size = System::Drawing::Size(128, 23);

this->button1->TabIndex = 15;

this->button1->Text = L"Надіслати";

this->button1->UseVisualStyleBackColor = true;

this->button1->Click += gcnew System::EventHandler(this, &Standart::button1\_Click);

//

// checkBox1

//

this->checkBox1->AutoSize = true;

this->checkBox1->Location = System::Drawing::Point(361, 261);

this->checkBox1->Name = L"checkBox1";

this->checkBox1->Size = System::Drawing::Size(204, 21);

this->checkBox1->TabIndex = 16;

this->checkBox1->Text = L"Включити комісію в платіж";

this->checkBox1->UseVisualStyleBackColor = true;

//

// Standart

//

this->AutoScaleDimensions = System::Drawing::SizeF(8, 16);

this->AutoScaleMode = System::Windows::Forms::AutoScaleMode::Font;

this->BackColor = System::Drawing::SystemColors::Control;

this->ClientSize = System::Drawing::Size(854, 290);

this->Controls->Add(this->checkBox1);

this->Controls->Add(this->button1);

this->Controls->Add(this->moneyToTransfer);

this->Controls->Add(this->label8);

this->Controls->Add(this->label7);

this->Controls->Add(this->cartNumber);

this->Controls->Add(this->label6);

this->Controls->Add(this->addToAcc);

this->Controls->Add(this->addMoney);

this->Controls->Add(this->label5);

this->Controls->Add(this->label4);

this->Controls->Add(this->transactionHistory);

this->Controls->Add(this->label3);

this->Controls->Add(this->comision);

this->Controls->Add(this->label2);

this->Controls->Add(this->yourMoney);

this->Controls->Add(this->label1);

this->Name = L"Standart";

this->Text = L"Звичайний банківський рахунок";

this->ResumeLayout(false);

this->PerformLayout();

}

#pragma endregion

private: System::Void addToAcc\_Click(System::Object^ sender, System::EventArgs^ e)

{

double moneyToAdd, moneyOnCard;

moneyToAdd = Convert::ToDouble(addMoney->Text);

moneyOnCard = Convert::ToDouble(yourMoney->Text);

StandartAcc a(moneyOnCard);

yourMoney->Text = Convert::ToString(a.AddToCard(moneyToAdd, 2));

transactionHistory->Text += "Вашу карту було поповнено на " + Convert::ToString(moneyToAdd \* 98 / 100) + " гривень!\n";

}

private: System::Void button1\_Click(System::Object^ sender, System::EventArgs^ e)

{

double moneyToSend, moneyOnCard;

moneyToSend = Convert::ToDouble(moneyToTransfer->Text);

moneyOnCard = Convert::ToDouble(yourMoney->Text);

if (cartNumber->Text != "" && moneyOnCard > moneyToSend)

{

StandartAcc a(moneyOnCard);

if (checkBox1->Checked == false)

{

yourMoney->Text = Convert::ToString(a.SendToOtherCard(moneyToSend));

transactionHistory->Text += "На карту з номером " + cartNumber->Text + " було відіслано кошти.\nЗ вашого рахунку було списано " + Convert::ToString(moneyToSend) + " гривень\n";

}

else

{

yourMoney->Text = Convert::ToString(a.SendToOtherCardWithPercent(moneyToSend, 2));

transactionHistory->Text += "На карту з номером " + cartNumber->Text + " було відіслано кошти.\nЗ вашого рахунку було списано " + Convert::ToString(moneyToSend \* 102 / 100) + " гривень\n";

}

}

else

{

transactionHistory->Text += "Транзакція не була закінчена\n";

}

}

};

}

**Social.h**

#pragma once

#include "classes.h"

namespace lab09 {

using namespace System;

using namespace System::ComponentModel;

using namespace System::Collections;

using namespace System::Windows::Forms;

using namespace System::Data;

using namespace System::Drawing;

/// <summary>

/// Сводка для Social

/// </summary>

public ref class Social : public System::Windows::Forms::Form

{

public:

Social(void)

{

InitializeComponent();

//

//TODO: добавьте код конструктора

//

}

protected:

/// <summary>

/// Освободить все используемые ресурсы.

/// </summary>

~Social()

{

if (components)

{

delete components;

}

}

private: System::Windows::Forms::CheckBox^ checkBox1;

protected:

private: System::Windows::Forms::Button^ button1;

private: System::Windows::Forms::RichTextBox^ moneyToTransfer;

private: System::Windows::Forms::Label^ label8;

private: System::Windows::Forms::Label^ label7;

private: System::Windows::Forms::RichTextBox^ cartNumber;

private: System::Windows::Forms::Label^ label6;

private: System::Windows::Forms::Button^ addToAcc;

private: System::Windows::Forms::RichTextBox^ addMoney;

private: System::Windows::Forms::Label^ label5;

private: System::Windows::Forms::Label^ label4;

private: System::Windows::Forms::RichTextBox^ transactionHistory;

private: System::Windows::Forms::Label^ label3;

private: System::Windows::Forms::RichTextBox^ comision;

private: System::Windows::Forms::Label^ label2;

private: System::Windows::Forms::RichTextBox^ yourMoney;

private: System::Windows::Forms::Label^ label1;

private: System::Windows::Forms::Label^ label9;

private: System::Windows::Forms::RichTextBox^ richTextBox1;

private: System::Windows::Forms::Button^ button2;

private:

/// <summary>

/// Обязательная переменная конструктора.

/// </summary>

System::ComponentModel::Container^ components;

#pragma region Windows Form Designer generated code

/// <summary>

/// Требуемый метод для поддержки конструктора — не изменяйте

/// содержимое этого метода с помощью редактора кода.

/// </summary>

void InitializeComponent(void)

{

this->checkBox1 = (gcnew System::Windows::Forms::CheckBox());

this->button1 = (gcnew System::Windows::Forms::Button());

this->moneyToTransfer = (gcnew System::Windows::Forms::RichTextBox());

this->label8 = (gcnew System::Windows::Forms::Label());

this->label7 = (gcnew System::Windows::Forms::Label());

this->cartNumber = (gcnew System::Windows::Forms::RichTextBox());

this->label6 = (gcnew System::Windows::Forms::Label());

this->addToAcc = (gcnew System::Windows::Forms::Button());

this->addMoney = (gcnew System::Windows::Forms::RichTextBox());

this->label5 = (gcnew System::Windows::Forms::Label());

this->label4 = (gcnew System::Windows::Forms::Label());

this->transactionHistory = (gcnew System::Windows::Forms::RichTextBox());

this->label3 = (gcnew System::Windows::Forms::Label());

this->comision = (gcnew System::Windows::Forms::RichTextBox());

this->label2 = (gcnew System::Windows::Forms::Label());

this->yourMoney = (gcnew System::Windows::Forms::RichTextBox());

this->label1 = (gcnew System::Windows::Forms::Label());

this->label9 = (gcnew System::Windows::Forms::Label());

this->richTextBox1 = (gcnew System::Windows::Forms::RichTextBox());

this->button2 = (gcnew System::Windows::Forms::Button());

this->SuspendLayout();

//

// checkBox1

//

this->checkBox1->AutoSize = true;

this->checkBox1->Location = System::Drawing::Point(340, 260);

this->checkBox1->Name = L"checkBox1";

this->checkBox1->Size = System::Drawing::Size(204, 21);

this->checkBox1->TabIndex = 33;

this->checkBox1->Text = L"Включити комісію в платіж";

this->checkBox1->UseVisualStyleBackColor = true;

//

// button1

//

this->button1->Location = System::Drawing::Point(434, 229);

this->button1->Name = L"button1";

this->button1->Size = System::Drawing::Size(128, 23);

this->button1->TabIndex = 32;

this->button1->Text = L"Надіслати";

this->button1->UseVisualStyleBackColor = true;

this->button1->Click += gcnew System::EventHandler(this, &Social::button1\_Click);

//

// moneyToTransfer

//

this->moneyToTransfer->Location = System::Drawing::Point(312, 229);

this->moneyToTransfer->Name = L"moneyToTransfer";

this->moneyToTransfer->Size = System::Drawing::Size(116, 25);

this->moneyToTransfer->TabIndex = 31;

this->moneyToTransfer->Text = L"";

//

// label8

//

this->label8->AutoSize = true;

this->label8->Font = (gcnew System::Drawing::Font(L"Microsoft Sans Serif", 14));

this->label8->Location = System::Drawing::Point(113, 225);

this->label8->Name = L"label8";

this->label8->Size = System::Drawing::Size(193, 29);

this->label8->TabIndex = 30;

this->label8->Text = L"Сума переводу:";

//

// label7

//

this->label7->AutoSize = true;

this->label7->Font = (gcnew System::Drawing::Font(L"Microsoft Sans Serif", 14));

this->label7->Location = System::Drawing::Point(272, 177);

this->label7->Name = L"label7";

this->label7->Size = System::Drawing::Size(168, 29);

this->label7->TabIndex = 29;

this->label7->Text = L"Номер карти:";

//

// cartNumber

//

this->cartNumber->Location = System::Drawing::Point(446, 181);

this->cartNumber->Name = L"cartNumber";

this->cartNumber->Size = System::Drawing::Size(116, 25);

this->cartNumber->TabIndex = 28;

this->cartNumber->Text = L"";

//

// label6

//

this->label6->AutoSize = true;

this->label6->Font = (gcnew System::Drawing::Font(L"Microsoft Sans Serif", 14));

this->label6->Location = System::Drawing::Point(9, 177);

this->label6->Name = L"label6";

this->label6->Size = System::Drawing::Size(266, 29);

this->label6->TabIndex = 27;

this->label6->Text = L"Надіслати на рахунок:";

//

// addToAcc

//

this->addToAcc->Location = System::Drawing::Point(382, 115);

this->addToAcc->Name = L"addToAcc";

this->addToAcc->Size = System::Drawing::Size(128, 23);

this->addToAcc->TabIndex = 26;

this->addToAcc->Text = L"Поповнити";

this->addToAcc->UseVisualStyleBackColor = true;

this->addToAcc->Click += gcnew System::EventHandler(this, &Social::addToAcc\_Click);

//

// addMoney

//

this->addMoney->Location = System::Drawing::Point(260, 115);

this->addMoney->Name = L"addMoney";

this->addMoney->Size = System::Drawing::Size(116, 25);

this->addMoney->TabIndex = 25;

this->addMoney->Text = L"";

//

// label5

//

this->label5->AutoSize = true;

this->label5->Font = (gcnew System::Drawing::Font(L"Microsoft Sans Serif", 14));

this->label5->Location = System::Drawing::Point(9, 111);

this->label5->Name = L"label5";

this->label5->Size = System::Drawing::Size(245, 29);

this->label5->TabIndex = 24;

this->label5->Text = L"Поповнити рахунок:";

//

// label4

//

this->label4->AutoSize = true;

this->label4->Font = (gcnew System::Drawing::Font(L"Microsoft Sans Serif", 14));

this->label4->Location = System::Drawing::Point(188, 62);

this->label4->Name = L"label4";

this->label4->Size = System::Drawing::Size(174, 29);

this->label4->TabIndex = 23;

this->label4->Text = L"Дії з рахунком";

//

// transactionHistory

//

this->transactionHistory->Location = System::Drawing::Point(568, 43);

this->transactionHistory->Name = L"transactionHistory";

this->transactionHistory->ReadOnly = true;

this->transactionHistory->Size = System::Drawing::Size(271, 280);

this->transactionHistory->TabIndex = 22;

this->transactionHistory->Text = L"";

//

// label3

//

this->label3->AutoSize = true;

this->label3->Font = (gcnew System::Drawing::Font(L"Microsoft Sans Serif", 14));

this->label3->Location = System::Drawing::Point(590, 12);

this->label3->Name = L"label3";

this->label3->Size = System::Drawing::Size(225, 29);

this->label3->TabIndex = 21;

this->label3->Text = L"Історія транзакцій";

//

// comision

//

this->comision->Location = System::Drawing::Point(394, 11);

this->comision->Name = L"comision";

this->comision->ReadOnly = true;

this->comision->Size = System::Drawing::Size(116, 25);

this->comision->TabIndex = 20;

this->comision->Text = L"1%";

//

// label2

//

this->label2->AutoSize = true;

this->label2->Font = (gcnew System::Drawing::Font(L"Microsoft Sans Serif", 14));

this->label2->Location = System::Drawing::Point(283, 8);

this->label2->Name = L"label2";

this->label2->Size = System::Drawing::Size(105, 29);

this->label2->TabIndex = 19;

this->label2->Text = L"Комісія:";

//

// yourMoney

//

this->yourMoney->Location = System::Drawing::Point(161, 12);

this->yourMoney->Name = L"yourMoney";

this->yourMoney->ReadOnly = true;

this->yourMoney->Size = System::Drawing::Size(116, 25);

this->yourMoney->TabIndex = 18;

this->yourMoney->Text = L"0";

//

// label1

//

this->label1->AutoSize = true;

this->label1->Font = (gcnew System::Drawing::Font(L"Microsoft Sans Serif", 14));

this->label1->Location = System::Drawing::Point(9, 8);

this->label1->Name = L"label1";

this->label1->Size = System::Drawing::Size(145, 29);

this->label1->TabIndex = 17;

this->label1->Text = L"Ваші гроші:";

//

// label9

//

this->label9->AutoSize = true;

this->label9->Font = (gcnew System::Drawing::Font(L"Microsoft Sans Serif", 14));

this->label9->Location = System::Drawing::Point(9, 294);

this->label9->Name = L"label9";

this->label9->Size = System::Drawing::Size(109, 29);

this->label9->TabIndex = 34;

this->label9->Text = L"Кешбек:";

//

// richTextBox1

//

this->richTextBox1->Location = System::Drawing::Point(124, 298);

this->richTextBox1->Name = L"richTextBox1";

this->richTextBox1->ReadOnly = true;

this->richTextBox1->Size = System::Drawing::Size(116, 25);

this->richTextBox1->TabIndex = 35;

this->richTextBox1->Text = L"0";

//

// button2

//

this->button2->Location = System::Drawing::Point(248, 298);

this->button2->Name = L"button2";

this->button2->Size = System::Drawing::Size(286, 23);

this->button2->TabIndex = 36;

this->button2->Text = L"Вивести кешбек на основний рахунок";

this->button2->UseVisualStyleBackColor = true;

this->button2->Click += gcnew System::EventHandler(this, &Social::button2\_Click);

//

// Social

//

this->AutoScaleDimensions = System::Drawing::SizeF(8, 16);

this->AutoScaleMode = System::Windows::Forms::AutoScaleMode::Font;

this->ClientSize = System::Drawing::Size(855, 338);

this->Controls->Add(this->button2);

this->Controls->Add(this->richTextBox1);

this->Controls->Add(this->label9);

this->Controls->Add(this->checkBox1);

this->Controls->Add(this->button1);

this->Controls->Add(this->moneyToTransfer);

this->Controls->Add(this->label8);

this->Controls->Add(this->label7);

this->Controls->Add(this->cartNumber);

this->Controls->Add(this->label6);

this->Controls->Add(this->addToAcc);

this->Controls->Add(this->addMoney);

this->Controls->Add(this->label5);

this->Controls->Add(this->label4);

this->Controls->Add(this->transactionHistory);

this->Controls->Add(this->label3);

this->Controls->Add(this->comision);

this->Controls->Add(this->label2);

this->Controls->Add(this->yourMoney);

this->Controls->Add(this->label1);

this->Name = L"Social";

this->ShowIcon = false;

this->Text = L"Банківський рахунок \"Соціальний\"";

this->ResumeLayout(false);

this->PerformLayout();

}

#pragma endregion

private: System::Void addToAcc\_Click(System::Object^ sender, System::EventArgs^ e)

{

double moneyToAdd, moneyOnCard;

moneyToAdd = Convert::ToDouble(addMoney->Text);

moneyOnCard = Convert::ToDouble(yourMoney->Text);

SocialAcc a(moneyOnCard);

yourMoney->Text = Convert::ToString(a.AddToCard(moneyToAdd, 1));

transactionHistory->Text = "Ваш рахунок був поповнений на " + Convert::ToString(moneyToAdd) + " гривень\n";

}

private: System::Void button1\_Click(System::Object^ sender, System::EventArgs^ e)

{

double moneyToSend, moneyOnCard;

moneyToSend = Convert::ToDouble(moneyToTransfer->Text);

moneyOnCard = Convert::ToDouble(yourMoney->Text);

if (cartNumber->Text != "" && moneyOnCard > moneyToSend)

{

SocialAcc a(moneyOnCard);

if (checkBox1->Checked == false)

{

yourMoney->Text = Convert::ToString(a.SendToOtherCard(moneyToSend));

transactionHistory->Text += "На карту з номером " + cartNumber->Text + " було відіслано кошти.\nЗ вашого рахунку було списано " + Convert::ToString(moneyToSend) + " гривень\n";

richTextBox1->Text = Convert::ToString(a.cashback + Convert::ToInt16(richTextBox1->Text));

}

else

{

yourMoney->Text = Convert::ToString(a.SendToOtherCardWithPercent(moneyToSend, 1));

transactionHistory->Text += "На карту з номером " + cartNumber->Text + " було відіслано кошти.\nЗ вашого рахунку було списано " + Convert::ToString(moneyToSend \* 102 / 100) + " гривень\n";

richTextBox1->Text = Convert::ToString(a.cashback + Convert::ToInt16(richTextBox1->Text));

}

}

else

{

transactionHistory->Text += "Транзакція не була закінчена\n";

}

}

private: System::Void button2\_Click(System::Object^ sender, System::EventArgs^ e)

{

double cashback = Convert::ToDouble(richTextBox1->Text);

yourMoney->Text = Convert::ToString(Convert::ToDouble(yourMoney->Text) + cashback);

richTextBox1->Text = "0";

transactionHistory->Text += "З кешбек-рахунку було списано " + cashback + " гривень\n";

}

};

}

**vip.h**

#pragma once

#include "classes.h"

namespace lab09 {

using namespace System;

using namespace System::ComponentModel;

using namespace System::Collections;

using namespace System::Windows::Forms;

using namespace System::Data;

using namespace System::Drawing;

/// <summary>

/// Сводка для vip

/// </summary>

public ref class vip : public System::Windows::Forms::Form

{

public:

vip(void)

{

InitializeComponent();

//

//TODO: добавьте код конструктора

//

}

protected:

/// <summary>

/// Освободить все используемые ресурсы.

/// </summary>

~vip()

{

if (components)

{

delete components;

}

}

private: System::Windows::Forms::Button^ button2;

protected:

private: System::Windows::Forms::RichTextBox^ richTextBox1;

private: System::Windows::Forms::Label^ label9;

private: System::Windows::Forms::Button^ button1;

private: System::Windows::Forms::RichTextBox^ moneyToTransfer;

private: System::Windows::Forms::Label^ label8;

private: System::Windows::Forms::Label^ label7;

private: System::Windows::Forms::RichTextBox^ cartNumber;

private: System::Windows::Forms::Label^ label6;

private: System::Windows::Forms::Button^ addToAcc;

private: System::Windows::Forms::RichTextBox^ addMoney;

private: System::Windows::Forms::Label^ label5;

private: System::Windows::Forms::Label^ label4;

private: System::Windows::Forms::RichTextBox^ transactionHistory;

private: System::Windows::Forms::Label^ label3;

private: System::Windows::Forms::RichTextBox^ comision;

private: System::Windows::Forms::Label^ label2;

private: System::Windows::Forms::RichTextBox^ yourMoney;

private: System::Windows::Forms::Label^ label1;

private:

/// <summary>

/// Обязательная переменная конструктора.

/// </summary>

System::ComponentModel::Container^ components;

#pragma region Windows Form Designer generated code

/// <summary>

/// Требуемый метод для поддержки конструктора — не изменяйте

/// содержимое этого метода с помощью редактора кода.

/// </summary>

void InitializeComponent(void)

{

this->button2 = (gcnew System::Windows::Forms::Button());

this->richTextBox1 = (gcnew System::Windows::Forms::RichTextBox());

this->label9 = (gcnew System::Windows::Forms::Label());

this->button1 = (gcnew System::Windows::Forms::Button());

this->moneyToTransfer = (gcnew System::Windows::Forms::RichTextBox());

this->label8 = (gcnew System::Windows::Forms::Label());

this->label7 = (gcnew System::Windows::Forms::Label());

this->cartNumber = (gcnew System::Windows::Forms::RichTextBox());

this->label6 = (gcnew System::Windows::Forms::Label());

this->addToAcc = (gcnew System::Windows::Forms::Button());

this->addMoney = (gcnew System::Windows::Forms::RichTextBox());

this->label5 = (gcnew System::Windows::Forms::Label());

this->label4 = (gcnew System::Windows::Forms::Label());

this->transactionHistory = (gcnew System::Windows::Forms::RichTextBox());

this->label3 = (gcnew System::Windows::Forms::Label());

this->comision = (gcnew System::Windows::Forms::RichTextBox());

this->label2 = (gcnew System::Windows::Forms::Label());

this->yourMoney = (gcnew System::Windows::Forms::RichTextBox());

this->label1 = (gcnew System::Windows::Forms::Label());

this->SuspendLayout();

//

// button2

//

this->button2->Location = System::Drawing::Point(245, 271);

this->button2->Name = L"button2";

this->button2->Size = System::Drawing::Size(286, 23);

this->button2->TabIndex = 56;

this->button2->Text = L"Вивести кешбек на основний рахунок";

this->button2->UseVisualStyleBackColor = true;

this->button2->Click += gcnew System::EventHandler(this, &vip::button2\_Click);

//

// richTextBox1

//

this->richTextBox1->Location = System::Drawing::Point(121, 271);

this->richTextBox1->Name = L"richTextBox1";

this->richTextBox1->ReadOnly = true;

this->richTextBox1->Size = System::Drawing::Size(116, 25);

this->richTextBox1->TabIndex = 55;

this->richTextBox1->Text = L"0";

//

// label9

//

this->label9->AutoSize = true;

this->label9->Font = (gcnew System::Drawing::Font(L"Microsoft Sans Serif", 14));

this->label9->Location = System::Drawing::Point(6, 267);

this->label9->Name = L"label9";

this->label9->Size = System::Drawing::Size(109, 29);

this->label9->TabIndex = 54;

this->label9->Text = L"Кешбек:";

//

// button1

//

this->button1->Location = System::Drawing::Point(431, 229);

this->button1->Name = L"button1";

this->button1->Size = System::Drawing::Size(128, 23);

this->button1->TabIndex = 52;

this->button1->Text = L"Надіслати";

this->button1->UseVisualStyleBackColor = true;

this->button1->Click += gcnew System::EventHandler(this, &vip::button1\_Click);

//

// moneyToTransfer

//

this->moneyToTransfer->Location = System::Drawing::Point(309, 229);

this->moneyToTransfer->Name = L"moneyToTransfer";

this->moneyToTransfer->Size = System::Drawing::Size(116, 25);

this->moneyToTransfer->TabIndex = 51;

this->moneyToTransfer->Text = L"";

//

// label8

//

this->label8->AutoSize = true;

this->label8->Font = (gcnew System::Drawing::Font(L"Microsoft Sans Serif", 14));

this->label8->Location = System::Drawing::Point(110, 225);

this->label8->Name = L"label8";

this->label8->Size = System::Drawing::Size(193, 29);

this->label8->TabIndex = 50;

this->label8->Text = L"Сума переводу:";

//

// label7

//

this->label7->AutoSize = true;

this->label7->Font = (gcnew System::Drawing::Font(L"Microsoft Sans Serif", 14));

this->label7->Location = System::Drawing::Point(269, 177);

this->label7->Name = L"label7";

this->label7->Size = System::Drawing::Size(168, 29);

this->label7->TabIndex = 49;

this->label7->Text = L"Номер карти:";

//

// cartNumber

//

this->cartNumber->Location = System::Drawing::Point(443, 181);

this->cartNumber->Name = L"cartNumber";

this->cartNumber->Size = System::Drawing::Size(116, 25);

this->cartNumber->TabIndex = 48;

this->cartNumber->Text = L"";

//

// label6

//

this->label6->AutoSize = true;

this->label6->Font = (gcnew System::Drawing::Font(L"Microsoft Sans Serif", 14));

this->label6->Location = System::Drawing::Point(6, 177);

this->label6->Name = L"label6";

this->label6->Size = System::Drawing::Size(266, 29);

this->label6->TabIndex = 47;

this->label6->Text = L"Надіслати на рахунок:";

//

// addToAcc

//

this->addToAcc->Location = System::Drawing::Point(379, 115);

this->addToAcc->Name = L"addToAcc";

this->addToAcc->Size = System::Drawing::Size(128, 23);

this->addToAcc->TabIndex = 46;

this->addToAcc->Text = L"Поповнити";

this->addToAcc->UseVisualStyleBackColor = true;

this->addToAcc->Click += gcnew System::EventHandler(this, &vip::addToAcc\_Click);

//

// addMoney

//

this->addMoney->Location = System::Drawing::Point(257, 115);

this->addMoney->Name = L"addMoney";

this->addMoney->Size = System::Drawing::Size(116, 25);

this->addMoney->TabIndex = 45;

this->addMoney->Text = L"";

//

// label5

//

this->label5->AutoSize = true;

this->label5->Font = (gcnew System::Drawing::Font(L"Microsoft Sans Serif", 14));

this->label5->Location = System::Drawing::Point(6, 111);

this->label5->Name = L"label5";

this->label5->Size = System::Drawing::Size(245, 29);

this->label5->TabIndex = 44;

this->label5->Text = L"Поповнити рахунок:";

//

// label4

//

this->label4->AutoSize = true;

this->label4->Font = (gcnew System::Drawing::Font(L"Microsoft Sans Serif", 14));

this->label4->Location = System::Drawing::Point(185, 62);

this->label4->Name = L"label4";

this->label4->Size = System::Drawing::Size(174, 29);

this->label4->TabIndex = 43;

this->label4->Text = L"Дії з рахунком";

//

// transactionHistory

//

this->transactionHistory->Location = System::Drawing::Point(565, 43);

this->transactionHistory->Name = L"transactionHistory";

this->transactionHistory->ReadOnly = true;

this->transactionHistory->Size = System::Drawing::Size(271, 253);

this->transactionHistory->TabIndex = 42;

this->transactionHistory->Text = L"";

//

// label3

//

this->label3->AutoSize = true;

this->label3->Font = (gcnew System::Drawing::Font(L"Microsoft Sans Serif", 14));

this->label3->Location = System::Drawing::Point(587, 12);

this->label3->Name = L"label3";

this->label3->Size = System::Drawing::Size(225, 29);

this->label3->TabIndex = 41;

this->label3->Text = L"Історія транзакцій";

//

// comision

//

this->comision->Location = System::Drawing::Point(391, 11);

this->comision->Name = L"comision";

this->comision->ReadOnly = true;

this->comision->Size = System::Drawing::Size(116, 25);

this->comision->TabIndex = 40;

this->comision->Text = L"0%";

this->comision->UseWaitCursor = true;

//

// label2

//

this->label2->AutoSize = true;

this->label2->Font = (gcnew System::Drawing::Font(L"Microsoft Sans Serif", 14));

this->label2->Location = System::Drawing::Point(280, 8);

this->label2->Name = L"label2";

this->label2->Size = System::Drawing::Size(105, 29);

this->label2->TabIndex = 39;

this->label2->Text = L"Комісія:";

//

// yourMoney

//

this->yourMoney->Location = System::Drawing::Point(158, 12);

this->yourMoney->Name = L"yourMoney";

this->yourMoney->ReadOnly = true;

this->yourMoney->Size = System::Drawing::Size(116, 25);

this->yourMoney->TabIndex = 38;

this->yourMoney->Text = L"0";

//

// label1

//

this->label1->AutoSize = true;

this->label1->Font = (gcnew System::Drawing::Font(L"Microsoft Sans Serif", 14));

this->label1->Location = System::Drawing::Point(6, 8);

this->label1->Name = L"label1";

this->label1->Size = System::Drawing::Size(145, 29);

this->label1->TabIndex = 37;

this->label1->Text = L"Ваші гроші:";

//

// vip

//

this->AutoScaleDimensions = System::Drawing::SizeF(8, 16);

this->AutoScaleMode = System::Windows::Forms::AutoScaleMode::Font;

this->ClientSize = System::Drawing::Size(854, 309);

this->Controls->Add(this->button2);

this->Controls->Add(this->richTextBox1);

this->Controls->Add(this->label9);

this->Controls->Add(this->button1);

this->Controls->Add(this->moneyToTransfer);

this->Controls->Add(this->label8);

this->Controls->Add(this->label7);

this->Controls->Add(this->cartNumber);

this->Controls->Add(this->label6);

this->Controls->Add(this->addToAcc);

this->Controls->Add(this->addMoney);

this->Controls->Add(this->label5);

this->Controls->Add(this->label4);

this->Controls->Add(this->transactionHistory);

this->Controls->Add(this->label3);

this->Controls->Add(this->comision);

this->Controls->Add(this->label2);

this->Controls->Add(this->yourMoney);

this->Controls->Add(this->label1);

this->Name = L"vip";

this->Text = L"Банківський рахунок \"VIP\"";

this->ResumeLayout(false);

this->PerformLayout();

}

#pragma endregion

private: System::Void addToAcc\_Click(System::Object^ sender, System::EventArgs^ e)

{

double moneyToAdd, moneyOnCard;

moneyToAdd = Convert::ToDouble(addMoney->Text);

moneyOnCard = Convert::ToDouble(yourMoney->Text);

SocialAcc a(moneyOnCard);

yourMoney->Text = Convert::ToString(a.AddToCard(moneyToAdd, 0));

transactionHistory->Text = "Ваш рахунок був поповнений на " + Convert::ToString(moneyToAdd) + " гривень\n";

}

private: System::Void button1\_Click(System::Object^ sender, System::EventArgs^ e)

{

double moneyToSend, moneyOnCard;

moneyToSend = Convert::ToDouble(moneyToTransfer->Text);

moneyOnCard = Convert::ToDouble(yourMoney->Text);

if (cartNumber->Text != "")

{

VIPAcc a(moneyOnCard);

yourMoney->Text = Convert::ToString(a.SendToOtherCard(moneyToSend));

transactionHistory->Text += "На карту з номером " + cartNumber->Text + " було відіслано кошти.\nЗ вашого рахунку було списано " + Convert::ToString(moneyToSend) + " гривень\n";

richTextBox1->Text = Convert::ToString(a.cashback + Convert::ToInt16(richTextBox1->Text));

}

else

{

transactionHistory->Text += "Транзакція не була закінчена\n";

}

}

private: System::Void button2\_Click(System::Object^ sender, System::EventArgs^ e)

{

double cashback = Convert::ToDouble(richTextBox1->Text);

yourMoney->Text = Convert::ToString(Convert::ToDouble(yourMoney->Text) + cashback);

richTextBox1->Text = "0";

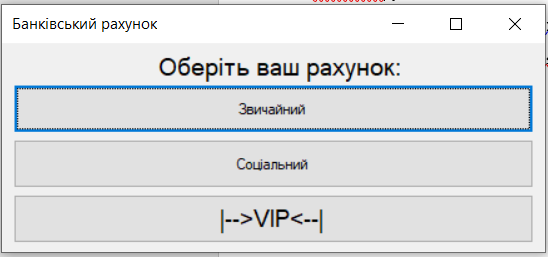
transactionHistory->Text += "З кешбек-рахунку було списано " + cashback + " гривень\n";

}

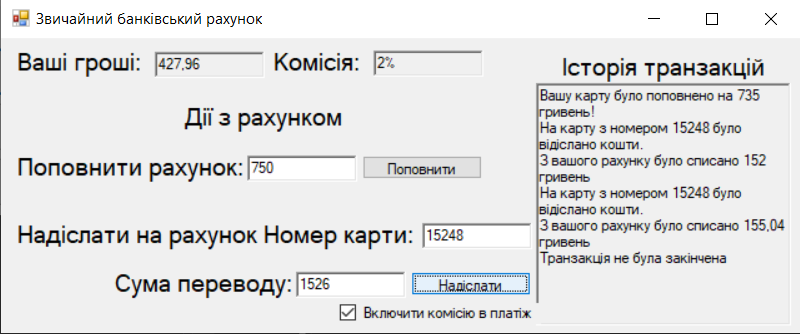
};

}

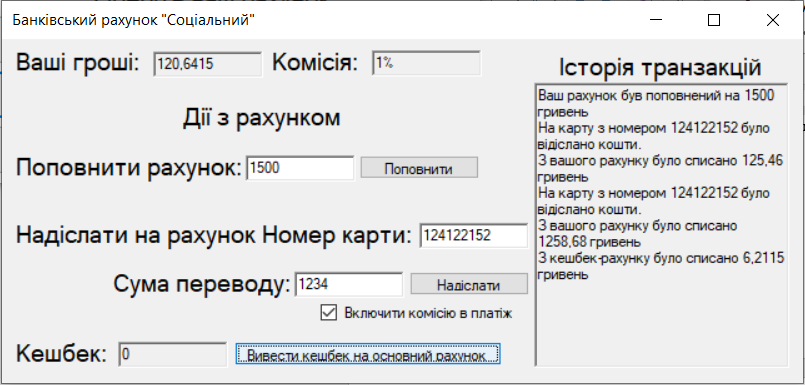
**Отримані результати**

****

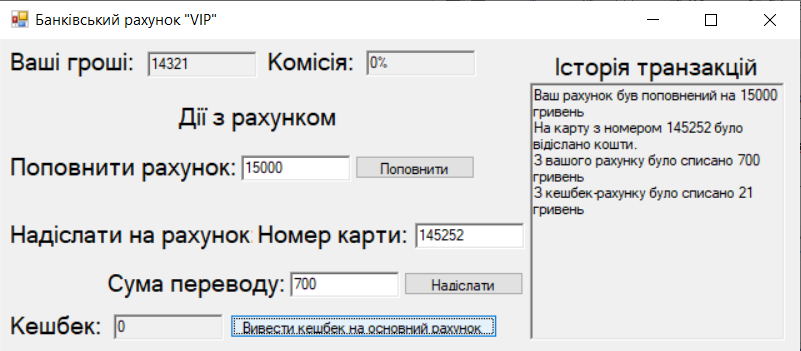
**Головне меню програми**

****

**Звичайний банківський рахунок**

****

**Соціальний банківський рахунок**

****

**VIP банківський рахунок**

**Висновок**

Виконуючи дану лабораторну роботу, я навчивсь розробляти алгоритми множинного наслідування, створювати абстрактні класи, використовувати чисто віртуальні функції.