Міністерство освіти і науки України

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Кафедра програмних засобів

ЗВІТ

Дисципліна «Фреймворки розробки програмного забезпечення»

Робота №7

Тема «Розроблення людинно-машинного інтерфейсу програмної системи»

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МЕТА

Узагальнити та поглибити на практиці знання та навички розроблення графічного інтерфейсу програмної системи на основі використання фреймворку WPF.

ЗАВДАННЯ

Провести аналіз ТЗ на предмет вимог щодо візуального інтерфейсу програмного забезпечення.

Розробити візуальний інтерфейс у відповідності до вимог у ТЗ та попереднього проєктування інтерфейус в ТЗ з обов’язковим використанням фреймворку створення інтерфейсу користувача WPF.

Виконати аналіз розробленого інтерфейсу відповідно до відомих вимог до інтерфейсів. Обґрунтувати прийняті рішення, базуючись на відомих правилах, законах, принципах, характеристиках.

Виконати тестування розробленого програмного забезпечення. Тестування має виконуватися на непідготовленому користувачі за різноманітних умов роботи програми, тобто шляхом введення різних даних, шляхом виконання на пристроях з різними апаратними характеристиками, а також під керуванням різних операційних систем або версій операційних систем та з різними параметрами налаштування монітору. Результатами тестування є швидкість роботи програми, вимоги до ресурсів, а також коректність отримуваних результатів та адекватність відображення інтерфейсу програми і взаємодії з користувачем.

Виконати аналіз отриманих результатів тестування. У процесі аналізу отриманих результатів має бути порівняно результати, отримані за різних умов виконання програми.

Задача

Додати графічну взаємодію із системою.

ВИКОНАННЯ

1 Опис

По виконанню роботи благодаттю Господа нашого Ісуса Христа було розроблено графічний застосунок взаємодії з базою даних за попередньо визначеними вимогами до програми. Програма розроблена мовою C# із застосуванням фреймворку WPF та бази даних MySQL.

2 Код

Database.cs

```
using MySql.Data.MySqlClient;
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
using System.Threading.Tasks;

namespace seven
{
    public class Database {
        string query;
        MySqlCommand command;
        MySqlDataReader reader;
        MySqlConnection connection;
        public const string LastCreatedID="SELECT LAST_INSERT_ID();";

        // SYSTEM
        public Database(MySqlConnection connection) { this.connection = 
connection; }
        public MySqlDataReader read(string query){
            command=new MySqlCommand(query,connection);
            return command.ExecuteReader();
        }
        public void write(string query){
            command = new MySqlCommand(query, connection);
            command.ExecuteNonQuery();
        }
        // CREATE
        public User createUser(string name, int admin = 0, int
balance=0) {
            write($"INSERT INTO user (name,admin,balance) VALUES
('{name}',{admin},{balance});");
            reader=read(LastCreatedID);
            var user = new User();
            while (reader.Read()) {
                user.ID = reader.GetInt32(0);
                user.Name = name;
                user.Admin = admin;
                user.Balance=balance;
            }
            reader.Close();
            return user;
        }
        public Estate createEstate(string title, string kind, User
owner, int price) {
            write($"INSERT INTO estate (title,kind,owner_id,price)
VALUES ('{title}','{kind}',{owner.ID},{price});");
            reader=read(LastCreatedID);
            var estate = new Estate();
            while (reader.Read()) {
                estate.ID = reader.GetInt32(0);
                estate.Title = title;
                estate.Kind = kind;
                estate.Owner = owner;
                estate.Price=price;
            }
            reader.Close();
            return estate;
        }
        public Meeting createMeeting(User sender,Estate target){
            write($"INSERT INTO meeting (sender_id,target_id) VALUES
({sender.ID},{target.ID});");
            reader=read(LastCreatedID);
            var meeting = new Meeting();
            while (reader.Read()) {
                meeting.ID = reader.GetInt32(0);
                meeting.Sender=sender;
                meeting.Target=target;
            }
            reader.Close();
            return meeting;
        }

        // READ
        public List<User> getUsers(){
            reader=read("SELECT id,name,admin,balance FROM user;");
            var users=new List<User>();
            while (reader.Read()) {
                var user = new User();
                user.ID = reader.GetInt32(0);
                user.Name = reader.GetString(1);
                user.Admin = reader.GetInt32(2);
                user.Balance=reader.GetInt32(3);
                users.Add(user);
            }
            reader.Close();
            return users;
        }
        public User getUser(int id){
            return
getUsers().Where(u=>u.ID==id).ToList().ElementAtOrDefault(0);
        }
        public List<Estate> getEstates(){
            reader=read("SELECT id,owner_id,title,kind,price FROM
estate;");
            var estates=new List<Estate>();
            var owners=new List<int>();
            while (reader.Read()){
                var estate=new Estate();
                estate.ID=reader.GetInt32(0);
                owners.Add(reader.GetInt32(1));
                estate.Title=reader.GetString(2);
                estate.Kind=reader.GetString(3);
                estate.Price=reader.GetInt32(4);
                estates.Add(estate);
            }
            reader.Close();
            for (int i=0;i<estates.Count;i++){
                estates[i].Owner=getUser(owners[i]);
            }
            return estates;
        }
        public Estate getEstate(int id){
            return
getEstates().Where(e=>e.ID==id).ToList().ElementAtOrDefault(0);
        }
        public List<Meeting> getMeetings(){
            reader=read("SELECT id,sender_id,target_id,score,status
FROM meeting;");
            var meetings=new List<Meeting>();
            var senders = new List<int>();
            var targets = new List<int>();
            while (reader.Read()) {
                var meeting = new Meeting();
                meeting.ID = reader.GetInt32(0);
                senders.Add(reader.GetInt32(1));
                targets.Add(reader.GetInt32(2));
                meeting.Score = reader.GetString(3);
                meeting.Status = reader.GetString(4);
                meetings.Add(meeting);
            }
            reader.Close();
            for (int i = 0; i < meetings.Count; i++) {
                meetings[i].Sender = getUser(senders[i]);
                meetings[i].Target = getEstate(targets[i]);
            }
            return meetings;
        }
        public Meeting getMeeting(int id){
            return
getMeetings().Where(m=>m.ID==id).ToList().ElementAtOrDefault(0);
        }
        // UPDATE
        public void updateUser(User user) {
            write($"UPDATE user SET
name='{user.Name}',admin={user.Admin},balance={user.Balance} WHERE
id={user.ID};");
        }
        public void updateEstate(Estate estate) {
            write($"UPDATE estate SET
owner_id={estate.Owner.ID},title='{estate.Title}',kind='{estate.Kind}',
price={estate.Price} WHERE id={estate.ID};");
        }
        public void updateMeeting(Meeting meeting) {
            write($"UPDATE meeting SET
sender_id={meeting.Sender.ID},target_id={meeting.Target.ID},score='{mee
ting.Score}',status='{meeting.Status}' WHERE id={meeting.ID};");
        }

        // DELETE
        public void deleteUser(int id) {
            write($"DELETE FROM user WHERE id={id};");
        }
        public void deleteEstate(int id) {
            write($"DELETE FROM estate WHERE id={id};");
        }
        public void deleteMeeting(int id) {
            write($"DELETE FROM meeting WHERE id={id};");
        }
    }
}
```

Estate.cs

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
using System.Threading.Tasks;

namespace seven
{
    public class Estate {
        public int ID { get; set; }
        public User Owner { get; set; }
        public string Title { get; set; }
        public string Kind { get; set; }
        public int Price { get; set; } = 0;
    }
}
```

EstateKind.cs

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
using System.Threading.Tasks;

namespace seven
{
    public static class EstateKind {
        public const string Home = "Home";
        public const string Flat = "Flat";
        public const string New = "New";
    }
}
```

LoginPage.xaml

```
<Page x:Class="seven.LoginPage"
      xmlns="http://schemas.microsoft.com/winfx/2006/xaml/presentation"
      xmlns:x="http://schemas.microsoft.com/winfx/2006/xaml"
      xmlns:mc="http://schemas.openxmlformats.org/markup-
compatibility/2006"
      xmlns:d="http://schemas.microsoft.com/expression/blend/2008"
      xmlns:local="clr-namespace:seven"
      mc:Ignorable="d"
      Title="LoginPage" Height="85" Width="199">

    <Grid>
        <TextBox x:Name="UserNameInput" HorizontalAlignment="Left"
Margin="10,40,0,0" TextWrapping="Wrap" VerticalAlignment="Top"
Width="120" Height="19" FontFamily="Verdana"/>
        <Button Content="Log in" HorizontalAlignment="Left"
Margin="135,40,0,0" VerticalAlignment="Top" FontFamily="Verdana"
Width="47" Click="Button_Click"/>
        <Label Content="User name" HorizontalAlignment="Left"
Margin="10,10,0,0" VerticalAlignment="Top" FontFamily="Verdana"
Width="90" FontStretch="Normal"/>

    </Grid>
</Page>
```

LoginPage.xaml.cs

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
using System.Threading.Tasks;
using System.Windows;
using System.Windows.Controls;
using System.Windows.Data;
using System.Windows.Documents;
using System.Windows.Input;
using System.Windows.Media;
using System.Windows.Media.Imaging;
using System.Windows.Navigation;
using System.Windows.Shapes;

namespace seven
{
    /// <summary>
    /// Interaction logic for LoginPage.xaml
    /// </summary>
    public partial class LoginPage : Page
    {
        public LoginPage()
        {
            InitializeComponent();
            UserNameInput.Focus();
        }

        private void Button_Click(object sender, RoutedEventArgs e)
        {
            var userName = UserNameInput.Text;
            this.NavigationService.Navigate(new ProfilePage(userName));
        }
    }
}
```

Meeting.cs

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
using System.Threading.Tasks;

namespace seven
{
    public class Meeting {
        public int ID { get; set; }
        public User Sender { get; set; }
        public Estate Target { get; set; }
        public string Score { get; set; } = "Unrated";
        public string Status { get; set; } = MeetingStatus.Wait;
    }
}
```

MeetingScore.cs

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
using System.Threading.Tasks;

namespace seven
{
    public static class MeetingScore {
        public const string Bad = "Bad";
        public const string Okay = "Okay";
        public const string Fine = "Fine";
    }
}
```

MeetingStatus.cs

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
using System.Threading.Tasks;

namespace seven
{
    public static class MeetingStatus {
        public const string Wait = "Wait";
        public const string Done = "Done";
        public const string Skip = "Skip";
    }
}
```

ProfilePage.xaml

```
<Page x:Class="seven.ProfilePage"
      xmlns="http://schemas.microsoft.com/winfx/2006/xaml/presentation"
      xmlns:x="http://schemas.microsoft.com/winfx/2006/xaml"
      xmlns:mc="http://schemas.openxmlformats.org/markup-
compatibility/2006"
      xmlns:d="http://schemas.microsoft.com/expression/blend/2008"
      xmlns:local="clr-namespace:seven"
      mc:Ignorable="d"
      d:DesignHeight="450" d:DesignWidth="800"
      Title="ProfilePage">
    <TabControl>
        <TabItem Selector.Selected="homeTabOpened" x:Name="HomeTab"
Header="Home">
            <Grid Background="White">
                <Label x:Name="UserNameLabel" Content="Name"
HorizontalAlignment="Left" Margin="10,15,0,0" VerticalAlignment="Top"
FontFamily="Verdana"/>
                <Label x:Name="UserBalanceLabel" Content="Balance"
HorizontalAlignment="Left" Margin="10,44,0,0" VerticalAlignment="Top"
FontFamily="Verdana"/>
                <Button x:Name="ChangeNameButton" Content="Change"
HorizontalAlignment="Left" Margin="181,19,0,0" VerticalAlignment="Top"
```

```
Height="17" Width="53" FontFamily="Verdana" FontSize="11"
Click="ChangeNameButton_Click"/>
                <TextBox x:Name="UserNameBox"
HorizontalAlignment="Left" Margin="56,19,0,0" TextWrapping="Wrap"
VerticalAlignment="Top" Width="120" FontFamily="Verdana"/>
                <TextBox x:Name="UserBalanceBox"
HorizontalAlignment="Left" Margin="70,48,0,0" TextWrapping="Wrap"
VerticalAlignment="Top" Width="120" FontFamily="Verdana"/>
                <Button x:Name="ChangeBalanceButton" Content="Change"
HorizontalAlignment="Left" Margin="195,48,0,0" VerticalAlignment="Top"
Height="17" Width="53" FontFamily="Verdana" FontSize="11"
Click="ChangeBalanceButton_Click"/>
                <CheckBox x:Name="UserStatusToggle" Content="Manager?"
HorizontalAlignment="Left" Margin="59,74,0,0" VerticalAlignment="Top"
Click="UserStatusToggle_Click" />
                <Label x:Name="UserManagerLabel" Content="Status"
HorizontalAlignment="Left" Margin="10,69,0,0" VerticalAlignment="Top"
FontFamily="Verdana"/>
            </Grid>
        </TabItem>
        <TabItem Selector.Selected="availableEstatesTabOpened"
x:Name="AvailableEstatesTab" Header="Available Estate">
            <Grid Background="White">
                <ListBox x:Name="AvailableEstatesContainer"
d:ItemsSource="{d:SampleData ItemCount=5}" Margin="0,35,0,0"
FontFamily="Verdana"/>
                <Button x:Name="BuyEstateButton" Content="Buy"
HorizontalAlignment="Left" Margin="531,7,0,0" VerticalAlignment="Top"
FontFamily="Verdana" Width="43" Click="BuyEstateButton_Click"
Height="20"/>
                <Button x:Name="SetMeetingButton" Content="View"
HorizontalAlignment="Left" Margin="579,7,0,0" VerticalAlignment="Top"
FontFamily="Verdana" Width="43" Height="20"
Click="SetMeetingButton_Click"/>
                <TextBox x:Name="SellTitleInput"
HorizontalAlignment="Left" Margin="44,7,0,0" TextWrapping="Wrap"
VerticalAlignment="Top" Width="140" FontFamily="Verdana" Height="20"/>
                <TextBox x:Name="SellPriceInput"
HorizontalAlignment="Left" Margin="189,7,0,0" TextWrapping="Wrap"
Text="0" VerticalAlignment="Top" Width="57" FontFamily="Verdana"
Height="20"/>
                <ComboBox x:Name="SellKindInput"
HorizontalAlignment="Left" Margin="251,7,0,0" VerticalAlignment="Top"
Width="77" Height="20" FontFamily="Verdana">
                    <ComboBoxItem Content="Home" IsSelected="True"/>
                    <ComboBoxItem Content="Flat"/>
                    <ComboBoxItem Content="New"/>
                </ComboBox>
                <Button x:Name="SellButton" Content="Sell"
HorizontalAlignment="Left" Margin="333,7,0,0" VerticalAlignment="Top"
Height="20" FontFamily="Verdana" Width="48"
Click="AeSellButton_Click"/>
                <Label x:Name="AeSelectedHeading" Content="Selected"
HorizontalAlignment="Left" Margin="460,5,0,0" VerticalAlignment="Top"
FontFamily="Verdana" FontWeight="Bold"/>
                <Label x:Name="SellHeading" Content="Sell"
HorizontalAlignment="Left" Margin="10,4,0,0" VerticalAlignment="Top"
FontWeight="Bold"/>
```

```
            </Grid>
        </TabItem>
        <TabItem Selector.Selected="ownedEstatesTabOpened"
x:Name="OwnedEstatesTab" Header="Owned Estate">
            <Grid Background="White">
                <Grid.ColumnDefinitions>
                    <ColumnDefinition/>
                </Grid.ColumnDefinitions>
                <ListBox x:Name="OwnedEstatesContainer"
d:ItemsSource="{d:SampleData ItemCount=5}" Margin="0,34,0,0"
FontFamily="Verdana"
SelectionChanged="OwnedEstatesContainer_SelectionChanged"/>
                <TextBox x:Name="EditTitleInput"
HorizontalAlignment="Left" Margin="51,6,0,0" TextWrapping="Wrap"
VerticalAlignment="Top" Width="140" FontFamily="Verdana" Height="20"/>
                <TextBox x:Name="EditPriceInput"
HorizontalAlignment="Left" Margin="196,6,0,0" TextWrapping="Wrap"
Text="0" VerticalAlignment="Top" Width="57" FontFamily="Verdana"
Height="20"/>
                <ComboBox x:Name="EditKindInput"
HorizontalAlignment="Left" Margin="258,6,0,0" VerticalAlignment="Top"
Width="77" Height="20" FontFamily="Verdana">
                    <ComboBoxItem Content="Home" IsSelected="True"/>
                    <ComboBoxItem Content="Flat"/>
                    <ComboBoxItem Content="New"/>
                </ComboBox>
                <Button x:Name="EditButton" Content="Edit"
HorizontalAlignment="Left" Margin="340,6,0,0" VerticalAlignment="Top"
Height="20" FontFamily="Verdana" Width="48"
Click="OeEditButton_Click"/>
                <Label x:Name="EditHeading" Content="Edit"
HorizontalAlignment="Left" Margin="10,4,0,0" VerticalAlignment="Top"
FontWeight="Bold" FontFamily="Verdana"/>
            </Grid>
        </TabItem>
        <TabItem Selector.Selected="incomingMeetingsTabOpened"
x:Name="IncomingMeetingsTab" Header="Incoming Meetings">
            <Grid Background="White">
                <Grid.ColumnDefinitions>
                    <ColumnDefinition/>
                </Grid.ColumnDefinitions>
                <ListBox x:Name="IncomingMeetingsContainer"
d:ItemsSource="{d:SampleData ItemCount=5}" Margin="0,40,0,0"
FontFamily="Verdana"
SelectionChanged="IncomingMeetingsContainer_SelectionChanged"/>
                <Button x:Name="ProcessButton" Content="Process"
HorizontalAlignment="Left" Margin="162,12,0,0" VerticalAlignment="Top"
Height="20" FontFamily="Verdana" Width="48"
Click="ProcessButton_Click"/>
                <Label x:Name="ProcessHeading" Content="Process"
HorizontalAlignment="Left" Margin="10,10,0,0" VerticalAlignment="Top"
FontWeight="Bold" FontFamily="Verdana"/>
                <ComboBox x:Name="ProcessInput"
HorizontalAlignment="Left" Margin="80,12,0,0" VerticalAlignment="Top"
Width="77" Height="20" FontFamily="Verdana">
                    <ComboBoxItem Content="Wait" IsSelected="True"
FontFamily="Verdana"/>
                    <ComboBoxItem Content="Done" FontFamily="Verdana"/>
                    <ComboBoxItem Content="Skip" FontFamily="Verdana"/>
                </ComboBox>
            </Grid>
        </TabItem>
        <TabItem Selector.Selected="outgoingMeetingsTabOpened"
x:Name="OutgoingMeetingsTab" Header="Outgoing Meetings">
            <Grid Background="White">
                <ListBox x:Name="OutgoingMeetingsContainer"
d:ItemsSource="{d:SampleData ItemCount=5}" Margin="0,38,0,0"
FontFamily="Verdana"
SelectionChanged="OutgoingMeetingsContainer_SelectionChanged"/>
                <Button x:Name="RateButton" Content="Rate"
HorizontalAlignment="Left" Margin="138,10,0,0" VerticalAlignment="Top"
Height="20" FontFamily="Verdana" Width="48" Click="RateButton_Click"/>
                <Label x:Name="RateHeading" Content="Rate"
HorizontalAlignment="Left" Margin="10,8,0,0" VerticalAlignment="Top"
FontWeight="Bold" FontFamily="Verdana"/>
                <ComboBox x:Name="RateInput" HorizontalAlignment="Left"
Margin="56,10,0,0" VerticalAlignment="Top" Width="77" Height="20"
FontFamily="Verdana">
                    <ComboBoxItem Content="Bad" FontFamily="Verdana"/>
                    <ComboBoxItem Content="Okay" FontFamily="Verdana"
IsSelected="True"/>
                    <ComboBoxItem Content="Fine" FontFamily="Verdana"/>
                </ComboBox>
            </Grid>
        </TabItem>
    </TabControl>
</Page>
```

ProfilePage.xaml.cs

```
using MySql.Data.MySqlClient;
using System;
using System.Collections.Generic;
using System.Collections.ObjectModel;
using System.Linq;
using System.Security.Cryptography.X509Certificates;
using System.Text;
using System.Threading.Tasks;
using System.Windows;
using System.Windows.Controls;
using System.Windows.Data;
using System.Windows.Documents;
using System.Windows.Input;
using System.Windows.Media;
using System.Windows.Media.Imaging;
using System.Windows.Navigation;
using System.Windows.Shapes;
using System.Xml.Linq;

namespace seven
{
    /// <summary>
    /// Interaction logic for ProfilePage.xaml
    /// </summary>
    public partial class ProfilePage : Page
    {
        public User client;
        public MySqlConnection connection = new
MySqlConnection(UtilityVariables.connectionString);
        public Database database;
        public ProfilePage(string userName) {
            InitializeComponent();
            connection.Open();
            database = new Database(connection);

            User found=database.getUsers().Where(u => u.Name ==
userName).ToList().ElementAtOrDefault(0);
            if (found != null) {
                client = found;
            } else {
                client = database.createUser(userName);
            }
        }
        public void homeTabOpened(object sender, RoutedEventArgs e) {
            showUserData();
        }
        public void ownedEstatesTabOpened(object sender,
RoutedEventArgs e) {
            showOwnedEstates();
        }
        public void availableEstatesTabOpened(object sender,
RoutedEventArgs e) {
            showAvailableEstates();
        }
        public void incomingMeetingsTabOpened(object sender,
RoutedEventArgs e){
            showIncomingMeetings();
        }
        public void outgoingMeetingsTabOpened(object sender,
RoutedEventArgs e){
            showOutgoingMeetings();
        }
        public void showUserData() {
            UserNameBox.Text=client.Name;
            UserBalanceBox.Text= client.Balance.ToString();
            UserStatusToggle.IsChecked=Convert.ToBoolean(client.Admin);
        }
        public void showOwnedEstates() {
            var data = database.getEstates().Where(e => e.Owner.ID ==
client.ID).ToList();
            OwnedEstatesContainer.Items.Clear();
            foreach (var e in data) {
                OwnedEstatesContainer.Items.Add($"{e.ID}. {e.Title} of
kind {e.Kind} price {e.Price} owned by {e.Owner.Name}");
            }
            EditTitleInput.Text = "";
            EditKindInput.Text = EstateKind.Home;
            EditPriceInput.Text = "0";
        }
        public void showAvailableEstates() {
            var data =
database.getEstates().Where(e=>e.Owner.ID!=client.ID).ToList();
            AvailableEstatesContainer.Items.Clear();
            foreach (var e in data) {
                AvailableEstatesContainer.Items.Add($"{e.ID}. {e.Title}
of kind {e.Kind} price {e.Price} owned by {e.Owner.Name}");
            }
        }
        public void showIncomingMeetings() {
            var data = database.getMeetings().Where(m =>
m.Target.Owner.ID == client.ID).OrderBy(m=>m.ID).Reverse().ToList();
            IncomingMeetingsContainer.Items.Clear();
            foreach (var m in data) {
                IncomingMeetingsContainer.Items.Add($"{m.ID}. For
{m.Target.Title} by {m.Sender.Name} to {m.Target.Owner.Name} rated
{m.Score} status {m.Status}");
            }
        }
        public void showOutgoingMeetings() {
            var data =
database.getMeetings().Where(m=>m.Sender.ID==client.ID).OrderBy(m =>
m.ID).Reverse().ToList();
            OutgoingMeetingsContainer.Items.Clear();
            foreach (var m in data) {
                OutgoingMeetingsContainer.Items.Add($"{m.ID}. For
{m.Target.Title} by {m.Sender.Name} to {m.Target.Owner.Name} rated
{m.Score} status {m.Status}");
            }
        }
        private void ChangeNameButton_Click(object sender,
RoutedEventArgs e) {
            var name = UserNameBox.Text;
            client.Name = name;
            database.updateUser(client);

            client = database.getUser(client.ID);
            showUserData();
        }
        private void ChangeBalanceButton_Click(object sender,
RoutedEventArgs e) {
            int balance=client.Balance;
            try {
                balance = Convert.ToInt32(UserBalanceBox.Text);
            } catch { MessageBox.Show("Wrong balance. Please enter a
number"); }

            client.Balance = balance;
            database.updateUser(client);

            client = database.getUser(client.ID);
            showUserData();
        }
        private void UserStatusToggle_Click(object sender,
RoutedEventArgs e) {
            var status = UserStatusToggle.IsChecked;
            client.Admin = Convert.ToInt32(status);
            database.updateUser(client);
            client = database.getUser(client.ID);
            showUserData();
        }
        private void BuyEstateButton_Click(object sender,
RoutedEventArgs e) {
            if (AvailableEstatesContainer.SelectedIndex<0) { return; }
            string id =
AvailableEstatesContainer.SelectedValue.ToString().Split('.')[0];
            var estate = database.getEstate(int.Parse(id));

            if (client.Balance < estate.Price) {
                MessageBox.Show("Not enough money");
                return;
            }
            estate.Owner = client;
            client.Balance -= estate.Price;

            database.updateEstate(estate);
            showAvailableEstates();
        }
        private void SetMeetingButton_Click(object sender,
RoutedEventArgs e) {
            if (AvailableEstatesContainer.SelectedIndex < 0) { return;
}
            string id =
AvailableEstatesContainer.SelectedValue.ToString().Split('.')[0];
            var estate = database.getEstate(int.Parse(id));

            database.createMeeting(client, estate);
            showOutgoingMeetings();
        }
        private void AeSellButton_Click(object sender, RoutedEventArgs
e) {
            var title = SellTitleInput.Text;
            var priceInput = SellPriceInput.Text;
            int price;
            var kind = SellKindInput.Text;
            try {
                price = int.Parse(priceInput);
            } catch {
                MessageBox.Show("Incorrect price, please enter a
number");
                return;
            }
            if (kind==EstateKind.New && client.Admin == 0) {
                MessageBox.Show($"Estate of kind {EstateKind.New} may
be added only by managers");
                return;
            }

            database.createEstate(title, kind, client, price);
            showAvailableEstates();
        }
        private void OwnedEstatesContainer_SelectionChanged(object
sender, SelectionChangedEventArgs e) {
            if (OwnedEstatesContainer.SelectedIndex<0) { return; }
            string id =
OwnedEstatesContainer.SelectedValue.ToString().Split('.')[0];
```

```
            var estate = database.getEstate(int.Parse(id));

            EditTitleInput.Text = estate.Title;
            EditKindInput.Text = estate.Kind;
            EditPriceInput.Text = estate.Price.ToString();
        }
        private void OeEditButton_Click(object sender, RoutedEventArgs
e) {
            if (OwnedEstatesContainer.SelectedIndex < 0) { return; }
            string id =
OwnedEstatesContainer.SelectedValue.ToString().Split('.')[0];
            var estate = database.getEstate(int.Parse(id));

            var title = EditTitleInput.Text;
            var kind = EditKindInput.Text;
            var priceInput = EditPriceInput.Text;
            int price;
            try {
                price = int.Parse(priceInput);
            } catch {
                MessageBox.Show("Incorrect price, please enter a
number");
                return;
            }
            estate.Title = title;
            estate.Price = price;
            estate.Kind = kind;

            database.updateEstate(estate);
            showOwnedEstates();
        }
        private void ProcessButton_Click(object sender, RoutedEventArgs
e) {
            if (IncomingMeetingsContainer.SelectedIndex < 0) { return;
}
            string id =
IncomingMeetingsContainer.SelectedValue.ToString().Split('.')[0];
            var meeting = database.getMeeting(int.Parse(id));

            var status = ProcessInput.Text;
            meeting.Status = status;

            database.updateMeeting(meeting);
            showIncomingMeetings();
        }
        private void RateButton_Click(object sender, RoutedEventArgs e)
{
            if (OutgoingMeetingsContainer.SelectedIndex < 0) { return;
}
            string id =
OutgoingMeetingsContainer.SelectedValue.ToString().Split('.')[0];
            var meeting = database.getMeeting(int.Parse(id));

            var score = RateInput.Text;
            meeting.Score = score;

            database.updateMeeting(meeting);
            showOutgoingMeetings();
        }
        private void IncomingMeetingsContainer_SelectionChanged(object
sender, SelectionChangedEventArgs e) {
            if (IncomingMeetingsContainer.SelectedIndex < 0) { return;
}
            string id =
IncomingMeetingsContainer.SelectedValue.ToString().Split('.')[0];
            var meeting = database.getMeeting(int.Parse(id));

            ProcessInput.Text = meeting.Status;
        }
        private void OutgoingMeetingsContainer_SelectionChanged(object
sender, SelectionChangedEventArgs e) {
            if (OutgoingMeetingsContainer.SelectedIndex < 0) { return;
}
            string id =
OutgoingMeetingsContainer.SelectedValue.ToString().Split('.')[0];
            var meeting = database.getMeeting(int.Parse(id));

            RateInput.Text = meeting.Score;
        }
    }
}
```

User.cs

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
using System.Threading.Tasks;

namespace seven
{
    public class User {
        public int ID { get; set; }
        public string Name { get; set; }
        public int Admin { get; set; } = 0;
        public int Balance { get; set; } = 0;
    }
}
```

UtilityFunctions.cs

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
using System.Threading.Tasks;

namespace seven
{
    public class UtilityFunctions {
        // CHECKERS
        public bool checkEstateKind(string kind)
        {
            return kind != EstateKind.Home && kind != EstateKind.Flat
&& kind != EstateKind.New ? false : true;
        }
        public bool checkMeetingStatus(string status)
        {
            return status != MeetingStatus.Wait && status !=
MeetingStatus.Done && status != MeetingStatus.Skip ? false : true;
        }
        public bool checkMeetingScore(string score)
        {
            return score != MeetingScore.Bad && score !=
MeetingScore.Okay && score != MeetingScore.Fine ? false : true;
        }

        // INPUT
        public string getInputString(string hint)
        {
            Console.Write($"{hint}: ");
            return Console.ReadLine();
        }
        public int getInputNumber(string hint)
        {
            var userInput = getInputString(hint);
            try
            {
                return int.Parse(userInput);
            }
            catch { return -1; }
        }

        // FORMATTERS
        public string getUserStatusString(User client)
        {
            return client.Admin == 0 ? "Client" : "Manager";
        }
        public string getEstateKindString(User client)
        {
            return client.Admin == 0 ? $"Estate kind ({EstateKind.Home}
or {EstateKind.Flat})" : $"Estate kind ({EstateKind.Home} or
{EstateKind.Flat} or {EstateKind.New})";
        }

        // DISPLAYS
        // Estate
        public void showEstates(List<Estate> estates, string header =
"")
        {
            if (header != "")
            {
                Console.WriteLine($"{header} estates
({estates.Count})");
            }
            foreach (var e in estates)
            {
                Console.WriteLine($"{e.ID}. {e.Title} of kind {e.Kind}
price {e.Price} owned by {e.Owner.Name}");
            }
        }
        public bool showOwnedEstates(Database db, User user)
        {
            var ownedEstates = db.getEstates().Where(e => e.Owner.ID ==
user.ID).ToList();
            if (ownedEstates.Count < 1)
            {
                Console.WriteLine("No owned estates");
                return false;
            }
            else
            {
                showEstates(ownedEstates, "Owned");
                return true;
            }
        }
        public bool showAvailableEstates(Database db, User user)
        {
            var availableEstates = db.getEstates().Where(e =>
e.Owner.ID != user.ID).ToList();
            if (availableEstates.Count < 1)
            {
                Console.WriteLine("No available estates");
                return false;
            }
            else
            {
                showEstates(availableEstates, "Available");
                return true;
            }
        }
        // Meeting
        public void showMeetings(List<Meeting> meetings, string header
= "")
        {
            if (header != "")
            {
                Console.WriteLine($"{header} meetings
({meetings.Count})");
            }
            foreach (var m in meetings)
            {
                Console.WriteLine($"{m.ID}. For {m.Target.Title} by
{m.Sender.Name} to {m.Target.Owner.Name} rated {m.Score} status
{m.Status}");
            }
        }
        public bool showIncomingMeetings(Database db, User user)
        {
            var incomingMeetings = db.getMeetings().Where(m =>
m.Target.Owner.ID == user.ID).ToList();
            if (incomingMeetings.Count < 1)
            {
                Console.WriteLine("No incoming meetings");
                return false;
            }
            else
            {
                showMeetings(incomingMeetings, "Incoming");
                return true;
            }
        }
        public bool showOutgoingMeetings(Database db, User user)
        {
            var incomingMeetings = db.getMeetings().Where(m =>
m.Sender.ID == user.ID).ToList();
            if (incomingMeetings.Count < 1)
            {
                Console.WriteLine("No outgoing meetings");
                return false;
            }
            else
            {
                showMeetings(incomingMeetings, "Outgoing");
                return true;
            }
        }
    }
}
```

UtilityVariables.cs

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
using System.Threading.Tasks;

namespace seven
{
    public static class UtilityVariables {
        public const string connectionString =
"uid=root;pwd=1313;host=localhost;port=3306;database=fr_data";
    }
}
```

3 Результати

Вигляд користувацького інтерфейсу подано нижче. Процес взаємодії із застосунком у вигляді відео за посиланням.

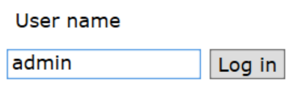
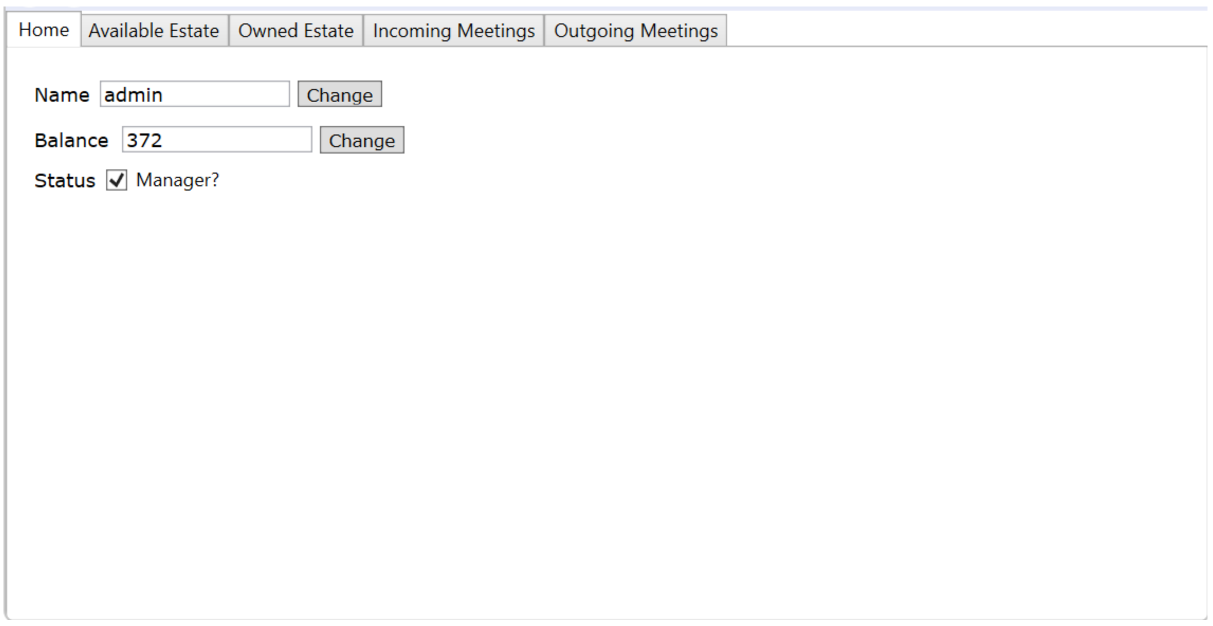


Рисунок 3.1 – Вхід

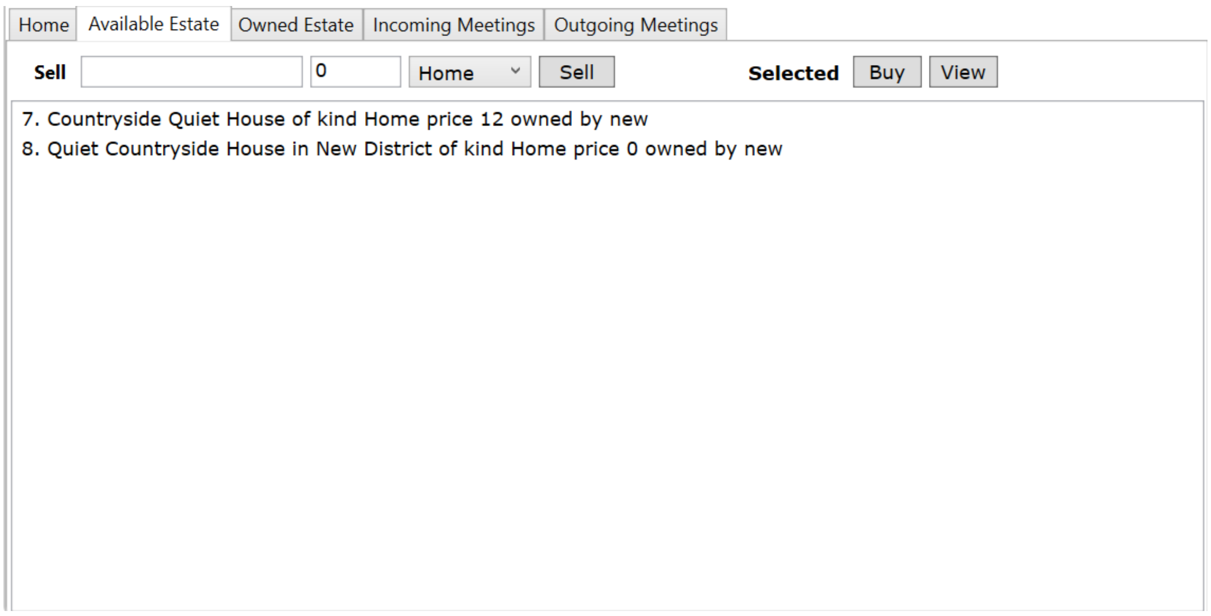


Name admin

Balance 372

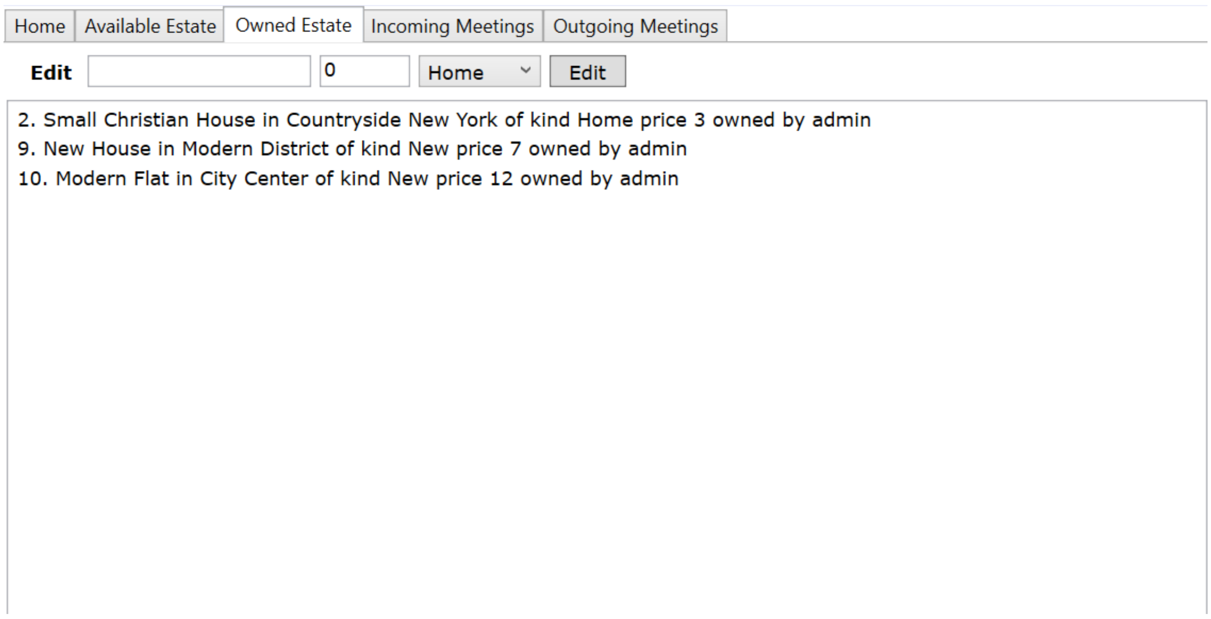
Status ✓ Manager?

Рисунок 3.2 – Профіль



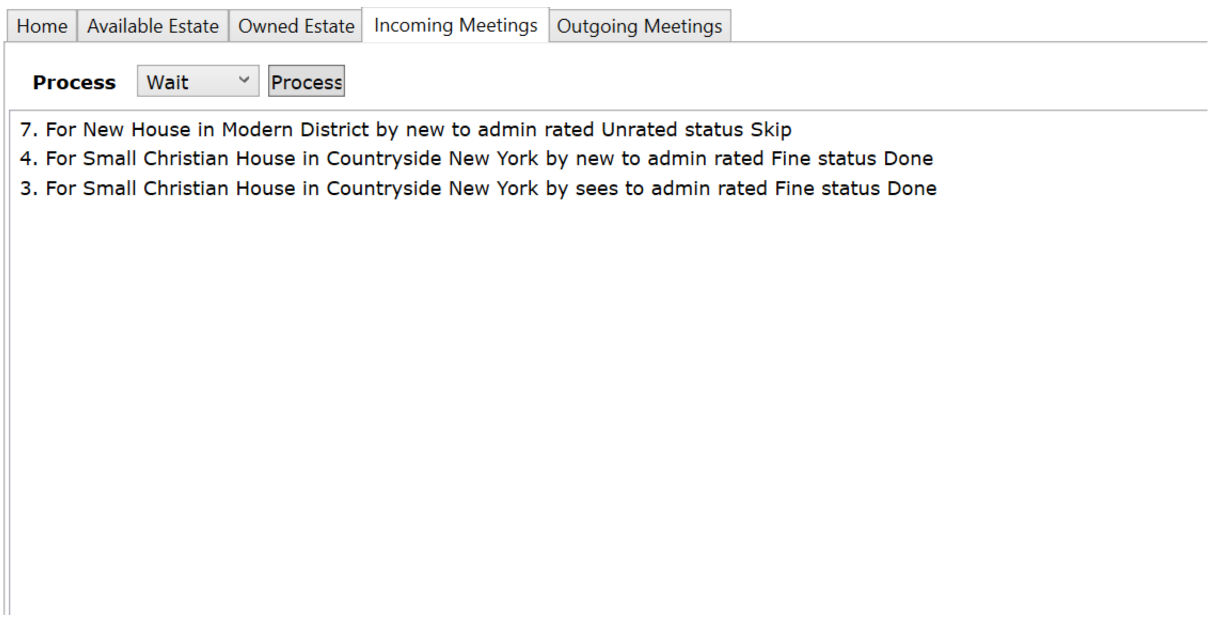
7. Countryside Quiet House of kind Home price 12 owned by new
8. Quiet Countryside House in New District of kind Home price 0 owned by new

Рисунок 3.3 – Ринок



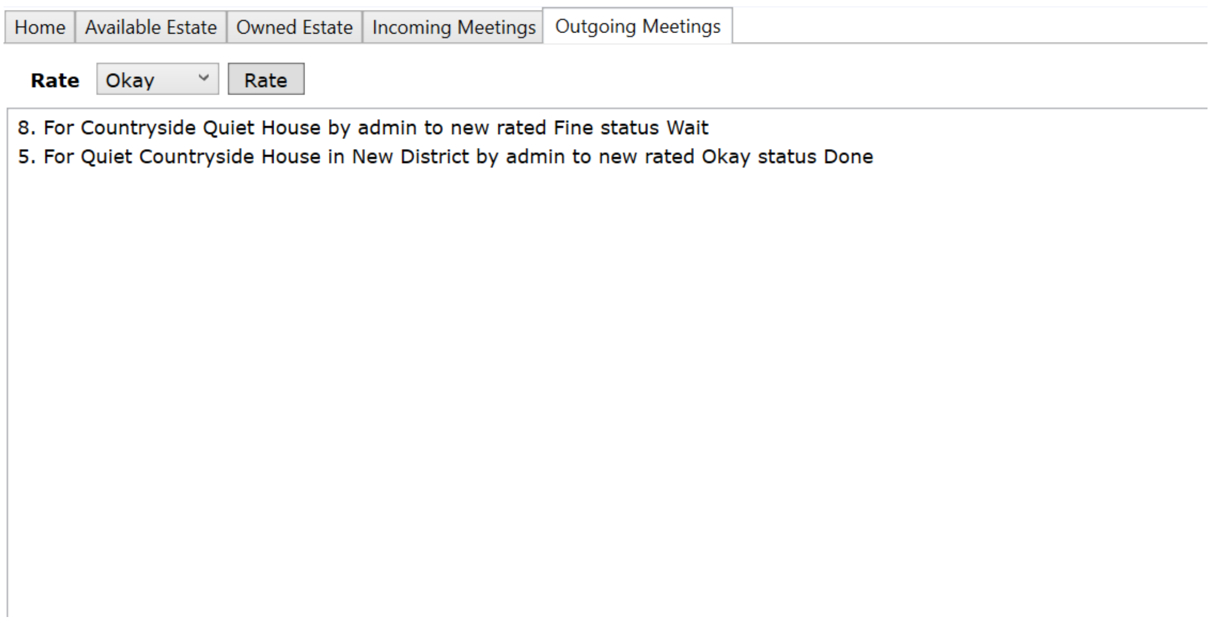
2. Small Christian House in Countryside New York of kind Home price 3 owned by admin
9. New House in Modern District of kind New price 7 owned by admin
10. Modern Flat in City Center of kind New price 12 owned by admin

Рисунок 3.4 – Наявні об’єкти нерухомості



```
7. For New House in Modern District by new to admin rated Unrated status Skip
4. For Small Christian House in Countryside New York by new to admin rated Fine status Done
3. For Small Christian House in Countryside New York by sees to admin rated Fine status Done
```

Рисунок 3.5 – Вхідні зустрічі



```
8. For Countryside Quiet House by admin to new rated Fine status Wait
5. For Quiet Countryside House in New District by admin to new rated Okay status Done
```

Рисунок 3.6 – Вихідні зустрічі