**Міністерство освіти і науки України**

**Національний університет «Запорізька Політехніка»**

Кафедра програмних засобів

# ЗВІТ

з лабораторної роботи №6

з дисципліни «Основи програмної інженерії» на тему:

«Обробка подій клавіатури»

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# Обробка подій миші

## Мета роботи

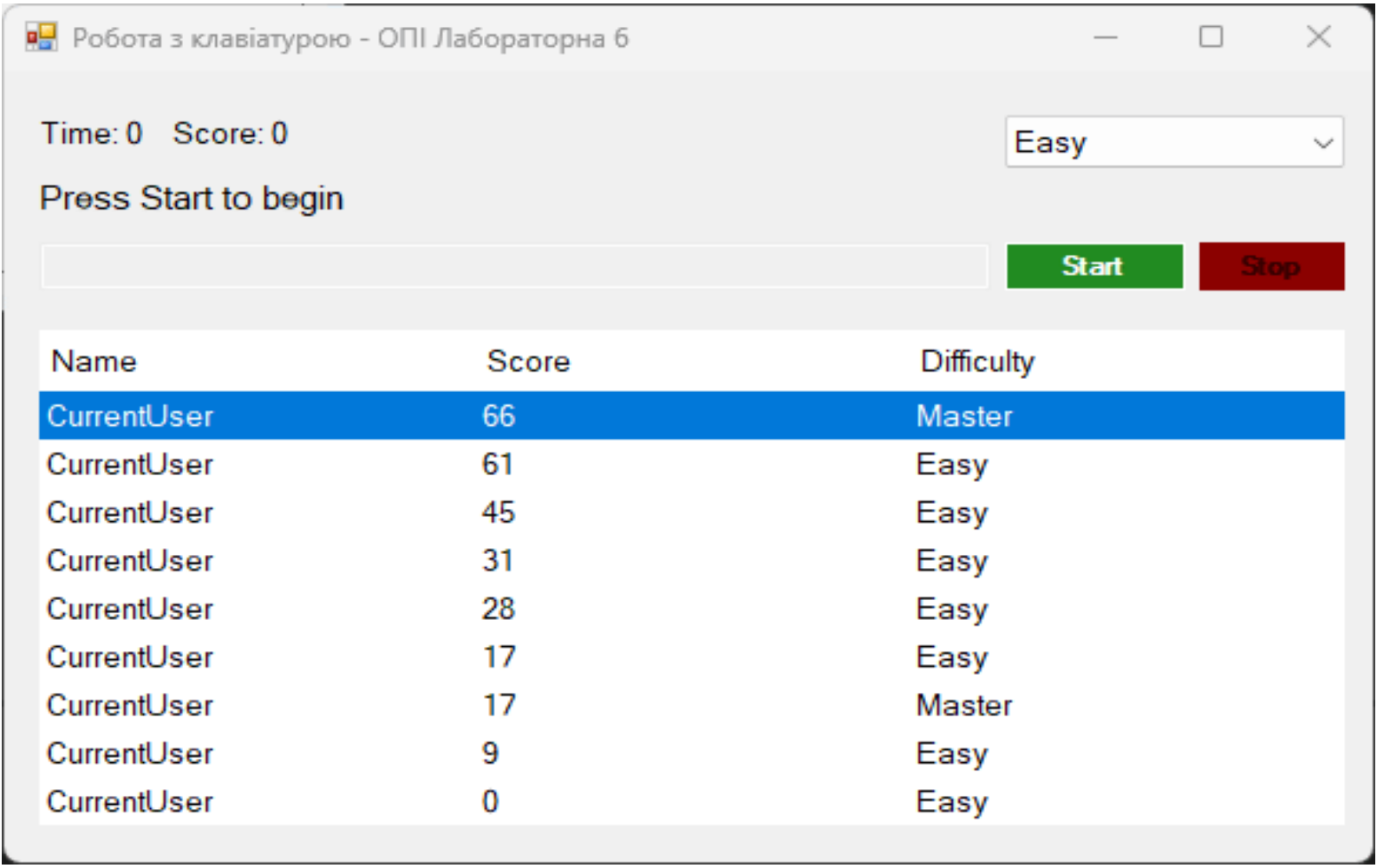
Навчитися основним принципам обробки подій клавіатури у середовищі Visual Studio C#.

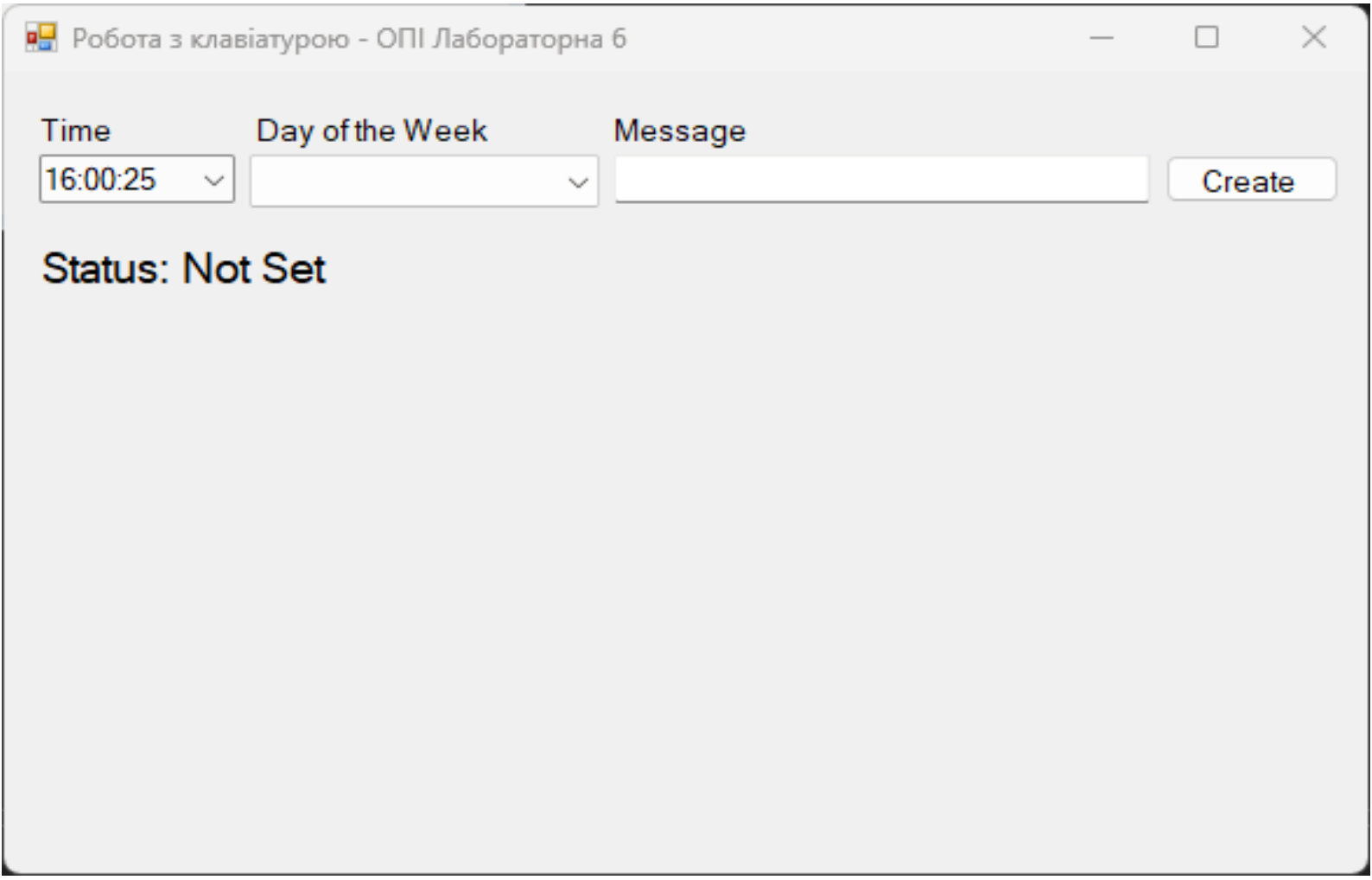
## Завдання до роботи

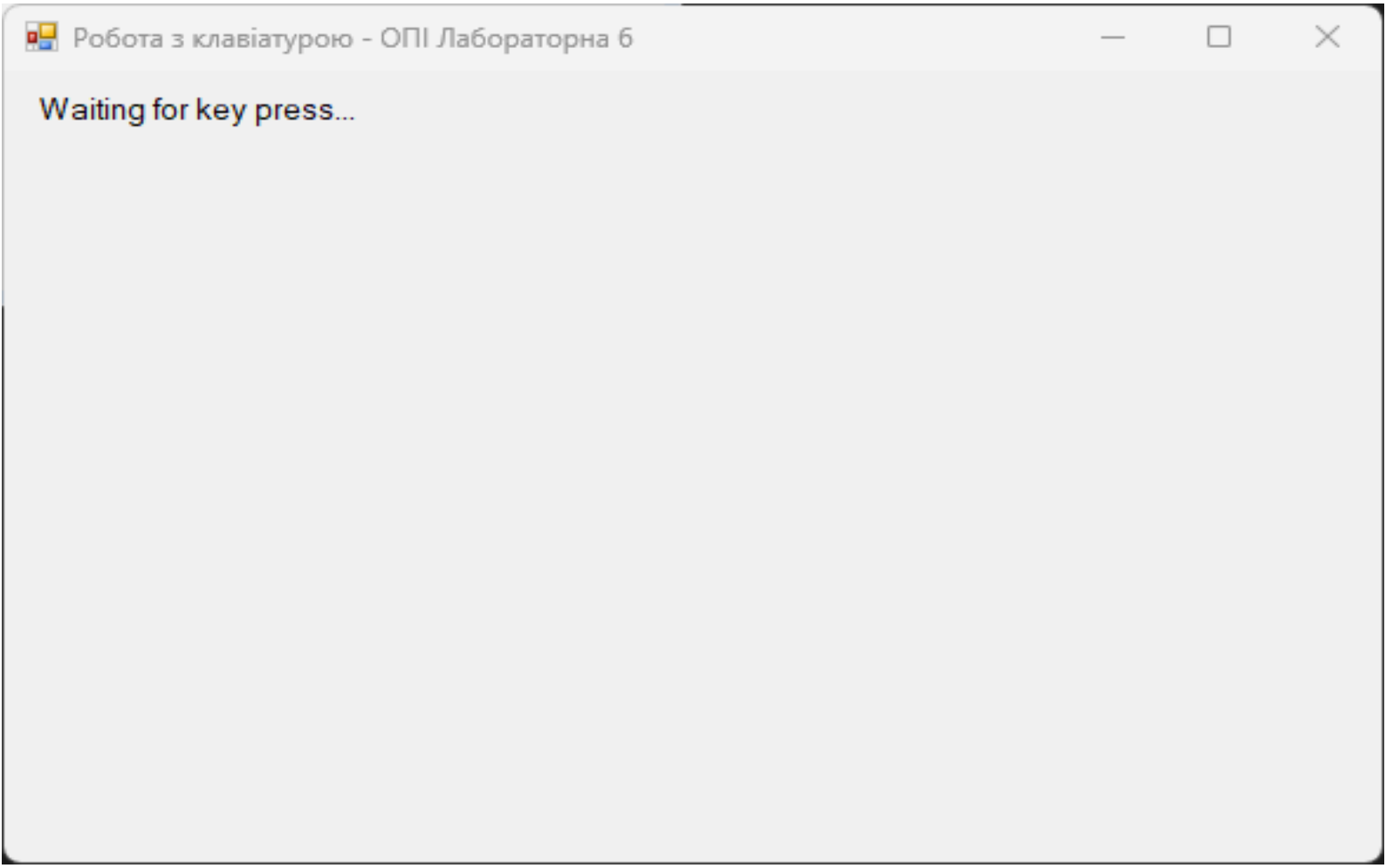
Виконати наступні завдання:

- реалізувати програму «клавіатурний тренажер». У програмі на екран виводиться певний символ, який треба увести та таймер для його введення. Передбачити 5 ступенів важкості - регулювання відведеного часу та кількості літер, слів для введення. Також передбачити таблицю найкращих результатівз можливістю автоматичного запису та зчитування з файлу. Крім того, реалізувати зберігання та завантаження прогресу користувача;
- реалізувати програму «будильник». Надати можливість виставлення сигналу на конкретний час, дату, день тижня, та коротке повідомлення. Інформацію про виставлені режими роботи зберігати у файлі;
- реалізувати «конвертер». Фіксувати кожне натискання клавіш клавіатурита виводити на екран відповідний код натиснутої клавіші. Зберігати лог роботи програми у файлі в наступному вигляді: код натиснутої клавіші - назва клавіші.

**Результати виконання роботи**




Робота з клавіатурою - ОПІ Лабораторна 6
Time
16:00:25
Day of the Week
Message
Create
Status: Not Set




**Код**

```
// Task A - Alarm Clock
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
using System.Threading.Tasks;
using System.Windows.Forms;

namespace dev
{
    public class AlarmClock
    {
        public Timer timer;
        public DateTime alarmTime;
        public DayOfWeek alarmDay;
        public bool hasAlarmWentOff;
```

```
        public AlarmClock(DateTime alarmTime, DayOfWeek alarmDay)
        {
            this.hasAlarmWentOff = false;
            this.alarmTime = alarmTime;
            this.alarmDay = alarmDay;
            timer = new Timer();
            timer.Interval = 1000;
            timer.Tick += Timer_Tick;
            timer.Start();
        }

        private void Timer_Tick(object sender, EventArgs e)
        {
            if (!hasAlarmWentOff && DateTime.Now.DayOfWeek == alarmDay &&
DateTime.Now.TimeOfDay >= alarmTime.TimeOfDay)
            {
                timer.Stop();
                OnAlarm();
                hasAlarmWentOff = true;
            }
        }

        public event Action Alarm;

        protected virtual void OnAlarm()
        {
            Alarm?.Invoke();
        }
    }
}
```

```
// Task A - Best Results
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
using System.Threading.Tasks;
using System.IO;
using System.Windows.Forms;

namespace dev
{
    public class BestResults
    {
        // Properties
        public List<Result> Results { get; set; } // The list of best
results
```

```
        public string FileName { get; set; } // The name of the file
where the best results are saved

        // Constructor
        public BestResults(string fileName)
        {
            // Initialize the list of best results as an empty list
            Results = new List<Result>();
            // Initialize the file name with the parameter
            FileName = fileName;
        }

        // A method to load the best results from the file
        public void Load()
        {
            // Try to open the file for reading
            try
            {
                // Create a stream reader object with the file name
                using (StreamReader sr = new StreamReader(FileName))
                {
                    // Read the file line by line until the end of the
file
                    while (!sr.EndOfStream)
                    {
                        // Read a line from the file
                        string line = sr.ReadLine();
                        // Split the line by commas
                        string[] parts = line.Split(',');
                        // Create a new result object with the parts
                        Result result = new Result(parts[0],
int.Parse(parts[1]), parts[2]);
                        // Add the result to the list of best results
                        Results.Add(result);
                    }
                }
            }
            // Catch any exception that may occur
            catch (Exception e)
            {
                // Show a message box with the exception message
                MessageBox.Show(e.Message, "Error");
            }
        }

        // A method to save the best results to the file
        public void Save()
        {
```

```
            // Try to open the file for writing
            try
            {
                // Create a stream writer object with the file name
                using (StreamWriter sw = new StreamWriter(FileName))
                {
                    // Loop through each result in the list of best
results
                    foreach (Result result in Results)
                    {
                        // Write the result to the file
                        sw.WriteLine(result.ToString());
                    }
                }
            }
            // Catch any exception that may occur
            catch (Exception e)
            {
                // Show a message box with the exception message
                MessageBox.Show(e.Message, "Error");
            }
        }

        // A method to add a new result to the list of best results
        public void Add(Result result)
        {
            // Add the result to the list of best results
            Results.Add(result);
            // Sort the list of best results by score and difficulty
level
            Results = Results.OrderByDescending(r => r.Score).ThenBy(r =>
r.Difficulty).ToList();
        }

        // A method to show the best results in a message box
        public void Show()
        {
            // Initialize an empty string
            string message = "";
            // Loop through each result in the list of best results
            foreach (Result result in Results)
            {
                // Append the result to the message with a new line
                message += result.Name + " - " + result.Score + " - " +
result.Difficulty + "\n";
            }
            // Show a message box with the message and the title "Best
Results"
```

```
            MessageBox.Show(message, "Best Results");
        }
    }
}
```

```
// Task A - Main
using System;
using System.Collections.Generic;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Linq;
using System.Text;
using System.Threading.Tasks;
using System.Windows.Forms;

namespace dev
{
    public partial class FormMain : Form
    {
        // Global variables
        char character; // The current character to be entered by the
user
        int time; // The remaining time for entering the character
        int score; // The current score of the user
        int maxTime; // The maximum time for entering the character based
on the difficulty level
        int minChars; // The minimum number of characters to be entered
based on the difficulty level
        int maxChars; // The maximum number of characters to be entered
based on the difficulty level
        int minWords; // The minimum number of words to be entered based
on the difficulty level
        int maxWords; // The maximum number of words to be entered based
on the difficulty level
        Random random = new Random(); // A random number generator object
        BestResults bestResults; // A best results object


        public FormMain()
        {
            InitializeComponent();

            // Adjust the timer
            tmrGame.Interval = 1000;
            tmrGame.Tick += tmrGame_Tick;
            // Load the best results from the file
```

```
            bestResults = new BestResults("bestresults.txt");
            bestResults.Load();
            // Set the default difficulty level to Easy
            cmbDifficulty.SelectedIndex = 0;
            // Reset the game variables and controls
            ResetGame();
            // Load the scores from the best results list to the grid
view table
            LoadScores();
        }

        // A method to reset the game variables and controls
        private void ResetGame()
        {
            // Set the character to null
            character = '\0';
            // Set the time to 0
            time = 0;
            // Set the score to 0
            score = 0;
            // Set the maxTime, minChars, maxChars, minWords, and
maxWords variables according to the difficulty level
            switch (cmbDifficulty.SelectedIndex)
            {
                case 0: // Easy
                    maxTime = 10;
                    minChars = 1;
                    maxChars = 1;
                    minWords = 1;
                    maxWords = 1;
                    break;
                case 1: // Medium
                    maxTime = 8;
                    minChars = 1;
                    maxChars = 2;
                    minWords = 1;
                    maxWords = 2;
                    break;
                case 2: // Hard
                    maxTime = 6;
                    minChars = 1;
                    maxChars = 3;
                    minWords = 1;
                    maxWords = 3;
                    break;
                case 3: // Expert
                    maxTime = 4;
                    minChars = 2;
```

```
                    maxChars = 4;
                    minWords = 2;
                    maxWords = 4;
                    break;
                case 4: // Master
                    maxTime = 2;
                    minChars = 3;
                    maxChars = 5;
                    minWords = 3;
                    maxWords = 5;
                    break;
            }
            // Set the character label to "Press Start to begin"
            lblCharacter.Text = "Press Start to begin";
            // Set the input text box to empty
            txtInput.Text = "";
            // Set the timer label to "Time: 0"
            lblTimer.Text = "Time: 0";
            // Set the score label to "Score: 0"
            lblScore.Text = "Score: 0";
            // Enable the start button
            btnStart.Enabled = true;
            // Disable the stop button
            btnStop.Enabled = false;
            // Disable the input text box
            txtInput.Enabled = false;
            // Enable the difficulty combo box
            cmbDifficulty.Enabled = true;
        }

        // A method to generate a new character to be entered by the user
        private void GenerateCharacter()
        {
            // Get a random number of characters between minChars and
maxChars
            int chars = random.Next(minChars, maxChars + 1);
            // Get a random number of words between minWords and maxWords
            int words = random.Next(minWords, maxWords + 1);
            // Initialize an empty string
            string str = "";
            // Loop for each word
            for (int i = 1; i <= words; i++)
            {
                // Loop for each character
                for (int j = 1; j <= chars; j++)
                {
                    // Get a random character between 'a' and 'z'
                    char c = (char)random.Next('a', 'z' + 1);
```

```
                    // Append the character to the string
                    str += c;
                }
                // If the current word is not the last word, append a
space to the string
                if (i < words)
                {
                    str += ' ';
                }
            }
            // Set the character variable to the string
            character = str[0];
            // Set the character label to the character
            lblCharacter.Text = character.ToString();
        }

        // A method to start the game
        private void StartGame()
        {
            // Disable the start button
            btnStart.Enabled = false;
            // Enable the stop button
            btnStop.Enabled = true;
            // Enable the input text box
            txtInput.Enabled = true;
            // Disable the difficulty combo box
            cmbDifficulty.Enabled = false;
            // Set the input text box to empty
            txtInput.Text = "";
            // Set the focus to the input text box
            txtInput.Focus();
            // Generate a new character to be entered by the user
            GenerateCharacter();
            // Set the time variable to maxTime
            time = maxTime;
            // Set the timer label to "Time: " + time
            lblTimer.Text = "Time: " + time;
            // Enable the game timer
            tmrGame.Enabled = true;
        }

        // A method to stop the game
        private void StopGame()
        {
            // Disable the game timer
            tmrGame.Enabled = false;
            // Disable the start button
            btnStart.Enabled = true;
```

```
            // Disable the stop button
            btnStop.Enabled = false;
            // Disable the input text box
            txtInput.Enabled = false;
            // Enable the difficulty combo box
            cmbDifficulty.Enabled = true;
            // Create a new result object with the user's name, score,
and difficulty level
            Result result = new Result("CurrentUser", score,
cmbDifficulty.SelectedItem.ToString());
            // Add the result to the best results list
            bestResults.Add(result);
            // Save the best results to the file
            bestResults.Save();
            // Load the scores from the best results list to the grid
view table
            LoadScores();
            // Reset the game variables and controls
            ResetGame();
        }

        private void btnStart_Click(object sender, EventArgs e)
        {
            // Start the game
            StartGame();
        }

        private void btnStop_Click(object sender, EventArgs e)
        {
            // Stop the game
            StopGame();
        }

        private void tmrGame_Tick(object sender, EventArgs e)
        {
            // Decrement the time by 1
            time--;
            // Update the timer label
            lblTimer.Text = "Time: " + time;
            // If the time is up
            if (time == 0)
            {
                // Show a message box with the game over message and the
correct score
                MessageBox.Show("Time is up! Your score is " +
lblScore.Text, "Game Over");
                // Stop the game
                StopGame();
```

```
            }
        }

        private void txtInput_TextChanged(object sender, EventArgs e)
        {
            // If the input text is not empty
            if (txtInput.Text != "")
            {
                // Get the last character of the input text
                char input = txtInput.Text[txtInput.Text.Length - 1];
                // If the input character is equal to the character
                if (input == character)
                {
                    // Increment the score by 1
                    score++;
                    // Update the score label
                    lblScore.Text = "Score: " + score;
                    // Generate a new character
                    GenerateCharacter();
                    // Reset the time to maxTime
                    time = maxTime;
                    // Update the timer label
                    lblTimer.Text = "Time: " + time;
                }
            }
        }

        private void LoadScores()
        {
            // Clear the rows of the grid view table
            dgvScores.Rows.Clear();
            // Loop through each result in the best results list
            foreach (Result result in bestResults.Results)
            {
                // Add a new row to the grid view table with the result
properties
                dgvScores.Rows.Add(result.Name, result.Score,
result.Difficulty);
            }
        }

        private void cmbDifficulty_SelectedIndexChanged(object sender,
EventArgs e)
        {
            // Update the game variables according to the new difficulty
level
            switch (cmbDifficulty.SelectedIndex)
            {
```

```
                case 0: // Easy
                    maxTime = 10;
                    minChars = 1;
                    maxChars = 1;
                    minWords = 1;
                    maxWords = 1;
                    break;
                case 1: // Medium
                    maxTime = 8;
                    minChars = 1;
                    maxChars = 2;
                    minWords = 1;
                    maxWords = 2;
                    break;
                case 2: // Hard
                    maxTime = 6;
                    minChars = 1;
                    maxChars = 3;
                    minWords = 1;
                    maxWords = 3;
                    break;
                case 3: // Expert
                    maxTime = 4;
                    minChars = 2;
                    maxChars = 4;
                    minWords = 2;
                    maxWords = 4;
                    break;
                case 4: // Master
                    maxTime = 2;
                    minChars = 3;
                    maxChars = 5;
                    minWords = 3;
                    maxWords = 5;
                    break;
            }
        }
    }
}
```

```
// Task A - Designer
namespace dev
{
    partial class FormMain
    {
        /// <summary>
        /// Required designer variable.
        /// </summary>
```

```
        private System.ComponentModel.IContainer components = null;

        /// <summary>
        /// Clean up any resources being used.
        /// </summary>
        /// <param name="disposing">true if managed resources should be
disposed; otherwise, false.</param>
        protected override void Dispose(bool disposing)
        {
            if (disposing && (components != null))
            {
                components.Dispose();
            }
            base.Dispose(disposing);
        }

        #region Windows Form Designer generated code

        /// <summary>
        /// Required method for Designer support - do not modify
        /// the contents of this method with the code editor.
        /// </summary>
        private void InitializeComponent()
        {
            this.components = new System.ComponentModel.Container();
            System.Windows.Forms.DataGridViewCellStyle
dataGridViewCellStyle3 = new
System.Windows.Forms.DataGridViewCellStyle();
            this.lblCharacter = new System.Windows.Forms.Label();
            this.txtInput = new System.Windows.Forms.TextBox();
            this.lblTimer = new System.Windows.Forms.Label();
            this.tmrGame = new
System.Windows.Forms.Timer(this.components);
            this.btnStart = new System.Windows.Forms.Button();
            this.btnStop = new System.Windows.Forms.Button();
            this.cmbDifficulty = new System.Windows.Forms.ComboBox();
            this.lblScore = new System.Windows.Forms.Label();
            this.dgvScores = new System.Windows.Forms.DataGridView();
            this.ResultName = new
System.Windows.Forms.DataGridViewTextBoxColumn();
            this.ResultScore = new
System.Windows.Forms.DataGridViewTextBoxColumn();
            this.ResultDifficulty = new
System.Windows.Forms.DataGridViewTextBoxColumn();
            ((System.ComponentModel.ISupportInitialize)(this.dgvScores)).
BeginInit();
            this.SuspendLayout();
            //
```

```
            // lblCharacter
            //
            this.lblCharacter.AutoSize = true;
            this.lblCharacter.Font = new System.Drawing.Font("Microsoft
Sans Serif", 11.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
            this.lblCharacter.Location = new System.Drawing.Point(12,
48);
            this.lblCharacter.Name = "lblCharacter";
            this.lblCharacter.Size = new System.Drawing.Size(12, 18);
            this.lblCharacter.TabIndex = 1;
            this.lblCharacter.Text = "f";
            //
            // txtInput
            //
            this.txtInput.Location = new System.Drawing.Point(15, 78);
            this.txtInput.Name = "txtInput";
            this.txtInput.Size = new System.Drawing.Size(406, 22);
            this.txtInput.TabIndex = 2;
            this.txtInput.TextChanged += new
System.EventHandler(this.txtInput_TextChanged);
            //
            // lblTimer
            //
            this.lblTimer.AutoSize = true;
            this.lblTimer.Location = new System.Drawing.Point(12, 20);
            this.lblTimer.Name = "lblTimer";
            this.lblTimer.Size = new System.Drawing.Size(51, 16);
            this.lblTimer.TabIndex = 3;
            this.lblTimer.Text = "Time: 0";
            //
            // btnStart
            //
            this.btnStart.BackColor = System.Drawing.Color.ForestGreen;
            this.btnStart.FlatAppearance.BorderSize = 0;
            this.btnStart.FlatStyle =
System.Windows.Forms.FlatStyle.Flat;
            this.btnStart.Font = new System.Drawing.Font("Microsoft Sans
Serif", 8.25F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
            this.btnStart.ForeColor =
System.Drawing.SystemColors.ControlLightLight;
            this.btnStart.Location = new System.Drawing.Point(427, 78);
            this.btnStart.Name = "btnStart";
            this.btnStart.Size = new System.Drawing.Size(77, 22);
            this.btnStart.TabIndex = 4;
            this.btnStart.Text = "Start";
            this.btnStart.UseVisualStyleBackColor = false;
```

```
            this.btnStart.Click += new
System.EventHandler(this.btnStart_Click);
            //
            // btnStop
            //
            this.btnStop.BackColor = System.Drawing.Color.DarkRed;
            this.btnStop.FlatAppearance.BorderSize = 0;
            this.btnStop.FlatStyle = System.Windows.Forms.FlatStyle.Flat;
            this.btnStop.Font = new System.Drawing.Font("Microsoft Sans
Serif", 8.25F, System.Drawing.FontStyle.Bold,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
            this.btnStop.ForeColor =
System.Drawing.SystemColors.ControlLightLight;
            this.btnStop.Location = new System.Drawing.Point(510, 78);
            this.btnStop.Name = "btnStop";
            this.btnStop.Size = new System.Drawing.Size(62, 22);
            this.btnStop.TabIndex = 4;
            this.btnStop.Text = "Stop";
            this.btnStop.UseVisualStyleBackColor = false;
            this.btnStop.Click += new
System.EventHandler(this.btnStop_Click);
            //
            // cmbDifficulty
            //
            this.cmbDifficulty.DropDownStyle =
System.Windows.Forms.ComboBoxStyle.DropDownList;
            this.cmbDifficulty.FormattingEnabled = true;
            this.cmbDifficulty.Items.AddRange(new object[] {
            "Easy",
            "Medium",
            "High",
            "Expert",
            "Master"});
            this.cmbDifficulty.Location = new System.Drawing.Point(427,
20);
            this.cmbDifficulty.Name = "cmbDifficulty";
            this.cmbDifficulty.Size = new System.Drawing.Size(145, 24);
            this.cmbDifficulty.TabIndex = 5;
            this.cmbDifficulty.SelectedIndexChanged += new
System.EventHandler(this.cmbDifficulty_SelectedIndexChanged);
            //
            // lblScore
            //
            this.lblScore.AutoSize = true;
            this.lblScore.Location = new System.Drawing.Point(69, 20);
            this.lblScore.Name = "lblScore";
            this.lblScore.Size = new System.Drawing.Size(56, 16);
            this.lblScore.TabIndex = 3;
```

```
            this.lblScore.Text = "Score: 0";
            //
            // dgvScores
            //
            this.dgvScores.AllowUserToAddRows = false;
            this.dgvScores.AllowUserToDeleteRows = false;
            this.dgvScores.AutoSizeColumnsMode =
System.Windows.Forms.DataGridViewAutoSizeColumnsMode.Fill;
            this.dgvScores.BackgroundColor =
System.Drawing.SystemColors.Control;
            this.dgvScores.BorderStyle =
System.Windows.Forms.BorderStyle.None;
            this.dgvScores.CellBorderStyle =
System.Windows.Forms.DataGridViewCellBorderStyle.None;
            this.dgvScores.ColumnHeadersBorderStyle =
System.Windows.Forms.DataGridViewHeaderBorderStyle.None;
            dataGridViewCellStyle3.Alignment =
System.Windows.Forms.DataGridViewContentAlignment.MiddleLeft;
            dataGridViewCellStyle3.BackColor =
System.Drawing.SystemColors.ControlLightLight;
            dataGridViewCellStyle3.Font = new
System.Drawing.Font("Microsoft Sans Serif", 9.75F,
System.Drawing.FontStyle.Bold, System.Drawing.GraphicsUnit.Point,
((byte)(0)));
            dataGridViewCellStyle3.ForeColor =
System.Drawing.SystemColors.WindowText;
            dataGridViewCellStyle3.SelectionBackColor =
System.Drawing.SystemColors.ControlLightLight;
            dataGridViewCellStyle3.SelectionForeColor =
System.Drawing.SystemColors.HighlightText;
            dataGridViewCellStyle3.WrapMode =
System.Windows.Forms.DataGridViewTriState.True;
            this.dgvScores.ColumnHeadersDefaultCellStyle =
dataGridViewCellStyle3;
            this.dgvScores.ColumnHeadersHeight = 28;
            this.dgvScores.Columns.AddRange(new
System.Windows.Forms.DataGridViewColumn[] {
            this.ResultName,
            this.ResultScore,
            this.ResultDifficulty});
            this.dgvScores.EnableHeadersVisualStyles = false;
            this.dgvScores.Location = new System.Drawing.Point(15, 118);
            this.dgvScores.Name = "dgvScores";
            this.dgvScores.ReadOnly = true;
            this.dgvScores.RowHeadersBorderStyle =
System.Windows.Forms.DataGridViewHeaderBorderStyle.None;
            this.dgvScores.RowHeadersVisible = false;
```

```
            this.dgvScores.SelectionMode =
System.Windows.Forms.DataGridViewSelectionMode.FullRowSelect;
            this.dgvScores.Size = new System.Drawing.Size(557, 231);
            this.dgvScores.TabIndex = 6;
            //
            // ResultName
            //
            this.ResultName.HeaderText = "Name";
            this.ResultName.Name = "ResultName";
            this.ResultName.ReadOnly = true;
            //
            // ResultScore
            //
            this.ResultScore.HeaderText = "Score";
            this.ResultScore.Name = "ResultScore";
            this.ResultScore.ReadOnly = true;
            //
            // ResultDifficulty
            //
            this.ResultDifficulty.HeaderText = "Difficulty";
            this.ResultDifficulty.Name = "ResultDifficulty";
            this.ResultDifficulty.ReadOnly = true;
            //
            // FormMain
            //
            this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.None;
            this.ClientSize = new System.Drawing.Size(584, 361);
            this.Controls.Add(this.dgvScores);
            this.Controls.Add(this.cmbDifficulty);
            this.Controls.Add(this.btnStop);
            this.Controls.Add(this.btnStart);
            this.Controls.Add(this.lblScore);
            this.Controls.Add(this.lblTimer);
            this.Controls.Add(this.txtInput);
            this.Controls.Add(this.lblCharacter);
            this.Font = new System.Drawing.Font("Microsoft Sans Serif",
9.75F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
            this.Margin = new System.Windows.Forms.Padding(4);
            this.MaximumSize = new System.Drawing.Size(600, 400);
            this.MinimumSize = new System.Drawing.Size(600, 400);
            this.Name = "FormMain";
            this.Text = "Робота з клавіатурою – ОПІ Лабораторна 6";
            ((System.ComponentModel.ISupportInitialize)(this.dgvScores)).
EndInit();
            this.ResumeLayout(false);
            this.PerformLayout();
```

```
        }

        #endregion
        private System.Windows.Forms.Label lblCharacter;
        private System.Windows.Forms.TextBox txtInput;
        private System.Windows.Forms.Label lblTimer;
        private System.Windows.Forms.Timer tmrGame;
        private System.Windows.Forms.Button btnStart;
        private System.Windows.Forms.Button btnStop;
        private System.Windows.Forms.ComboBox cmbDifficulty;
        private System.Windows.Forms.Label lblScore;
        private System.Windows.Forms.DataGridView dgvScores;
        private System.Windows.Forms.DataGridViewTextBoxColumn
ResultName;
        private System.Windows.Forms.DataGridViewTextBoxColumn
ResultScore;
        private System.Windows.Forms.DataGridViewTextBoxColumn
ResultDifficulty;
    }
}
```

```
// Task B - Alarm Clock
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
using System.Threading.Tasks;
using System.Windows.Forms;

namespace dev
{
    public class AlarmClock
    {
        public Timer timer;
        public DateTime alarmTime;
        public DayOfWeek alarmDay;
        public bool hasAlarmWentOff;

        public AlarmClock(DateTime alarmTime, DayOfWeek alarmDay)
        {
            this.hasAlarmWentOff = false;
            this.alarmTime = alarmTime;
            this.alarmDay = alarmDay;
            timer = new Timer();
            timer.Interval = 1000;
            timer.Tick += Timer_Tick;
```

```
            timer.Start();
        }

        private void Timer_Tick(object sender, EventArgs e)
        {
            if (!hasAlarmWentOff && DateTime.Now.DayOfWeek == alarmDay &&
DateTime.Now.TimeOfDay >= alarmTime.TimeOfDay)
            {
                timer.Stop();
                OnAlarm();
                hasAlarmWentOff = true;
            }
        }

        public event Action Alarm;

        protected virtual void OnAlarm()
        {
            Alarm?.Invoke();
        }
    }
}
```

```
// Task B - Main
using System;
using System.Collections.Generic;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.IO;
using System.Linq;
using System.Runtime.Serialization.Formatters.Binary;
using System.Text;
using System.Threading.Tasks;
using System.Windows.Forms;

namespace dev
{
    public partial class FormMain : Form
    {
        private DateTime alarmTime;
        private DayOfWeek alarmDay;
        private string alarmText;
        public FormMain()
        {
            InitializeComponent();
        }
```

```
        private void CreateAlarm()
        {
            AlarmClock alarmClock = new AlarmClock(this.alarmTime,
this.alarmDay);
            alarmClock.Alarm += () =>
            {
                MessageBox.Show(this.alarmText, "Alarm");
                lblStatus.Text = "Status: Not Set";
            };
            lblStatus.Text = $"Status: Set to {this.alarmTime} on
{this.alarmDay}";
        }

        private void btnCreate_Click(object sender, EventArgs e)
        {
            this.alarmTime = dateTimePickerTime.Value;
            this.alarmDay = (DayOfWeek)Enum.Parse(typeof(DayOfWeek),
comboBoxDayOfWeek.SelectedItem.ToString());
            this.alarmText = textBoxMessage.Text;

            CreateAlarm();
        }

        private void FormMain_FormClosing(object sender,
FormClosingEventArgs e)
        {
            using (StreamWriter sw = new StreamWriter("alarm.txt"))
            {
                sw.WriteLine(this.alarmTime);
                sw.WriteLine(this.alarmDay);
                sw.WriteLine(this.alarmText);
            }
        }

        private void FormMain_Load(object sender, EventArgs e)
        {
            if (File.Exists("alarm.txt"))
            {
                using (StreamReader sr = new StreamReader("alarm.txt"))
                {
                    string alarmTimeString = sr.ReadLine();
                    string alarmDayString = sr.ReadLine();
                    string message = sr.ReadLine();

                    this.alarmTime = DateTime.Parse(alarmTimeString);
                    this.alarmDay =
(DayOfWeek)Enum.Parse(typeof(DayOfWeek), alarmDayString);
```

```
                    this.alarmText = message;

                    if (this.alarmTime < DateTime.Now || this.alarmDay <
DateTime.Now.DayOfWeek || this.alarmText == "")
                    {
                        return;
                    }

                    CreateAlarm();
                }
            }
        }

        private void FormMain_KeyDown(object sender, KeyEventArgs e)
        {
            if (e.KeyCode == Keys.Enter)
            {
                CreateAlarm();
            }
        }
    }
}
```

```
// Task B - Designer
namespace dev
{
    partial class FormMain
    {
        /// <summary>
        /// Required designer variable.
        /// </summary>
        private System.ComponentModel.IContainer components = null;

        /// <summary>
        /// Clean up any resources being used.
        /// </summary>
        /// <param name="disposing">true if managed resources should be
disposed; otherwise, false.</param>
        protected override void Dispose(bool disposing)
        {
            if (disposing && (components != null))
            {
                components.Dispose();
            }
            base.Dispose(disposing);
        }
```

```
        #region Windows Form Designer generated code

        /// <summary>
        /// Required method for Designer support - do not modify
        /// the contents of this method with the code editor.
        /// </summary>
        private void InitializeComponent()
        {
            this.dateTimePickerTime = new
System.Windows.Forms.DateTimePicker();
            this.lblTime = new System.Windows.Forms.Label();
            this.comboBoxDayOfWeek = new System.Windows.Forms.ComboBox();
            this.lblDayOfWeek = new System.Windows.Forms.Label();
            this.textBoxMessage = new System.Windows.Forms.TextBox();
            this.lblMessage = new System.Windows.Forms.Label();
            this.btnCreate = new System.Windows.Forms.Button();
            this.lblStatus = new System.Windows.Forms.Label();
            this.SuspendLayout();
            //
            // dateTimePickerTime
            //
            this.dateTimePickerTime.Format =
System.Windows.Forms.DateTimePickerFormat.Time;
            this.dateTimePickerTime.Location = new
System.Drawing.Point(15, 37);
            this.dateTimePickerTime.Name = "dateTimePickerTime";
            this.dateTimePickerTime.Size = new System.Drawing.Size(84,
22);
            this.dateTimePickerTime.TabIndex = 0;
            //
            // lblTime
            //
            this.lblTime.AutoSize = true;
            this.lblTime.Location = new System.Drawing.Point(12, 18);
            this.lblTime.Name = "lblTime";
            this.lblTime.Size = new System.Drawing.Size(38, 16);
            this.lblTime.TabIndex = 1;
            this.lblTime.Text = "Time";
            //
            // comboBoxDayOfWeek
            //
            this.comboBoxDayOfWeek.DropDownStyle =
System.Windows.Forms.ComboBoxStyle.DropDownList;
            this.comboBoxDayOfWeek.FormattingEnabled = true;
            this.comboBoxDayOfWeek.Items.AddRange(new object[] {
            "Monday",
            "Tuesday",
            "Wednesday",
```

```
            "Thursday",
            "Friday",
            "Saturday",
            "Sunday"});
            this.comboBoxDayOfWeek.Location = new
System.Drawing.Point(105, 37);
            this.comboBoxDayOfWeek.Name = "comboBoxDayOfWeek";
            this.comboBoxDayOfWeek.Size = new System.Drawing.Size(150,
24);
            this.comboBoxDayOfWeek.TabIndex = 2;
            //
            // lblDayOfWeek
            //
            this.lblDayOfWeek.AutoSize = true;
            this.lblDayOfWeek.Location = new System.Drawing.Point(105,
18);
            this.lblDayOfWeek.Name = "lblDayOfWeek";
            this.lblDayOfWeek.Size = new System.Drawing.Size(106, 16);
            this.lblDayOfWeek.TabIndex = 1;
            this.lblDayOfWeek.Text = "Day of the Week";
            //
            // textBoxMessage
            //
            this.textBoxMessage.Location = new System.Drawing.Point(261,
37);
            this.textBoxMessage.Name = "textBoxMessage";
            this.textBoxMessage.Size = new System.Drawing.Size(230, 22);
            this.textBoxMessage.TabIndex = 3;
            //
            // lblMessage
            //
            this.lblMessage.AutoSize = true;
            this.lblMessage.Location = new System.Drawing.Point(258, 18);
            this.lblMessage.Name = "lblMessage";
            this.lblMessage.Size = new System.Drawing.Size(64, 16);
            this.lblMessage.TabIndex = 1;
            this.lblMessage.Text = "Message";
            //
            // btnCreate
            //
            this.btnCreate.Location = new System.Drawing.Point(497, 37);
            this.btnCreate.Name = "btnCreate";
            this.btnCreate.Size = new System.Drawing.Size(75, 22);
            this.btnCreate.TabIndex = 4;
            this.btnCreate.Text = "Create";
            this.btnCreate.UseVisualStyleBackColor = true;
            this.btnCreate.Click += new
System.EventHandler(this.btnCreate_Click);
```

```
            //
            // lblStatus
            //
            this.lblStatus.AutoSize = true;
            this.lblStatus.Font = new System.Drawing.Font("Microsoft Sans
Serif", 14.25F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
            this.lblStatus.Location = new System.Drawing.Point(12, 76);
            this.lblStatus.Name = "lblStatus";
            this.lblStatus.Size = new System.Drawing.Size(131, 24);
            this.lblStatus.TabIndex = 5;
            this.lblStatus.Text = "Status: Not Set";
            //
            // FormMain
            //
            this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.None;
            this.ClientSize = new System.Drawing.Size(584, 361);
            this.Controls.Add(this.lblStatus);
            this.Controls.Add(this.btnCreate);
            this.Controls.Add(this.textBoxMessage);
            this.Controls.Add(this.comboBoxDayOfWeek);
            this.Controls.Add(this.lblMessage);
            this.Controls.Add(this.lblDayOfWeek);
            this.Controls.Add(this.lblTime);
            this.Controls.Add(this.dateTimePickerTime);
            this.Font = new System.Drawing.Font("Microsoft Sans Serif",
9.75F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
            this.MaximumSize = new System.Drawing.Size(600, 400);
            this.MinimumSize = new System.Drawing.Size(600, 400);
            this.Name = "FormMain";
            this.Text = "Робота з клавіатурою - ОПІ Лабораторна 6";
            this.FormClosing += new
System.Windows.Forms.FormClosingEventHandler(this.FormMain_FormClosing);
            this.Load += new System.EventHandler(this.FormMain_Load);
            this.KeyDown += new
System.Windows.Forms.KeyEventHandler(this.FormMain_KeyDown);
            this.ResumeLayout(false);
            this.PerformLayout();

        }

        #endregion

        private System.Windows.Forms.DateTimePicker dateTimePickerTime;
        private System.Windows.Forms.Label lblTime;
        private System.Windows.Forms.ComboBox comboBoxDayOfWeek;
        private System.Windows.Forms.Label lblDayOfWeek;
```

```
        private System.Windows.Forms.TextBox textBoxMessage;
        private System.Windows.Forms.Label lblMessage;
        private System.Windows.Forms.Button btnCreate;
        private System.Windows.Forms.Label lblStatus;
    }
}
```

```
// Task C - Main
using System;
using System.Collections.Generic;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Linq;
using System.Text;
using System.Threading.Tasks;
using System.Windows.Forms;
using System.IO;

namespace dev
{
    public partial class FormMain : Form
    {
        public FormMain()
        {
            InitializeComponent();

            this.KeyPreview = true;
        }

        private void FormMain_KeyPress(object sender, KeyPressEventArgs
e)
        {
            int keyCode = (int)e.KeyChar;
            labelKeyCode.Text = $"Key Code: {keyCode}\nKey Name:
{e.KeyChar}";

            using (StreamWriter writer = new StreamWriter("log.txt",
true))
            {
                writer.WriteLine($"Key Code: {keyCode} - Key Name:
{e.KeyChar}");
            }
        }
    }
}
```

```
// Task C - Designer
namespace dev
{
    partial class FormMain
    {
        /// <summary>
        /// Required designer variable.
        /// </summary>
        private System.ComponentModel.IContainer components = null;

        /// <summary>
        /// Clean up any resources being used.
        /// </summary>
        /// <param name="disposing">true if managed resources should be
disposed; otherwise, false.</param>
        protected override void Dispose(bool disposing)
        {
            if (disposing && (components != null))
            {
                components.Dispose();
            }
            base.Dispose(disposing);
        }

        #region Windows Form Designer generated code

        /// <summary>
        /// Required method for Designer support - do not modify
        /// the contents of this method with the code editor.
        /// </summary>
        private void InitializeComponent()
        {
            this.labelKeyCode = new System.Windows.Forms.Label();
            this.SuspendLayout();
            //
            // labelKeyCode
            //
            this.labelKeyCode.AutoSize = true;
            this.labelKeyCode.Location = new System.Drawing.Point(12, 9);
            this.labelKeyCode.Name = "labelKeyCode";
            this.labelKeyCode.Size = new System.Drawing.Size(141, 16);
            this.labelKeyCode.TabIndex = 0;
            this.labelKeyCode.Text = "Waiting for key press...";
            //
            // FormMain
            //
            this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.None;
            this.ClientSize = new System.Drawing.Size(584, 361);
```

```
            this.Controls.Add(this.labelKeyCode);
            this.Font = new System.Drawing.Font("Microsoft Sans Serif",
9.75F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
            this.Margin = new System.Windows.Forms.Padding(4);
            this.MaximumSize = new System.Drawing.Size(600, 400);
            this.MinimumSize = new System.Drawing.Size(600, 400);
            this.Name = "FormMain";
            this.Text = "Робота з клавіатурою – ОПІ Лабораторна 6";
            this.KeyPress += new
System.Windows.Forms.KeyPressEventHandler(this.FormMain_KeyPress);
            this.ResumeLayout(false);
            this.PerformLayout();

        }

        #endregion

        private System.Windows.Forms.Label labelKeyCode;
    }
}
```

**Висновки**

Таким чином, ми навчилися основним принципам обробки подій клавіатури у середовищі Visual Studio C#.

**Контрольні питання**

**Назвіть основні події клавіатури**

У C# WinForms основними подіями клавіатури є

KeyDown: ця подія спрацьовує, коли клавішу натиснуто, коли елемент керування знаходиться у фокусі.

KeyPress: Ця подія спрацьовує, коли клавішу натискають і відпускають, коли елемент керування перебуває у фокусі. Ця подія зазвичай використовується для введення символів.

KeyUp: Ця подія спрацьовує, коли клавішу відпускають, коли елемент керування перебуває у фокусі.

**Що містить клас KeyEventArgs?**

Клас KeyEventArgs у C# WinForms - це клас, який надає дані для подій клавіатури. Він містить наступні властивості:

KeyCode: Отримує код клавіші, яка викликала подію.

KeyData: Отримує дані клавіші, яка викликала подію.

KeyValue: Отримує значення клавіші для клавіші, яка викликала подію.

Alt, Control, Shift: Ці булеві властивості вказують, чи були натиснуті клавіші ALT, CTRL або SHIFT, коли відбулася подія.

Handled: Отримує або встановлює значення, що вказує на те, чи була подія оброблена.

**Як отримати інформацію про натискання керуючих клавіш?**

У C# WinForms ви можете отримати інформацію про натискання керуючих клавіш (таких як Shift, Ctrl, Alt) за допомогою класу KeyEventArgs у клавіатурних подіях.