ĐẠI HỌC QUỐC GIA THÀNH PHỐ HỒ CHÍ MINH
TRƯỜNG ĐẠI HỌC CÔNG NGHỆ THÔNG TIN
KHOA CÔNG NGHỆ PHẦN MỀM

MÔN LẬP TRÌNH TRỰC QUAN
BÀI TẬP THỰC HÀNH 5

GVHD: Nguyễn Ngọc Quí
Sinh viên thực hiện: Đặng Trường Sinh - 24521524

Tp. Hồ Chí Minh, 12/2025

IT008 – LẬP TRÌNH TRỰC QUAN

NHẬN XÉT CỦA GIÁO VIÊN HƯỚNG DẪN

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

....., ngày…….....tháng……năm 2025

Người nhận xét

(Ký tên và ghi rõ họ tên)

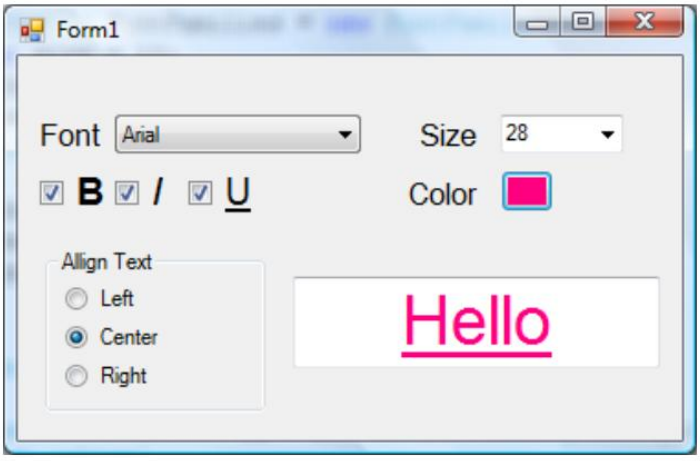
MỤC LỤC

DANH MỤC BẢNG

DANH MỤC HÌNH ẢNH

NỘI DUNG BÀI LÀM

1. Xây dựng ứng dụng xử lý font văn bản như sau



- Cho chọn kiểu Font (gồm các font có sẵn trong hệ thống)
- Chọn kích thước (Size), in đậm (B), in nghiêng (I), gạch dưới (U)
- Canh lề trái, phải hoặc giữa
- Chọn màu chữ: khi nhấn Button Color, hiện ColorDialog cho người dùng chọn màu

Nội dung code của bài 1:

Bảng 1.1 - Nội dung code phần Logic của bài 1

```
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 Bai04
{
    public partial class Form1 : Form
    {
        private readonly ColorDialog colorDialog = new ColorDialog();
        private Color currentColor = Color.Black;

        public Form1()
        {
            InitializeComponent();
            InitializeUI();
        }
        private void InitializeUI()
        {
            LoadSystemFonts();
            LoadFontSizes();
            SetDefaultValues();
            RegisterEvents();
            ApplyTextFormat();
        }

        private void LoadSystemFonts()
```

```
        {
            foreach (var font in FontFamily.Families)
                cb_Font.Items.Add(font.Name);
        }

        private void LoadFontSizes()
        {
            int[] sizes = { 8, 10, 12, 14, 16, 18, 20, 24, 28, 32, 36, 48,
72 };
            foreach (int size in sizes)
                cb_Size.Items.Add(size.ToString());
        }

        private void SetDefaultValues()
        {
            cb_Font.Text = "Arial";
            cb_Size.Text = "28";

            checkBox_Bold.Checked = false;
            checkBox_Italic.Checked = false;
            checkBox_Underline.Checked = false;

            tBtn_Center.Checked = true;

            currentColor = Color.DeepPink;
            btn_Color.BackColor = currentColor;
        }

        private void RegisterEvents()
        {
            cb_Font.SelectedIndexChanged += (s, e) => ApplyTextFormat();
            cb_Size.SelectedIndexChanged += (s, e) => ApplyTextFormat();

            checkBox_Bold.CheckedChanged += (s, e) => ApplyTextFormat();
            checkBox_Italic.CheckedChanged += (s, e) => ApplyTextFormat();
            checkBox_Underline.CheckedChanged += (s, e) =>
ApplyTextFormat();

            rBtn_Left.CheckedChanged += AlignmentChanged;
            tBtn_Center.CheckedChanged += AlignmentChanged;
            rBtn_Right.CheckedChanged += AlignmentChanged;

        }

        private void ApplyTextFormat()
        {
            string fontName = cb_Font.Text;

            float fontSize = float.TryParse(cb_Size.Text, out float size) ?
size : 12;

            FontStyle style = FontStyle.Regular;
            if (checkBox_Bold.Checked)
                style |= FontStyle.Bold;
            if (checkBox_Italic.Checked)
                style |= FontStyle.Italic;
            if (checkBox_Underline.Checked)
                style |= FontStyle.Underline;

            try
            {
                txt_Content.Font = new Font(fontName, fontSize, style);
            }
            catch
            {
```

```
                MessageBox.Show("Font không hỗ trợ kiểu chữ này!", "Lỗi
Font");
            }

            txt_Content.ForeColor = currentColor;
        }
        private void AlignmentChanged(object sender, EventArgs e)
        {
            if (sender is RadioButton rb && rb.Checked)
            {
                if (rBtn_Left.Checked) txt_Content.TextAlign =
HorizontalAlignment.Left;
                else if (tBtn_Center.Checked) txt_Content.TextAlign =
HorizontalAlignment.Center;
                else if (rBtn_Right.Checked) txt_Content.TextAlign =
HorizontalAlignment.Right;
            }
        }
        private void btn_Color_Click(object sender, EventArgs e)
        {
            colorDialog.Color = currentColor;

            if (colorDialog.ShowDialog() == DialogResult.OK)
            {
                currentColor = colorDialog.Color;
                btn_Color.BackColor = currentColor;
                ApplyTextFormat();
            }
        }
    }
}
```

Bảng 1.2 - Nội dung code phần Design của bài 1

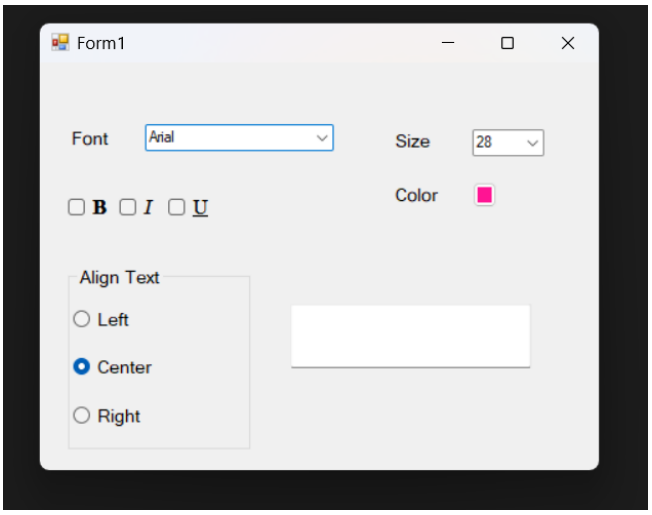
```
namespace Bai04
{
    partial class Form1
    {
        /// <summary>
        /// Required designer variable.
        /// </summary>
        private System.ComponentModel.IContainer components = null;

        /// <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.lbl_Font = new System.Windows.Forms.Label();
            this.lbl_Size = new System.Windows.Forms.Label();
            this.lbl_Color = new System.Windows.Forms.Label();
            this.cb_Font = new System.Windows.Forms.ComboBox();
            this.checkBox_Bold = new System.Windows.Forms.CheckBox();
            this.checkBox_Italic = new System.Windows.Forms.CheckBox();
            this.checkBox_Underline = new System.Windows.Forms.CheckBox();
            this.gB_Align_Text = new System.Windows.Forms.GroupBox();
            this.rBtn_Right = new System.Windows.Forms.RadioButton();
            this.tBtn_Center = new System.Windows.Forms.RadioButton();
            this.rBtn_Left = new System.Windows.Forms.RadioButton();
            this.cb_Size = new System.Windows.Forms.ComboBox();
            this.btn_Color = new System.Windows.Forms.Button();
            this.txt_Content = new System.Windows.Forms.TextBox();
            this.gB_Align_Text.SuspendLayout();
            this.SuspendLayout();
            //
            // lbl_Font
            //
            this.lbl_Font.AutoSize = true;
            this.lbl_Font.Font = new System.Drawing.Font("Microsoft Sans
Serif", 10.2F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
            this.lbl_Font.Location = new System.Drawing.Point(29, 61);
            this.lbl_Font.Name = "lbl_Font";
            this.lbl_Font.Size = new System.Drawing.Size(42, 20);
            this.lbl_Font.TabIndex = 0;
            this.lbl_Font.Text = "Font";
            //
            // lbl_Size
            //
            this.lbl_Size.AutoSize = true;
            this.lbl_Size.Font = new System.Drawing.Font("Microsoft Sans
Serif", 10.2F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
            this.lbl_Size.Location = new System.Drawing.Point(366, 64);
            this.lbl_Size.Name = "lbl_Size";
            this.lbl_Size.Size = new System.Drawing.Size(42, 20);
            this.lbl_Size.TabIndex = 1;
            this.lbl_Size.Text = "Size";
            //
            // lbl_Color
            //
            this.lbl_Color.AutoSize = true;
            this.lbl_Color.Font = new System.Drawing.Font("Microsoft Sans
Serif", 10.2F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
            this.lbl_Color.Location = new System.Drawing.Point(366, 116);
            this.lbl_Color.Name = "lbl_Color";
            this.lbl_Color.Size = new System.Drawing.Size(49, 20);
            this.lbl_Color.TabIndex = 2;
            this.lbl_Color.Text = "Color";
            //
            // cb_Font
            //
            this.cb_Font.FormattingEnabled = true;
            this.cb_Font.Location = new System.Drawing.Point(109, 59);
            this.cb_Font.Name = "cb_Font";
            this.cb_Font.Size = new System.Drawing.Size(195, 24);
            this.cb_Font.TabIndex = 3;
            //
            // checkBox_Bold
            //
            this.checkBox_Bold.AutoSize = true;
```

```
            this.checkBox_Bold.Font = new System.Drawing.Font("Georgia",
12F, System.Drawing.FontStyle.Bold, System.Drawing.GraphicsUnit.Point,
((byte)(0)));
            this.checkBox_Bold.Location = new System.Drawing.Point(30, 125);
            this.checkBox_Bold.Name = "checkBox_Bold";
            this.checkBox_Bold.Size = new System.Drawing.Size(47, 28);
            this.checkBox_Bold.TabIndex = 4;
            this.checkBox_Bold.Text = "B";
            this.checkBox_Bold.UseVisualStyleBackColor = true;
            //
            // checkBox_Italic
            //
            this.checkBox_Italic.AutoSize = true;
            this.checkBox_Italic.Font = new System.Drawing.Font("Georgia",
12F, System.Drawing.FontStyle.Italic, System.Drawing.GraphicsUnit.Point,
((byte)(0)));
            this.checkBox_Italic.Location = new System.Drawing.Point(83,
125);
            this.checkBox_Italic.Name = "checkBox_Italic";
            this.checkBox_Italic.Size = new System.Drawing.Size(40, 28);
            this.checkBox_Italic.TabIndex = 5;
            this.checkBox_Italic.Text = "I";
            this.checkBox_Italic.UseVisualStyleBackColor = true;
            //
            // checkBox_Underline
            //
            this.checkBox_Underline.AutoSize = true;
            this.checkBox_Underline.Font = new
System.Drawing.Font("Georgia", 12F, System.Drawing.FontStyle.Underline,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
            this.checkBox_Underline.Location = new System.Drawing.Point(134,
125);
            this.checkBox_Underline.Name = "checkBox_Underline";
            this.checkBox_Underline.Size = new System.Drawing.Size(47, 28);
            this.checkBox_Underline.TabIndex = 6;
            this.checkBox_Underline.Text = "U";
            this.checkBox_Underline.UseVisualStyleBackColor = true;
            //
            // gB_Align_Text
            //
            this.gB_Align_Text.Controls.Add(this.rBtn_Right);
            this.gB_Align_Text.Controls.Add(this.tBtn_Center);
            this.gB_Align_Text.Controls.Add(this.rBtn_Left);
            this.gB_Align_Text.Font = new System.Drawing.Font("Microsoft
Sans Serif", 10.2F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
            this.gB_Align_Text.Location = new System.Drawing.Point(30, 195);
            this.gB_Align_Text.Name = "gB_Align_Text";
            this.gB_Align_Text.Size = new System.Drawing.Size(190, 177);
            this.gB_Align_Text.TabIndex = 7;
            this.gB_Align_Text.TabStop = false;
            this.gB_Align_Text.Text = "Align Text";
            //
            // rBtn_Right
            //
            this.rBtn_Right.AutoSize = true;
            this.rBtn_Right.Location = new System.Drawing.Point(6, 130);
            this.rBtn_Right.Name = "rBtn_Right";
            this.rBtn_Right.Size = new System.Drawing.Size(69, 24);
            this.rBtn_Right.TabIndex = 2;
            this.rBtn_Right.TabStop = true;
            this.rBtn_Right.Text = "Right";
            this.rBtn_Right.UseVisualStyleBackColor = true;
            //
            // tBtn_Center
```

```
            //
            this.tBtn_Center.AutoSize = true;
            this.tBtn_Center.Location = new System.Drawing.Point(6, 84);
            this.tBtn_Center.Name = "tBtn_Center";
            this.tBtn_Center.Size = new System.Drawing.Size(80, 24);
            this.tBtn_Center.TabIndex = 1;
            this.tBtn_Center.TabStop = true;
            this.tBtn_Center.Text = "Center";
            this.tBtn_Center.UseVisualStyleBackColor = true;
            //
            // rBtn_Left
            //
            this.rBtn_Left.AutoSize = true;
            this.rBtn_Left.Location = new System.Drawing.Point(6, 38);
            this.rBtn_Left.Name = "rBtn_Left";
            this.rBtn_Left.Size = new System.Drawing.Size(59, 24);
            this.rBtn_Left.TabIndex = 0;
            this.rBtn_Left.TabStop = true;
            this.rBtn_Left.Text = "Left";
            this.rBtn_Left.UseVisualStyleBackColor = true;
            //
            // cb_Size
            //
            this.cb_Size.FormattingEnabled = true;
            this.cb_Size.Location = new System.Drawing.Point(449, 64);
            this.cb_Size.Name = "cb_Size";
            this.cb_Size.Size = new System.Drawing.Size(73, 24);
            this.cb_Size.TabIndex = 8;
            //
            // btn_Color
            //
            this.btn_Color.Location = new System.Drawing.Point(449, 115);
            this.btn_Color.Name = "btn_Color";
            this.btn_Color.Size = new System.Drawing.Size(25, 25);
            this.btn_Color.TabIndex = 9;
            this.btn_Color.UseVisualStyleBackColor = true;
            this.btn_Color.Click += new
System.EventHandler(this.btn_Color_Click);
            //
            // txt_Content
            //
            this.txt_Content.BackColor = System.Drawing.Color.White;
            this.txt_Content.Font = new System.Drawing.Font("Microsoft Sans
Serif", 28.2F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
            this.txt_Content.Location = new System.Drawing.Point(260, 231);
            this.txt_Content.Name = "txt_Content";
            this.txt_Content.Size = new System.Drawing.Size(250, 61);
            this.txt_Content.TabIndex = 10;
            this.txt_Content.TextAlign =
System.Windows.Forms.HorizontalAlignment.Center;
            //
            // Form1
            //
            this.AutoScaleDimensions = new System.Drawing.SizeF(8F, 16F);
            this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font;
            this.ClientSize = new System.Drawing.Size(582, 392);
            this.Controls.Add(this.txt_Content);
            this.Controls.Add(this.btn_Color);
            this.Controls.Add(this.cb_Size);
            this.Controls.Add(this.gB_Align_Text);
            this.Controls.Add(this.checkBox_Underline);
            this.Controls.Add(this.checkBox_Italic);
            this.Controls.Add(this.checkBox_Bold);
            this.Controls.Add(this.cb_Font);
```

```
            this.Controls.Add(this.lbl_Color);
            this.Controls.Add(this.lbl_Size);
            this.Controls.Add(this.lbl_Font);
            this.Name = "Form1";
            this.StartPosition =
System.Windows.Forms.FormStartPosition.CenterScreen;
            this.Text = "Form1";
            this.gB_Align_Text.ResumeLayout(false);
            this.gB_Align_Text.PerformLayout();
            this.ResumeLayout(false);
            this.PerformLayout();

        }

        #endregion

        private System.Windows.Forms.Label lbl_Font;
        private System.Windows.Forms.Label lbl_Size;
        private System.Windows.Forms.Label lbl_Color;
        private System.Windows.Forms.ComboBox cb_Font;
        private System.Windows.Forms.CheckBox checkBox_Bold;
        private System.Windows.Forms.CheckBox checkBox_Italic;
        private System.Windows.Forms.CheckBox checkBox_Underline;
        private System.Windows.Forms.GroupBox gB_Align_Text;
        private System.Windows.Forms.RadioButton tBtn_Center;
        private System.Windows.Forms.RadioButton rBtn_Left;
        private System.Windows.Forms.RadioButton rBtn_Right;
        private System.Windows.Forms.ComboBox cb_Size;
        private System.Windows.Forms.Button btn_Color;
        private System.Windows.Forms.TextBox txt_Content;
    }
}
```

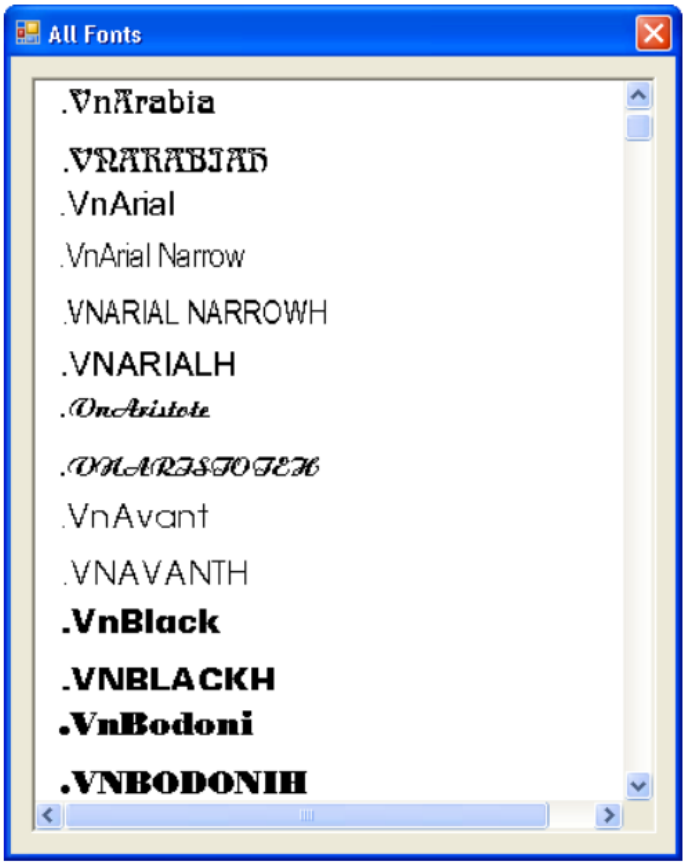


Hình 1. Giao diện của bài 1

Link video Testcase của bài 1:

https://drive.google.com/file/d/14zlfszVUs1euDPgFTx-bZ2V5Ymt7QeZs/view?usp=sharing

2. Viết chương trình liệt kê tất cả Font chữ có trong hệ thống có dạng như sau:



Mô tả bài làm:

- Sử dụng List Box để liệt kê các Font chữ của hệ thống. Mỗi loại Font chữ hiển thị chính Font của nó.

Nội dung code của bài 2:

Bảng 2.1 - Nội dung code phần Logic của bài 2

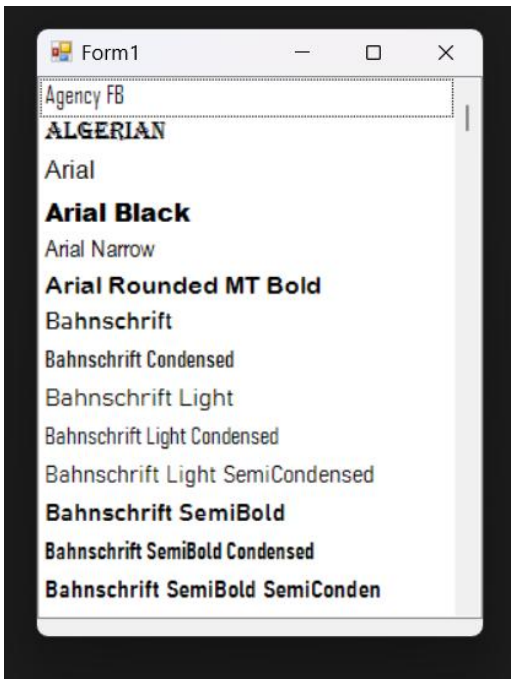
```
using System;
using System.Collections.Generic;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Linq;
using System.Text;
using System.Threading.Tasks;
using System.Windows.Forms;

namespace Bai06
{
    public partial class Form1 : Form
    {
        public Form1()
```

```
        {
            InitializeComponent();
        }

        private void Form1_Load(object sender, EventArgs e)
        {
            foreach (FontFamily fonts in FontFamily.Families)
            {
                listBox_Fonts.Items.Add(fonts.Name);
            }
        }

        private void listBox_Fonts_DrawItem(object sender, DrawItemEventArgs
e)
        {
            if (e.Index < 0) return;
            string fontName = (string)listBox_Fonts.Items[e.Index];
            e.DrawBackground();
            FontStyle fontStyle = FontStyle.Regular;
            float fontSize = 12f;
            Font currentFont;
            try
            {
                currentFont = new Font(fontName, fontSize, fontStyle);
            }
            catch
            {
                currentFont = new Font(FontFamily.GenericSansSerif,
fontSize, fontStyle);
            }

            Brush textBrush = (e.State & DrawItemState.Selected) ==
DrawItemState.Selected ? SystemBrushes.HighlightText :
SystemBrushes.ControlText;
            e.Graphics.DrawString(fontName, currentFont, textBrush,
e.Bounds);
            e.DrawFocusRectangle();
            currentFont.Dispose();
        }
    }
}
```

Bảng 2.2 - Nội dung code phần Design của bài 2

```
namespace Bai06
{
    partial class Form1
    {
        /// <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.listBox_Fonts = new System.Windows.Forms.ListBox();
            this.SuspendLayout();
            //
            // listBox_Fonts
            //
            this.listBox_Fonts.Dock = System.Windows.Forms.DockStyle.Fill;
            this.listBox_Fonts.DrawMode =
System.Windows.Forms.DrawMode.OwnerDrawFixed;
            this.listBox_Fonts.FormattingEnabled = true;
            this.listBox_Fonts.ItemHeight = 25;
            this.listBox_Fonts.Location = new System.Drawing.Point(0, 0);
            this.listBox_Fonts.Name = "listBox_Fonts";
            this.listBox_Fonts.Size = new System.Drawing.Size(387, 450);
            this.listBox_Fonts.TabIndex = 0;
            this.listBox_Fonts.DrawItem += new
System.Windows.Forms.DrawItemEventHandler(this.listBox_Fonts_DrawItem);
            //
            // Form1
            //
            this.AutoScaleDimensions = new System.Drawing.SizeF(8F, 16F);
            this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font;
            this.ClientSize = new System.Drawing.Size(387, 450);
            this.Controls.Add(this.listBox_Fonts);
            this.Name = "Form1";
            this.StartPosition =
System.Windows.Forms.FormStartPosition.CenterScreen;
            this.Text = "Form1";
            this.Load += new System.EventHandler(this.Form1_Load);
            this.ResumeLayout(false);

        }

        #endregion

        private System.Windows.Forms.ListBox listBox_Fonts;
    }
}
```

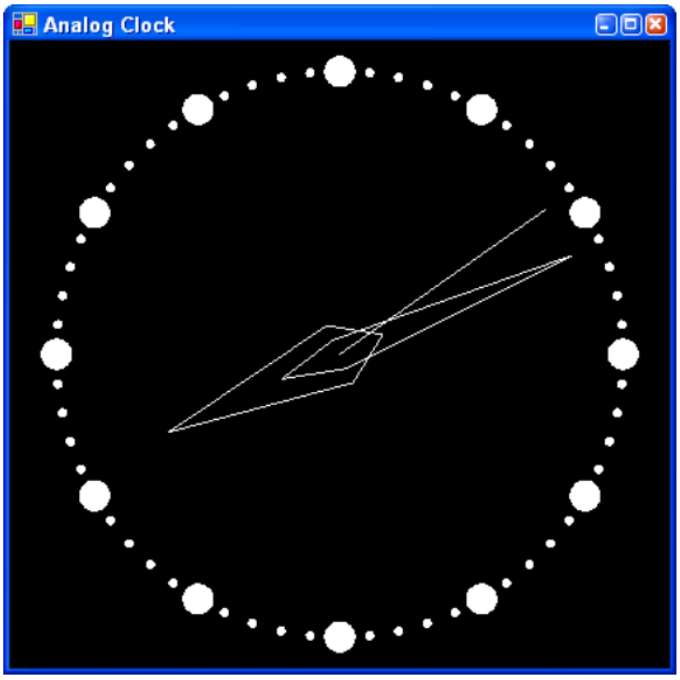


Hình 2. Giao diện của bài 2

Link video Testcase của bài 2:

https://drive.google.com/file/d/1O1Eg8ft5Y1og-5fOeuE81m3H2IWQL_Hr/view?usp=sharing

3. Viết ứng dụng hiển thị giờ hệ thống như sau:



Mô tả bài làm:

- Dùng Timer cập nhật thời gian
- Tính góc các kim dựa trên giờ/phút/giây
- Dùng công thức lượng giác để tính điểm đầu/cuối
- Vẽ chấm quanh mặt đồng hồ
- Vẽ kim đồng hồ bằng GDI+

Nội dung code của bài 3:

Bảng 3.1 - Nội dung code phần Logic của bài 3

```
using System;
using System.Collections.Generic;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Drawing.Drawing2D;
using System.Linq;
using System.Text;
using System.Threading.Tasks;
using System.Windows.Forms;

namespace Bai08
{
    public partial class Form1 : Form
    {

        public Form1()
        {
            InitializeComponent();
            timer.Start();
        }
```

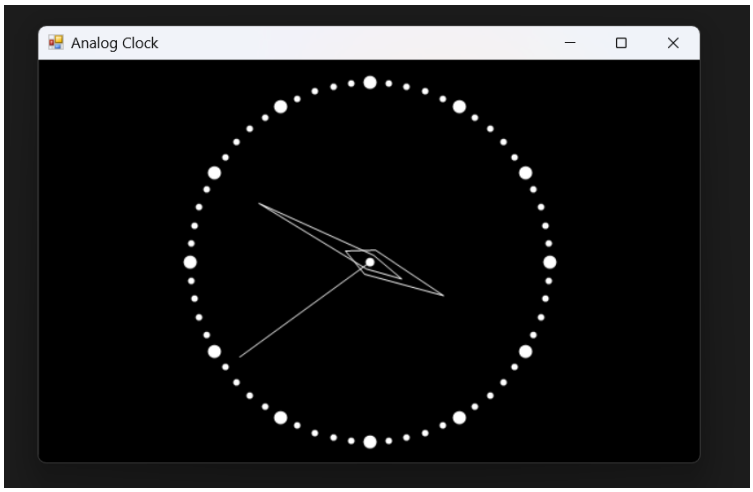
```
        private void timer_Tick(object sender, EventArgs e)
        {
            this.Invalidate();
        }
        private void Form1_Paint(object sender, PaintEventArgs e)
        {
            Graphics g = e.Graphics;
            g.SmoothingMode = SmoothingMode.AntiAlias;

            int w = this.ClientSize.Width;
            int h = this.ClientSize.Height;

            int radius = Math.Min(w, h) / 2 - 20;
            Point center = new Point(w / 2, h / 2);

            Pen pen = new Pen(Color.White, 2);
            Brush white = Brushes.White;

            for (int i = 0; i < 60; i++)
            {
                double angle = i * 6 * Math.PI / 180;
                int dotRadius = (i % 5 == 0) ? 6 : 3;

                int x = center.X + (int)(Math.Cos(angle) * radius);
                int y = center.Y + (int)(Math.Sin(angle) * radius);

                g.FillEllipse(white, x - dotRadius, y - dotRadius, dotRadius *
2, dotRadius * 2);
            }

            DateTime now = DateTime.Now;

            float secAngle = now.Second * 6;
            float minAngle = now.Minute * 6 + now.Second * 0.1f;
            float hourAngle = (now.Hour % 12) * 30 + now.Minute * 0.5f;

            DrawPolygonHand(g, center, hourAngle, length: radius * 0.45f,
backLength: radius * 0.15f, thickness: 12);
            DrawPolygonHand(g, center, minAngle, length: radius * 0.70f,
backLength: radius * 0.20f, thickness: 7);
            DrawStraightHand(g, center, secAngle, length: radius * 0.90f,
width: 1);

            g.FillEllipse(Brushes.White, center.X - 4, center.Y - 4, 8, 8);
        }
        private void DrawPolygonHand(Graphics g, Point center, float angle,
            float length, float backLength, float thickness)
        {
            angle -= 90;
            double rad = angle * Math.PI / 180;

            double cosA = Math.Cos(rad);
            double sinA = Math.Sin(rad);

            PointF tip = new PointF(center.X + (float)(cosA * length), center.Y
+ (float)(sinA * length));
            PointF side1 = new PointF(center.X + (float)(-sinA * thickness),
center.Y + (float)(cosA * thickness));
            PointF side2 = new PointF(center.X + (float)(sinA * thickness),
center.Y + (float)(-cosA * thickness));
            PointF back = new PointF(center.X - (float)(cosA * backLength),
center.Y - (float)(sinA * backLength));

            PointF[] poly = {side1, tip, side2, back};
            g.DrawPolygon(new Pen(Color.White, 1), poly);
```

```
        }
        private void DrawStraightHand(Graphics g, Point center, float angle,
float length, int width)
        {
            angle -= 90;
            double rad = angle * Math.PI / 180;

            int x = center.X + (int)(Math.Cos(rad) * length);
            int y = center.Y + (int)(Math.Sin(rad) * length);

            g.DrawLine(new Pen(Color.White, width), center, new Point(x, y));
        }
    }
}
```

Bảng 3.2 - Nội dung code phần Design của bài 3

```
namespace Bai08
{
    partial class Form1
    {
        /// <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();
            this.timer = new System.Windows.Forms.Timer(this.components);
            this.SuspendLayout();
            //
            // timer
            //
            this.timer.Interval = 1000;
            this.timer.Tick += new System.EventHandler(this.timer_Tick);
            //
            // Form1
            //
            this.AutoScaleDimensions = new System.Drawing.SizeF(8F, 16F);
            this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font;
```

```
            this.BackColor = System.Drawing.Color.Black;
            this.ClientSize = new System.Drawing.Size(800, 450);
            this.DoubleBuffered = true;
            this.Name = "Form1";
            this.StartPosition =
System.Windows.Forms.FormStartPosition.CenterScreen;
            this.Text = "Analog Clock";
            this.Paint += new
System.Windows.Forms.PaintEventHandler(this.Form1_Paint);
            this.ResumeLayout(false);

        }

        #endregion

        private System.Windows.Forms.Timer timer;
    }
}
```

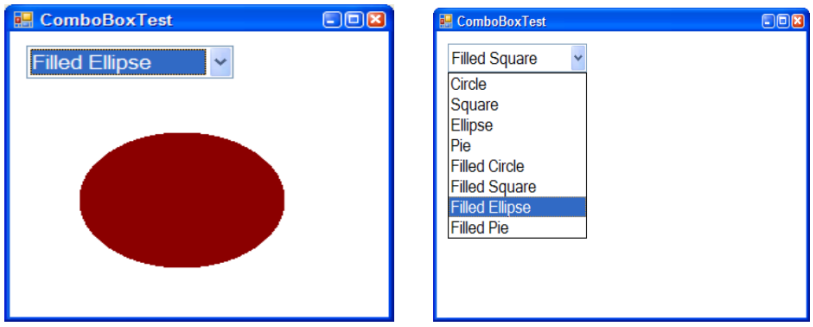


Hình 3. Giao diện của bài 3

Link video Testcase của bài 3

https://drive.google.com/file/d/11zmOL-Fdu6eYilN_zcLD_A4-sArgQGNZ/view?usp=sharing

4. Viết chương trình xây dựng các hình vẽ cơ bản



Mô tả nội dung bài làm:

- Dùng combo box để chứa các hình vẽ cơ bản như: Ellipse, Circle, Square, Pie, Filled Ellipse, Filled Circle, Filled Square, Filled Pie.
- Mỗi khi chọn một hình trong Combo Box sẽ vẽ lên Form hình vẽ đó

Nội dung code của bài 4:

Bảng 4.1 - Nội dung code phần Logic của bài 4

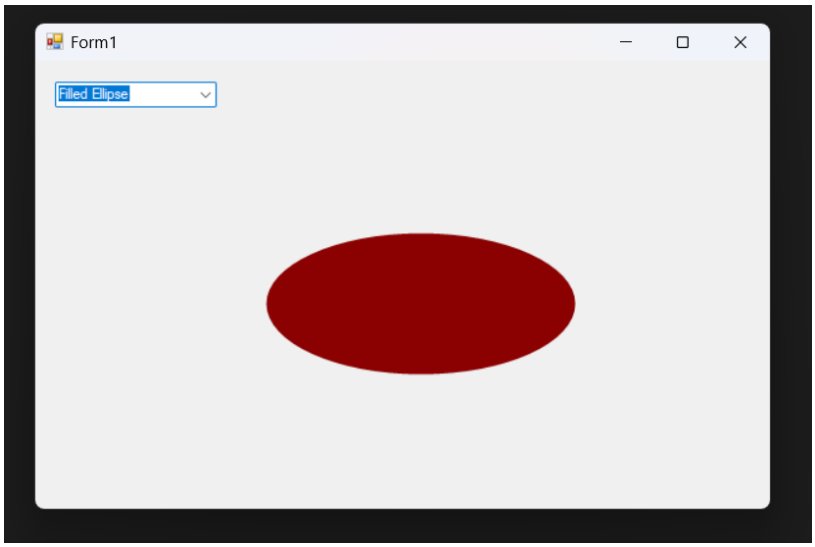
```
using System;
using System.Collections.Generic;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Drawing.Drawing2D;
using System.Linq;
using System.Text;
using System.Threading.Tasks;
using System.Windows.Forms;

namespace Bai09
{
    public partial class Form1 : Form
    {
        private string selectedShape = "Filled Ellipse";
        private Pen pen = new Pen(Color.Black, 2);
        private Brush brush = new SolidBrush(Color.DarkRed);

        public Form1()
        {
            InitializeComponent();
            cb_Shape.SelectedIndexChanged += (s, e) =>
            {
                selectedShape = cb_Shape.SelectedItem.ToString();
                Invalidate();
            };
        }

        private void Form1_Load(object sender, EventArgs e)
        {
            cb_Shape.Items.AddRange(new object[]
```

```
            {
                "Circle", "Square", "Ellipse", "Pie",
                "Filled Circle", "Filled Square", "Filled Ellipse", "Filled
Pie"
            });
            cb_Shape.SelectedItem = selectedShape;
        }

        private void Form1_Paint(object sender, PaintEventArgs e)
        {
            Graphics g = e.Graphics;
            g.SmoothingMode = SmoothingMode.AntiAlias;

            int padding = 20;
            int top = cb_Shape.Bottom + padding;

            int w = ClientSize.Width - 2 * padding;
            int h = ClientSize.Height - top - padding;
            if (w <= 0 || h <= 0) return;

            int size = (int)(Math.Min(w, h) * 0.3);

            Rectangle R = new Rectangle((ClientSize.Width - size * 2) / 2,
top + (ClientSize.Height - top - size * 2) / 2, size * 2, size * 2);
            Rectangle RE = new Rectangle((ClientSize.Width - (int)(w * 0.4))
/ 2, top + (ClientSize.Height - top - (int)(h * 0.5)) / 2, (int)(w * 0.45),
(int)(h * 0.4));

            switch (selectedShape)
            {
                case "Circle":
                    g.DrawEllipse(pen, R);
                    break;
                case "Square":
                    g.DrawRectangle(pen, R);
                    break;
                case "Ellipse":
                    g.DrawEllipse(pen, RE);
                    break;
                case "Pie":
                    g.DrawPie(pen, R, 0, 270);
                    break;

                case "Filled Circle":
                    g.FillEllipse(brush, R);
                    break;
                case "Filled Square":
                    g.FillRectangle(brush, R);
                    break;
                case "Filled Ellipse":
                    g.FillEllipse(brush, RE);
                    break;
                case "Filled Pie":
                    g.FillPie(brush, R, 0, 270);
                    break;
            }
        }
    }
}
```

Bảng 4.2 - Nội dung code phần Design của bài 4

```
namespace Bai09
{
    partial class Form1
    {
        /// <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.cb_Shape = new System.Windows.Forms.ComboBox();
            this.SuspendLayout();
            //
            // cb_Shape
            //
            this.cb_Shape.FormattingEnabled = true;
            this.cb_Shape.Location = new System.Drawing.Point(22, 21);
            this.cb_Shape.Name = "cb_Shape";
            this.cb_Shape.Size = new System.Drawing.Size(174, 24);
            this.cb_Shape.TabIndex = 0;
            //
            // Form1
            //
            this.AutoScaleDimensions = new System.Drawing.SizeF(8F, 16F);
            this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font;
            this.ClientSize = new System.Drawing.Size(800, 450);
            this.Controls.Add(this.cb_Shape);
            this.DoubleBuffered = true;
            this.Name = "Form1";
            this.StartPosition =
System.Windows.Forms.FormStartPosition.CenterScreen;
            this.Text = "Form1";
            this.Load += new System.EventHandler(this.Form1_Load);
            this.Paint += new
System.Windows.Forms.PaintEventHandler(this.Form1_Paint);
            this.ResumeLayout(false);

        }

        #endregion
```

```
        private System.Windows.Forms.ComboBox cb_Shape;
    }
}
```

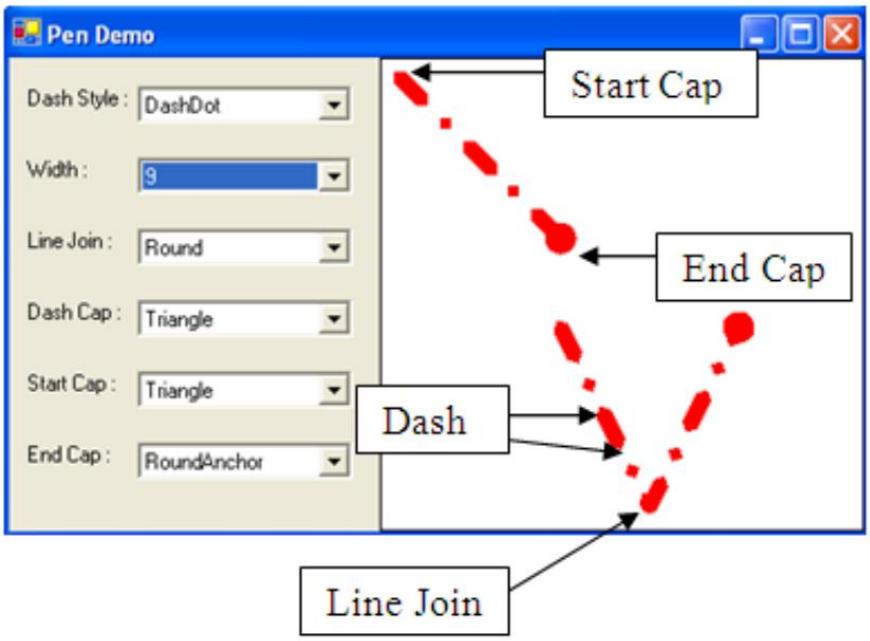


Hình 4. Giao diện của bài 4

Link video Testcase của bài 4:

https://drive.google.com/file/d/1c9NNy8sGH38sVp1IUuqJoykij9Fhza-y/view?usp=sharing

5. Viết chương trình cho demo các loại bút vẽ (pen) như sau:



Mô tả nội dung bài làm:

- Dùng các Combo Box để mô tả các thuộc tính của các loại bút vẽ.
- Nhấn chuột trái 2 điểm bất kì để nối thành 1 đường thẳng.
- Nhấn tiếp chuột trái tại các vị trí muốn vẽ để nối vào đường trước đó. Nhấn chuột phải để kết thúc lượt.

Nội dung code của bài 5:

Bảng 5.1 - Nội dung code phần Logic của bài 5

```
using System;
using System.Collections.Generic;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Drawing.Drawing2D;
using System.Linq;
using System.Text;
using System.Threading.Tasks;
using System.Windows.Forms;

namespace Bai10
{
    public partial class Form1 : Form
    {
        private List<Point> points = new List<Point>();

        private DashStyle dashStyle = DashStyle.DashDot;
        private float width = 5;
        private LineJoin lineJoin = LineJoin.Round;
        private LineCap startCap = LineCap.Triangle;
        private LineCap endCap = LineCap.RoundAnchor;
        private DashCap dashCap = DashCap.Triangle;
```

```
        private Bitmap canvas;

        public Form1()
        {
            InitializeComponent();

            canvas = new Bitmap(pictureBox1.Width, pictureBox1.Height);
            pictureBox1.Image = canvas;

            LoadComboBoxes();

            cb_DashStyle.SelectedIndexChanged += UpdateSettings;
            cb_Width.SelectedIndexChanged += UpdateSettings;
            cb_LineJoin.SelectedIndexChanged += UpdateSettings;
            cb_StartCap.SelectedIndexChanged += UpdateSettings;
            cb_EndCap.SelectedIndexChanged += UpdateSettings;
            cb_DashCap.SelectedIndexChanged += UpdateSettings;

            pictureBox1.MouseClick += PictureBox1_MouseClick;
            pictureBox1.Paint += PictureBox1_Paint;
        }

        void LoadComboBoxes()
        {
            cb_DashStyle.Items.AddRange(Enum.GetNames(typeof(DashStyle)));
            cb_LineJoin.Items.AddRange(Enum.GetNames(typeof(LineJoin)));
            cb_StartCap.Items.AddRange(Enum.GetNames(typeof(LineCap)));
            cb_EndCap.Items.AddRange(Enum.GetNames(typeof(LineCap)));
            cb_DashCap.Items.AddRange(Enum.GetNames(typeof(DashCap)));

            for (int i = 1; i <= 15; i++) cb_Width.Items.Add(i.ToString());

            cb_DashStyle.Text = "DashDot";
            cb_Width.Text = "5";
            cb_LineJoin.Text = "Round";
            cb_StartCap.Text = "Triangle";
            cb_EndCap.Text = "RoundAnchor";
            cb_DashCap.Text = "Triangle";
        }

        void UpdateSettings(object s, EventArgs e)
        {
            dashStyle = (DashStyle)Enum.Parse(typeof(DashStyle),
cb_DashStyle.Text);
            float.TryParse(cb_Width.Text, out width);
            lineJoin = (LineJoin)Enum.Parse(typeof(LineJoin),
cb_LineJoin.Text);
            startCap = (LineCap)Enum.Parse(typeof(LineCap), cb_StartCap.Text);
            endCap = (LineCap)Enum.Parse(typeof(LineCap), cb_EndCap.Text);
            dashCap = (DashCap)Enum.Parse(typeof(DashCap), cb_DashCap.Text);
            pictureBox1.Invalidate();
        }

        void PictureBox1_MouseClick(object sender, MouseEventArgs e)
        {
            if (e.Button == MouseButtons.Left)
            {
                points.Add(e.Location);
                pictureBox1.Invalidate();
            }
            else if (e.Button == MouseButtons.Right)
            {
                if (points.Count >= 2)
                {
```

```
                    using (Graphics g = Graphics.FromImage(canvas))
                    using (Pen p = CreatePen())
                    {
                        g.SmoothingMode = SmoothingMode.AntiAlias;
                        g.DrawLines(p, points.ToArray());
                    }
                }

                points.Clear();
                pictureBox1.Invalidate();
            }
        }

        void PictureBox1_Paint(object sender, PaintEventArgs e)
        {
            if (points.Count < 2) return;

            using (Pen p = CreatePen())
            {
                e.Graphics.SmoothingMode = SmoothingMode.AntiAlias;
                e.Graphics.DrawLines(p, points.ToArray());
            }
        }

        Pen CreatePen()
        {
            Pen p = new Pen(Color.Red, width);
            p.DashStyle = dashStyle;
            p.LineJoin = lineJoin;
            p.StartCap = startCap;
            p.EndCap = endCap;
            p.DashCap = dashCap;
            return p;
        }
    }
}
```

Bảng 5.2 - Nội dung code phần Design của bài 5

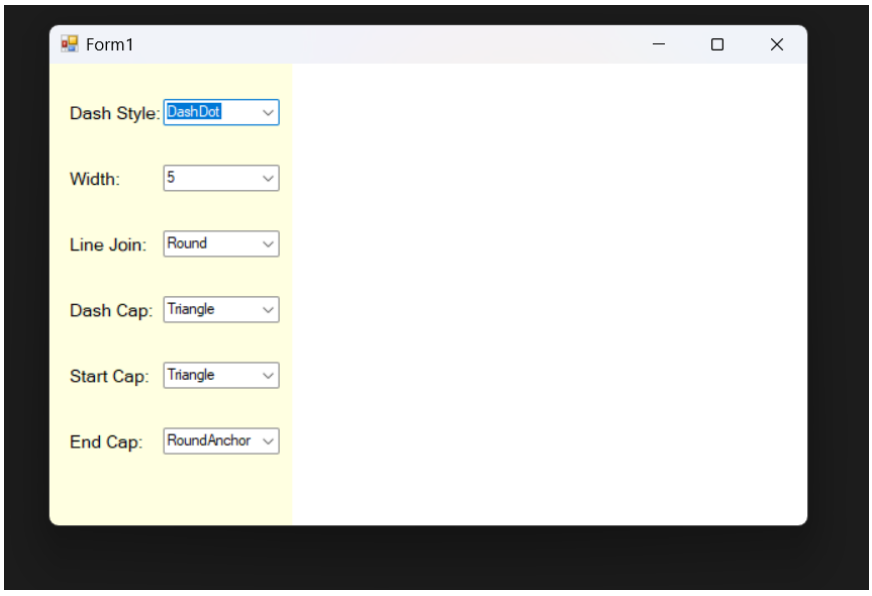
```
namespace Bai10
{
    partial class Form1
    {
        /// <summary>
        /// Required designer variable.
        /// </summary>
        private System.ComponentModel.IContainer components = null;

        /// <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.pn_Tool = new System.Windows.Forms.Panel();
            this.cb_EndCap = new System.Windows.Forms.ComboBox();
            this.cb_StartCap = new System.Windows.Forms.ComboBox();
            this.cb_DashCap = new System.Windows.Forms.ComboBox();
            this.cb_LineJoin = new System.Windows.Forms.ComboBox();
            this.cb_Width = new System.Windows.Forms.ComboBox();
            this.cb_DashStyle = new System.Windows.Forms.ComboBox();
            this.lbl_EndCap = new System.Windows.Forms.Label();
            this.lbl_StartCap = new System.Windows.Forms.Label();
            this.lbl_DashCap = new System.Windows.Forms.Label();
            this.lbl_LineJoin = new System.Windows.Forms.Label();
            this.lbl_Width = new System.Windows.Forms.Label();
            this.lbl_DashStyle = new System.Windows.Forms.Label();
            this.pictureBox1 = new System.Windows.Forms.PictureBox();
            this.pn_Tool.SuspendLayout();

((System.ComponentModel.ISupportInitialize)(this.pictureBox1)).BeginInit();
            this.SuspendLayout();
            //
            // pn_Tool
            //
            this.pn_Tool.BackColor = System.Drawing.SystemColors.Info;
            this.pn_Tool.Controls.Add(this.cb_EndCap);
            this.pn_Tool.Controls.Add(this.cb_StartCap);
            this.pn_Tool.Controls.Add(this.cb_DashCap);
            this.pn_Tool.Controls.Add(this.cb_LineJoin);
            this.pn_Tool.Controls.Add(this.cb_Width);
            this.pn_Tool.Controls.Add(this.cb_DashStyle);
            this.pn_Tool.Controls.Add(this.lbl_EndCap);
            this.pn_Tool.Controls.Add(this.lbl_StartCap);
            this.pn_Tool.Controls.Add(this.lbl_DashCap);
            this.pn_Tool.Controls.Add(this.lbl_LineJoin);
            this.pn_Tool.Controls.Add(this.lbl_Width);
            this.pn_Tool.Controls.Add(this.lbl_DashStyle);
            this.pn_Tool.Dock = System.Windows.Forms.DockStyle.Left;
            this.pn_Tool.Location = new System.Drawing.Point(0, 0);
            this.pn_Tool.Name = "pn_Tool";
            this.pn_Tool.Size = new System.Drawing.Size(256, 450);
            this.pn_Tool.TabIndex = 0;
            //
            // cb_EndCap
            //
            this.cb_EndCap.FormattingEnabled = true;
            this.cb_EndCap.Location = new System.Drawing.Point(120, 354);
            this.cb_EndCap.Name = "cb_EndCap";
            this.cb_EndCap.Size = new System.Drawing.Size(121, 24);
            this.cb_EndCap.TabIndex = 11;
            //
            // cb_StartCap
            //
            this.cb_StartCap.FormattingEnabled = true;
            this.cb_StartCap.Location = new System.Drawing.Point(120, 290);
            this.cb_StartCap.Name = "cb_StartCap";
            this.cb_StartCap.Size = new System.Drawing.Size(121, 24);
            this.cb_StartCap.TabIndex = 10;
            //
```

```
            // cb_DashCap
            //
            this.cb_DashCap.FormattingEnabled = true;
            this.cb_DashCap.Location = new System.Drawing.Point(120, 226);
            this.cb_DashCap.Name = "cb_DashCap";
            this.cb_DashCap.Size = new System.Drawing.Size(121, 24);
            this.cb_DashCap.TabIndex = 9;
            //
            // cb_LineJoin
            //
            this.cb_LineJoin.FormattingEnabled = true;
            this.cb_LineJoin.Location = new System.Drawing.Point(120, 162);
            this.cb_LineJoin.Name = "cb_LineJoin";
            this.cb_LineJoin.Size = new System.Drawing.Size(121, 24);
            this.cb_LineJoin.TabIndex = 8;
            //
            // cb_Width
            //
            this.cb_Width.FormattingEnabled = true;
            this.cb_Width.Location = new System.Drawing.Point(120, 98);
            this.cb_Width.Name = "cb_Width";
            this.cb_Width.Size = new System.Drawing.Size(121, 24);
            this.cb_Width.TabIndex = 7;
            //
            // cb_DashStyle
            //
            this.cb_DashStyle.FormattingEnabled = true;
            this.cb_DashStyle.Location = new System.Drawing.Point(120, 34);
            this.cb_DashStyle.Name = "cb_DashStyle";
            this.cb_DashStyle.Size = new System.Drawing.Size(121, 24);
            this.cb_DashStyle.TabIndex = 6;
            //
            // lbl_EndCap
            //
            this.lbl_EndCap.AutoSize = true;
            this.lbl_EndCap.Font = new System.Drawing.Font("Microsoft Sans
Serif", 10.2F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
            this.lbl_EndCap.Location = new System.Drawing.Point(17, 357);
            this.lbl_EndCap.Name = "lbl_EndCap";
            this.lbl_EndCap.Size = new System.Drawing.Size(78, 20);
            this.lbl_EndCap.TabIndex = 5;
            this.lbl_EndCap.Text = "End Cap:";
            //
            // lbl_StartCap
            //
            this.lbl_StartCap.AutoSize = true;
            this.lbl_StartCap.Font = new System.Drawing.Font("Microsoft Sans
Serif", 10.2F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
            this.lbl_StartCap.Location = new System.Drawing.Point(17, 293);
            this.lbl_StartCap.Name = "lbl_StartCap";
            this.lbl_StartCap.Size = new System.Drawing.Size(85, 20);
            this.lbl_StartCap.TabIndex = 4;
            this.lbl_StartCap.Text = "Start Cap:";
            //
            // lbl_DashCap
            //
            this.lbl_DashCap.AutoSize = true;
            this.lbl_DashCap.Font = new System.Drawing.Font("Microsoft Sans
Serif", 10.2F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
            this.lbl_DashCap.Location = new System.Drawing.Point(17, 229);
            this.lbl_DashCap.Name = "lbl_DashCap";
            this.lbl_DashCap.Size = new System.Drawing.Size(89, 20);
```

```
            this.lbl_DashCap.TabIndex = 3;
            this.lbl_DashCap.Text = "Dash Cap:";
            //
            // lbl_LineJoin
            //
            this.lbl_LineJoin.AutoSize = true;
            this.lbl_LineJoin.Font = new System.Drawing.Font("Microsoft Sans
Serif", 10.2F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
            this.lbl_LineJoin.Location = new System.Drawing.Point(17, 165);
            this.lbl_LineJoin.Name = "lbl_LineJoin";
            this.lbl_LineJoin.Size = new System.Drawing.Size(82, 20);
            this.lbl_LineJoin.TabIndex = 2;
            this.lbl_LineJoin.Text = "Line Join:";
            //
            // lbl_Width
            //
            this.lbl_Width.AutoSize = true;
            this.lbl_Width.Font = new System.Drawing.Font("Microsoft Sans
Serif", 10.2F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
            this.lbl_Width.Location = new System.Drawing.Point(17, 101);
            this.lbl_Width.Name = "lbl_Width";
            this.lbl_Width.Size = new System.Drawing.Size(57, 20);
            this.lbl_Width.TabIndex = 1;
            this.lbl_Width.Text = "Width:";
            //
            // lbl_DashStyle
            //
            this.lbl_DashStyle.AutoSize = true;
            this.lbl_DashStyle.Font = new System.Drawing.Font("Microsoft Sans
Serif", 10.2F, System.Drawing.FontStyle.Regular,
System.Drawing.GraphicsUnit.Point, ((byte)(0)));
            this.lbl_DashStyle.Location = new System.Drawing.Point(17, 37);
            this.lbl_DashStyle.Name = "lbl_DashStyle";
            this.lbl_DashStyle.Size = new System.Drawing.Size(96, 20);
            this.lbl_DashStyle.TabIndex = 0;
            this.lbl_DashStyle.Text = "Dash Style:";
            //
            // pictureBox1
            //
            this.pictureBox1.BackColor = System.Drawing.Color.White;
            this.pictureBox1.Dock = System.Windows.Forms.DockStyle.Fill;
            this.pictureBox1.Location = new System.Drawing.Point(256, 0);
            this.pictureBox1.Name = "pictureBox1";
            this.pictureBox1.Size = new System.Drawing.Size(544, 450);
            this.pictureBox1.TabIndex = 1;
            this.pictureBox1.TabStop = false;
            //
            // Form1
            //
            this.AutoScaleDimensions = new System.Drawing.SizeF(8F, 16F);
            this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font;
            this.ClientSize = new System.Drawing.Size(800, 450);
            this.Controls.Add(this.pictureBox1);
            this.Controls.Add(this.pn_Tool);
            this.Name = "Form1";
            this.StartPosition =
System.Windows.Forms.FormStartPosition.CenterScreen;
            this.Text = "Form1";
            this.pn_Tool.ResumeLayout(false);
            this.pn_Tool.PerformLayout();

((System.ComponentModel.ISupportInitialize)(this.pictureBox1)).EndInit();
            this.ResumeLayout(false);
```

```
        }

        #endregion

        private System.Windows.Forms.Panel pn_Tool;
        private System.Windows.Forms.Label lbl_Width;
        private System.Windows.Forms.Label lbl_DashStyle;
        private System.Windows.Forms.Label lbl_EndCap;
        private System.Windows.Forms.Label lbl_StartCap;
        private System.Windows.Forms.Label lbl_DashCap;
        private System.Windows.Forms.Label lbl_LineJoin;
        private System.Windows.Forms.ComboBox cb_Width;
        private System.Windows.Forms.ComboBox cb_DashStyle;
        private System.Windows.Forms.ComboBox cb_EndCap;
        private System.Windows.Forms.ComboBox cb_StartCap;
        private System.Windows.Forms.ComboBox cb_DashCap;
        private System.Windows.Forms.ComboBox cb_LineJoin;
        private System.Windows.Forms.PictureBox pictureBox1;
    }
}
```



Hình 5. Giao diện của bài 5

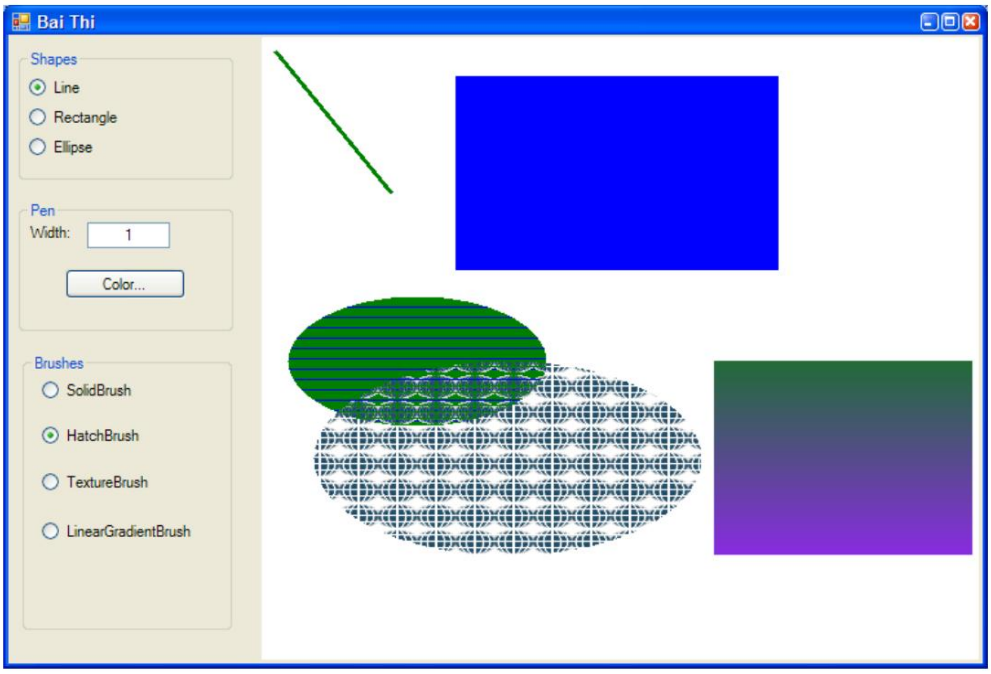
Link video Testcase của bài 5:

https://drive.google.com/file/d/1FveNHJEbAUVeLV18t8W1H5i9e5QaGKU_/view?usp=sharing

6. Xây dựng chương trình vẽ hình cơ bản như sau:

Khi chọn button "Color" thì xuất hiện hộp thoại Color để chọn màu vẽ đường.
Khi người dùng nhấn giữ nút trái chuột và di chuyển chuột trên pictureBox thì sẽ vẽ hình tương ứng tùy thuộc vào hình được chọn:

- Line: Vẽ đường thẳng có độ dày (txtWidth) và màu tương ứng đã được chọn.
- Rectangle hay Ellipse: Tô hình chữ nhật hay hình Ellipse với Brush tương ứng:
    - SolidBrush: sử dụng SolidBrush với màu là Green.
    - HatchBrush: sử dụng HatchBrush có kiểu là Horizontal với 2 màu tương ứng là Blue và Green
    - TextureBrush: sử dụng TextureBrush, tô với bitmap cho trước.
    - LinearGradientBrush: sử dụng LinearGradientBrush có kiểu là Vertical với 2 màu tương ứng là: Red và Green.



Nội dung code của bài 6:

Bảng 6.1 - Nội dung code phần Logic của bài 6

```
using System;
using System.Collections.Generic;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Drawing.Drawing2D;
using System.Linq;
using System.Text;
using System.Threading.Tasks;
using System.Windows.Forms;

namespace Bai11
{
    public partial class Form1 : Form
    {
        private Point startPoint;
        private Point endPoint;
        private bool isDrawing = false;
```

```
        private Color penColor = Color.Black;
        private float penWidth = 1;
        private Bitmap drawingBitmap;
        private ColorDialog colorDialog = new ColorDialog();

        private Bitmap textureBitmap;

        public Form1()
        {
            InitializeComponent();
            this.Load += Form1_Load;

            Btn_Color.Click += Btn_Color_Click;

            pB_Draw.MouseDown += pB_Draw_MouseDown;
            pB_Draw.MouseMove += pB_Draw_MouseMove;
            pB_Draw.MouseUp += pB_Draw_MouseUp;
            pB_Draw.Paint += pB_Draw_Paint;

            rBtn_Line.CheckedChanged += Shape_CheckedChanged;
            rBtn_Rectangle.CheckedChanged += Shape_CheckedChanged;
            rBtn_Ellipse.CheckedChanged += Shape_CheckedChanged;
            pB_Draw.Resize += PB_Draw_Resize;

        }

        private void Form1_Load(object sender, EventArgs e)
        {
            if (pB_Draw.Width > 0 && pB_Draw.Height > 0)
            {
                drawingBitmap = new Bitmap(pB_Draw.Width, pB_Draw.Height);

                textureBitmap = new Bitmap(8, 8);
                using (Graphics g = Graphics.FromImage(textureBitmap))
                {
                    g.Clear(Color.White);

                    g.FillRectangle(Brushes.Black, 0, 0, 4, 4);
                    g.FillRectangle(Brushes.Black, 4, 4, 4, 4);
                }
            }

            txt_Width.Text = penWidth.ToString();
            rBtn_Line.Checked = true;
            rBtn_SolidBrush.Checked = true;
        }

        private void Btn_Color_Click(object sender, EventArgs e)
        {
            colorDialog.Color = penColor;
            if (colorDialog.ShowDialog() == DialogResult.OK)
            {
                penColor = colorDialog.Color;
            }
        }

        private void Shape_CheckedChanged(object sender, EventArgs e)
        {
            pB_Draw.Invalidate();
        }

        private void pB_Draw_MouseDown(object sender, MouseEventArgs e)
        {
            if (e.Button == MouseButtons.Left)
            {
```

```
                isDrawing = true;
                startPoint = e.Location;
                endPoint = e.Location;
                pB_Draw.Invalidate();
            }
        }

        private void pB_Draw_MouseMove(object sender, MouseEventArgs e)
        {
            if (isDrawing)
            {
                endPoint = e.Location;
                pB_Draw.Invalidate();
            }
        }

        private void pB_Draw_MouseUp(object sender, MouseEventArgs e)
        {
            if (isDrawing && e.Button == MouseButtons.Left)
            {
                isDrawing = false;

                using (Graphics gBitmap = Graphics.FromImage(drawingBitmap))
                {
                    DrawShape(gBitmap, startPoint, endPoint, false);
                }

                pB_Draw.Invalidate();
            }
        }

        private void pB_Draw_Paint(object sender, PaintEventArgs e)
        {
            Graphics g = e.Graphics;

            g.DrawImage(drawingBitmap, 0, 0);

            if (isDrawing)
            {
                DrawShape(g, startPoint, endPoint, true);
            }
        }

        private Pen GetCurrentPen()
        {
            if (!float.TryParse(txt_Width.Text, out penWidth) || penWidth <= 0)
            {
                penWidth = 1;
            }
            return new Pen(penColor, penWidth);
        }

        private Brush GetCurrentBrush(Rectangle rect)
        {
            if (rect.Width == 0 || rect.Height == 0)
                return new SolidBrush(Color.Green);

            if (rBtn_SolidBrush.Checked)
            {
                return new SolidBrush(Color.Green);
            }
            else if (rBtn_HatchBrush.Checked)
            {
                return new HatchBrush(HatchStyle.Horizontal, Color.Blue,
Color.Green);
```

```
            }
            else if (rBtn_TextureBrush.Checked)
            {
                return new TextureBrush(textureBitmap);
            }
            else if (rBtn_LinearGradientBrush.Checked)
            {
                return new LinearGradientBrush(rect, Color.Red, Color.Green,
LinearGradientMode.Vertical);
            }

            return new SolidBrush(Color.Green);
        }

        private Rectangle GetShapeRectangle(Point p1, Point p2)
        {
            int x = Math.Min(p1.X, p2.X);
            int y = Math.Min(p1.Y, p2.Y);
            int width = Math.Abs(p1.X - p2.X);
            int height = Math.Abs(p1.Y - p2.Y);

            return new Rectangle(x, y, width, height);
        }

        private void DrawShape(Graphics g, Point p1, Point p2, bool
isTemporary)
        {
            Rectangle rect = GetShapeRectangle(p1, p2);

            if (rBtn_Line.Checked)
            {
                using (Pen pen = GetCurrentPen())
                {
                    g.DrawLine(pen, p1, p2);
                }
                return;
            }

            using (Brush brush = GetCurrentBrush(rect))
            {
                if (rBtn_Rectangle.Checked)
                {
                    g.FillRectangle(brush, rect);
                }
                else if (rBtn_Ellipse.Checked)
                {
                    g.FillEllipse(brush, rect);
                }
            }
        }
        private void PB_Draw_Resize(object sender, EventArgs e)
        {
            if (pB_Draw.Width > 0 && pB_Draw.Height > 0)
            {
                Bitmap newBitmap = new Bitmap(pB_Draw.Width, pB_Draw.Height);
                using (Graphics g = Graphics.FromImage(newBitmap))
                {
                    g.Clear(Color.White);
                    if (drawingBitmap != null)
                        g.DrawImage(drawingBitmap, 0, 0);
                }
                drawingBitmap = newBitmap;
                pB_Draw.Invalidate();
            }
        }
```

```
    }
}
```

Bảng 6.2 - Nội dung code phần Design của bài 6

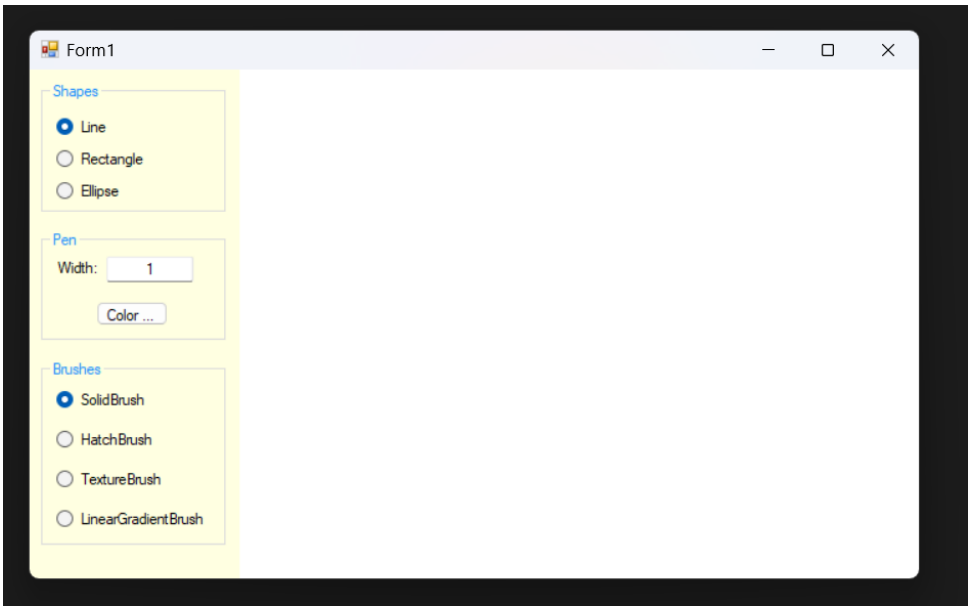
```
namespace Bai11
{
    partial class Form1
    {
        /// <summary>
        /// Required designer variable.
        /// </summary>
        private System.ComponentModel.IContainer components = null;

        /// <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.panel1 = new System.Windows.Forms.Panel();
            this.gB_Brushes = new System.Windows.Forms.GroupBox();
            this.rBtn_LinearGradientBrush = new
System.Windows.Forms.RadioButton();
            this.rBtn_TextureBrush = new System.Windows.Forms.RadioButton();
            this.rBtn_HatchBrush = new System.Windows.Forms.RadioButton();
            this.rBtn_SolidBrush = new System.Windows.Forms.RadioButton();
            this.gB_Pen = new System.Windows.Forms.GroupBox();
            this.Btn_Color = new System.Windows.Forms.Button();
            this.txt_Width = new System.Windows.Forms.TextBox();
            this.lbl_Width = new System.Windows.Forms.Label();
            this.gB_Shapes = new System.Windows.Forms.GroupBox();
            this.rBtn_Ellipse = new System.Windows.Forms.RadioButton();
            this.rBtn_Rectangle = new System.Windows.Forms.RadioButton();
            this.rBtn_Line = new System.Windows.Forms.RadioButton();
            this.pB_Draw = new System.Windows.Forms.PictureBox();
            this.panel1.SuspendLayout();
            this.gB_Brushes.SuspendLayout();
            this.gB_Pen.SuspendLayout();
            this.gB_Shapes.SuspendLayout();

((System.ComponentModel.ISupportInitialize)(this.pB_Draw)).BeginInit();
            this.SuspendLayout();
            //
            // panel1
            //
```

```
            this.panel1.BackColor = System.Drawing.SystemColors.Info;
            this.panel1.Controls.Add(this.gB_Brushes);
            this.panel1.Controls.Add(this.gB_Pen);
            this.panel1.Controls.Add(this.gB_Shapes);
            this.panel1.Dock = System.Windows.Forms.DockStyle.Left;
            this.panel1.Location = new System.Drawing.Point(0, 0);
            this.panel1.Name = "panel1";
            this.panel1.Size = new System.Drawing.Size(218, 490);
            this.panel1.TabIndex = 0;
            //
            // gB_Brushes
            //
            this.gB_Brushes.Controls.Add(this.rBtn_LinearGradientBrush);
            this.gB_Brushes.Controls.Add(this.rBtn_TextureBrush);
            this.gB_Brushes.Controls.Add(this.rBtn_HatchBrush);
            this.gB_Brushes.Controls.Add(this.rBtn_SolidBrush);
            this.gB_Brushes.ForeColor = System.Drawing.Color.DodgerBlue;
            this.gB_Brushes.Location = new System.Drawing.Point(12, 279);
            this.gB_Brushes.Name = "gB_Brushes";
            this.gB_Brushes.Size = new System.Drawing.Size(192, 179);
            this.gB_Brushes.TabIndex = 2;
            this.gB_Brushes.TabStop = false;
            this.gB_Brushes.Text = "Brushes";
            //
            // rBtn_LinearGradientBrush
            //
            this.rBtn_LinearGradientBrush.AutoSize = true;
            this.rBtn_LinearGradientBrush.ForeColor =
System.Drawing.Color.Black;
            this.rBtn_LinearGradientBrush.Location = new
System.Drawing.Point(16, 141);
            this.rBtn_LinearGradientBrush.Name = "rBtn_LinearGradientBrush";
            this.rBtn_LinearGradientBrush.Size = new System.Drawing.Size(150,
20);
            this.rBtn_LinearGradientBrush.TabIndex = 3;
            this.rBtn_LinearGradientBrush.TabStop = true;
            this.rBtn_LinearGradientBrush.Text = "LinearGradientBrush";
            this.rBtn_LinearGradientBrush.UseVisualStyleBackColor = true;
            //
            // rBtn_TextureBrush
            //
            this.rBtn_TextureBrush.AutoSize = true;
            this.rBtn_TextureBrush.ForeColor = System.Drawing.Color.Black;
            this.rBtn_TextureBrush.Location = new System.Drawing.Point(16,
103);
            this.rBtn_TextureBrush.Name = "rBtn_TextureBrush";
            this.rBtn_TextureBrush.Size = new System.Drawing.Size(107, 20);
            this.rBtn_TextureBrush.TabIndex = 2;
            this.rBtn_TextureBrush.TabStop = true;
            this.rBtn_TextureBrush.Text = "TextureBrush";
            this.rBtn_TextureBrush.UseVisualStyleBackColor = true;
            //
            // rBtn_HatchBrush
            //
            this.rBtn_HatchBrush.AutoSize = true;
            this.rBtn_HatchBrush.ForeColor = System.Drawing.Color.Black;
            this.rBtn_HatchBrush.Location = new System.Drawing.Point(16, 65);
            this.rBtn_HatchBrush.Name = "rBtn_HatchBrush";
            this.rBtn_HatchBrush.Size = new System.Drawing.Size(97, 20);
            this.rBtn_HatchBrush.TabIndex = 1;
            this.rBtn_HatchBrush.TabStop = true;
            this.rBtn_HatchBrush.Text = "HatchBrush";
            this.rBtn_HatchBrush.UseVisualStyleBackColor = true;
            //
            // rBtn_SolidBrush
```

```
            //
            this.rBtn_SolidBrush.AutoSize = true;
            this.rBtn_SolidBrush.ForeColor = System.Drawing.Color.Black;
            this.rBtn_SolidBrush.Location = new System.Drawing.Point(16, 27);
            this.rBtn_SolidBrush.Name = "rBtn_SolidBrush";
            this.rBtn_SolidBrush.Size = new System.Drawing.Size(93, 20);
            this.rBtn_SolidBrush.TabIndex = 0;
            this.rBtn_SolidBrush.TabStop = true;
            this.rBtn_SolidBrush.Text = "SolidBrush";
            this.rBtn_SolidBrush.UseVisualStyleBackColor = true;
            //
            // gB_Pen
            //
            this.gB_Pen.Controls.Add(this.Btn_Color);
            this.gB_Pen.Controls.Add(this.txt_Width);
            this.gB_Pen.Controls.Add(this.lbl_Width);
            this.gB_Pen.ForeColor = System.Drawing.Color.DodgerBlue;
            this.gB_Pen.Location = new System.Drawing.Point(12, 155);
            this.gB_Pen.Name = "gB_Pen";
            this.gB_Pen.Size = new System.Drawing.Size(192, 106);
            this.gB_Pen.TabIndex = 1;
            this.gB_Pen.TabStop = false;
            this.gB_Pen.Text = "Pen";
            //
            // Btn_Color
            //
            this.Btn_Color.ForeColor = System.Drawing.Color.Black;
            this.Btn_Color.Location = new System.Drawing.Point(57, 68);
            this.Btn_Color.Name = "Btn_Color";
            this.Btn_Color.Size = new System.Drawing.Size(75, 23);
            this.Btn_Color.TabIndex = 2;
            this.Btn_Color.Text = "Color ...";
            this.Btn_Color.UseVisualStyleBackColor = true;
            //
            // txt_Width
            //
            this.txt_Width.ForeColor = System.Drawing.Color.Black;
            this.txt_Width.Location = new System.Drawing.Point(68, 24);
            this.txt_Width.Name = "txt_Width";
            this.txt_Width.Size = new System.Drawing.Size(89, 22);
            this.txt_Width.TabIndex = 1;
            this.txt_Width.TextAlign =
System.Windows.Forms.HorizontalAlignment.Center;
            //
            // lbl_Width
            //
            this.lbl_Width.AutoSize = true;
            this.lbl_Width.ForeColor = System.Drawing.Color.Black;
            this.lbl_Width.Location = new System.Drawing.Point(13, 27);
            this.lbl_Width.Name = "lbl_Width";
            this.lbl_Width.Size = new System.Drawing.Size(47, 16);
            this.lbl_Width.TabIndex = 0;
            this.lbl_Width.Text = "Width: ";
            //
            // gB_Shapes
            //
            this.gB_Shapes.Controls.Add(this.rBtn_Ellipse);
            this.gB_Shapes.Controls.Add(this.rBtn_Rectangle);
            this.gB_Shapes.Controls.Add(this.rBtn_Line);
            this.gB_Shapes.ForeColor = System.Drawing.Color.DodgerBlue;
            this.gB_Shapes.Location = new System.Drawing.Point(12, 12);
            this.gB_Shapes.Name = "gB_Shapes";
            this.gB_Shapes.Size = new System.Drawing.Size(192, 125);
            this.gB_Shapes.TabIndex = 0;
            this.gB_Shapes.TabStop = false;
```

```
            this.gB_Shapes.Text = "Shapes";
            //
            // rBtn_Ellipse
            //
            this.rBtn_Ellipse.AutoSize = true;
            this.rBtn_Ellipse.ForeColor = System.Drawing.Color.Black;
            this.rBtn_Ellipse.Location = new System.Drawing.Point(16, 94);
            this.rBtn_Ellipse.Name = "rBtn_Ellipse";
            this.rBtn_Ellipse.Size = new System.Drawing.Size(69, 20);
            this.rBtn_Ellipse.TabIndex = 2;
            this.rBtn_Ellipse.TabStop = true;
            this.rBtn_Ellipse.Text = "Ellipse";
            this.rBtn_Ellipse.UseVisualStyleBackColor = true;
            //
            // rBtn_Rectangle
            //
            this.rBtn_Rectangle.AutoSize = true;
            this.rBtn_Rectangle.ForeColor = System.Drawing.Color.Black;
            this.rBtn_Rectangle.Location = new System.Drawing.Point(16, 63);
            this.rBtn_Rectangle.Name = "rBtn_Rectangle";
            this.rBtn_Rectangle.Size = new System.Drawing.Size(90, 20);
            this.rBtn_Rectangle.TabIndex = 1;
            this.rBtn_Rectangle.TabStop = true;
            this.rBtn_Rectangle.Text = "Rectangle";
            this.rBtn_Rectangle.UseVisualStyleBackColor = true;
            //
            // rBtn_Line
            //
            this.rBtn_Line.AutoSize = true;
            this.rBtn_Line.ForeColor = System.Drawing.Color.Black;
            this.rBtn_Line.Location = new System.Drawing.Point(16, 32);
            this.rBtn_Line.Name = "rBtn_Line";
            this.rBtn_Line.Size = new System.Drawing.Size(53, 20);
            this.rBtn_Line.TabIndex = 0;
            this.rBtn_Line.TabStop = true;
            this.rBtn_Line.Text = "Line";
            this.rBtn_Line.UseVisualStyleBackColor = true;
            //
            // pB_Draw
            //
            this.pB_Draw.BackColor = System.Drawing.Color.White;
            this.pB_Draw.Dock = System.Windows.Forms.DockStyle.Fill;
            this.pB_Draw.Location = new System.Drawing.Point(218, 0);
            this.pB_Draw.Name = "pB_Draw";
            this.pB_Draw.Size = new System.Drawing.Size(709, 490);
            this.pB_Draw.TabIndex = 1;
            this.pB_Draw.TabStop = false;
            //
            // Form1
            //
            this.AutoScaleDimensions = new System.Drawing.SizeF(8F, 16F);
            this.AutoScaleMode = System.Windows.Forms.AutoScaleMode.Font;
            this.ClientSize = new System.Drawing.Size(927, 490);
            this.Controls.Add(this.pB_Draw);
            this.Controls.Add(this.panel1);
            this.Name = "Form1";
            this.StartPosition =
System.Windows.Forms.FormStartPosition.CenterScreen;
            this.Text = "Form1";
            this.panel1.ResumeLayout(false);
            this.gB_Brushes.ResumeLayout(false);
            this.gB_Brushes.PerformLayout();
            this.gB_Pen.ResumeLayout(false);
            this.gB_Pen.PerformLayout();
            this.gB_Shapes.ResumeLayout(false);
```

```
            this.gB_Shapes.PerformLayout();

((System.ComponentModel.ISupportInitialize)(this.pB_Draw)).EndInit();
            this.ResumeLayout(false);

        }

        #endregion

        private System.Windows.Forms.Panel panel1;
        private System.Windows.Forms.GroupBox gB_Brushes;
        private System.Windows.Forms.GroupBox gB_Pen;
        private System.Windows.Forms.GroupBox gB_Shapes;
        private System.Windows.Forms.RadioButton rBtn_Ellipse;
        private System.Windows.Forms.RadioButton rBtn_Rectangle;
        private System.Windows.Forms.RadioButton rBtn_Line;
        private System.Windows.Forms.Button Btn_Color;
        private System.Windows.Forms.TextBox txt_Width;
        private System.Windows.Forms.Label lbl_Width;
        private System.Windows.Forms.RadioButton rBtn_LinearGradientBrush;
        private System.Windows.Forms.RadioButton rBtn_TextureBrush;
        private System.Windows.Forms.RadioButton rBtn_HatchBrush;
        private System.Windows.Forms.RadioButton rBtn_SolidBrush;
        private System.Windows.Forms.PictureBox pB_Draw;
    }
}
```



Hình 6. Giao diện của bài 6

Link video Testcase của bài 6:

https://drive.google.com/file/d/1FveNHJEbAUVeLV18t8W1H5i9e5QaGKU_/view?usp=sharing

7. Link Source code Github và Link các video Testcase

Link các Video Testcase:

https://drive.google.com/drive/folders/1YAiMHedQis4cu07rnrgoCiAdG9tCvHtP

Link Source code Github:

https://github.com/sinhdt-926/IT008.Q14