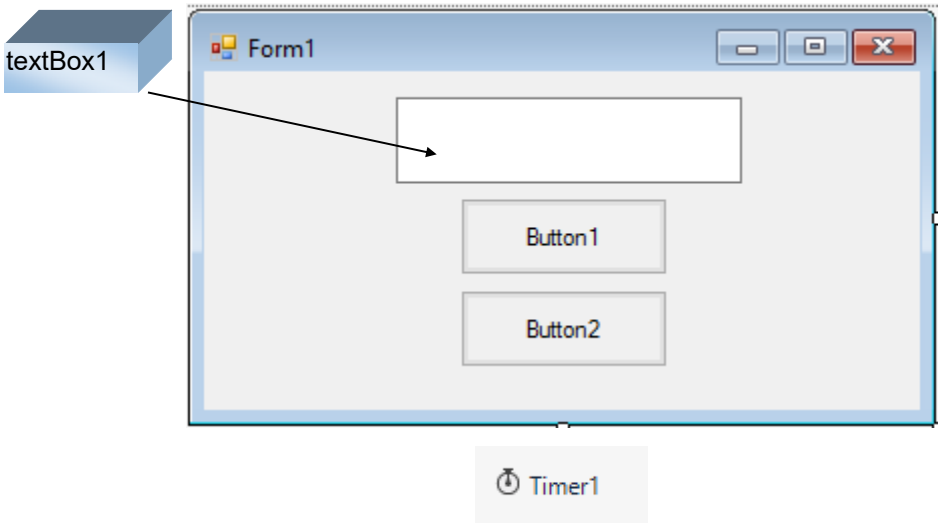
Project 1 - Computer Stopwatch

Project Design

In this project, we will build a computer stopwatch that measures elapsed time in seconds. One button will start and stop the timing and one will reset the display (a label). Elapsed time is measured using the C# **Now** function that provides the current time and date in a **Date** type function. The project you are about to build is saved as **Stopwatch** in the project folder (**\BeginVCS\BVCS Projects**).

Place Controls on Form

Start a new project in Visual C#. Place a text box control on the form. Then place two buttons on the form. Add a timer control. When done, your form should look something like this:



Set Control Properties

Set the control properties using the properties window:

Form1 Form:

Property Name	Property Value
Text	Stopwatch
FormBorderStyle	Fixed Single
StartPosition	CenterScreen

textBox1 Text Box:

Property Name	Property Value
Name	txtTime
Text	00:00:00
BackColor	White
Font	Arial
Font Size	24
Font Style	Bold
ReadOnly	True
TextAlign	Center
TabStop	False

button1 Button:

Property Name	Property Value
Name	btnStartStop
Text	Start
Font	Arial
Font Size	12

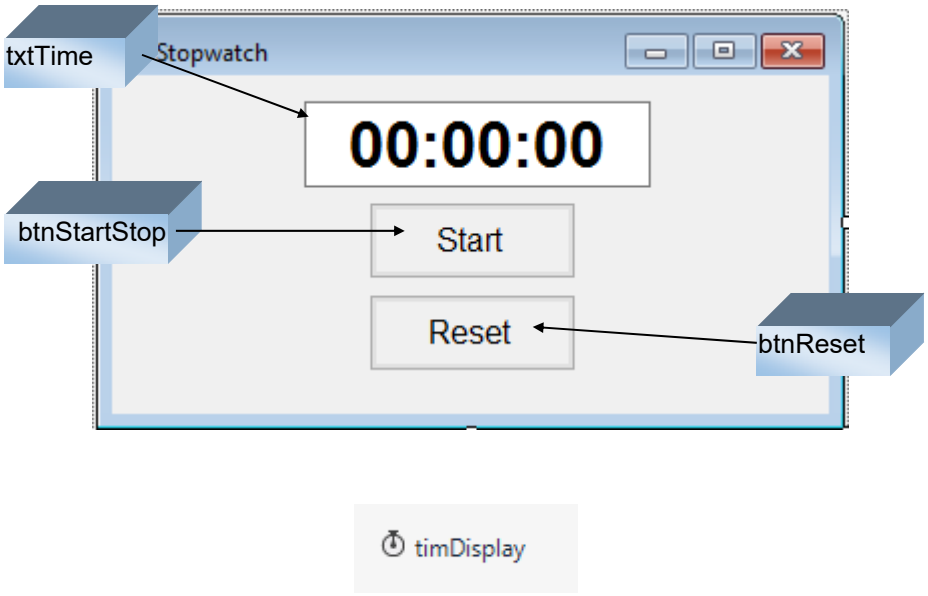
button2 Command Button:

Property Name	Property Value
Name	btnReset
Text	Reset
Enabled	False
Font	Arial
Font Size	12

timer1 Timer:

Property Name	Property Value
Name	timDisplay
Interval	1000

When done setting properties, my form looks like this (I resized the text box a bit):



Write Event methods

To start the stopwatch, click **Start**. To stop, click **Stop**. Click **Reset** to reset the display to zero. Each of these buttons has a **Click** event. The timer control **Tick** event controls the display of the time.

Add this code to the **general declarations** area:

```
DateTime startTime;  // time when stopwatch started
```

The **btnStartStop_Click** event method:

```
private void btnStartStop_Click(object sender, EventArgs e)
{
    // Starting timer?
    if (btnStartStop.Text == "Start")
    {
        // Reset Text on Start/Stop button
        btnStartStop.Text = "Stop";
        // Start timer and get starting time
        timDisplay.Enabled = true;
        startTime = DateTime.Now;
    }
    else
    {
        // Stop timer
        timDisplay.Enabled = false;
        // Disable Start/Stop button, enable Reset button
        btnStartStop.Enabled = false;
        btnReset.Enabled = true;
    }
}
```

The **btnReset_Click** event method:

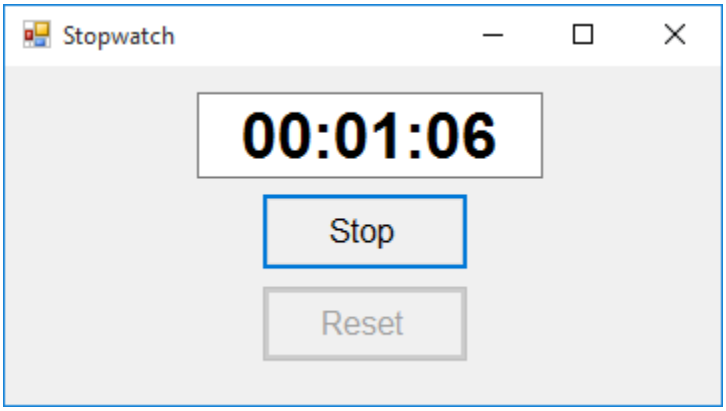
```
private void btnReset_Click(object sender, EventArgs e)
{
    // Reset display to zero
    txtTime.Text = "00:00:00";
    // Reset button Text and enable Start, disable Reset
    btnStartStop.Text = "Start";
    btnStartStop.Enabled = true;
    btnReset.Enabled = false;
}
```

The **timDisplay_Tick** event method:

```
private void timDisplay_Tick(object sender, EventArgs e)
{
    TimeSpan elapsedTime;
    // Determine elapsed time since Start was clicked
    elapsedTime = DateTime.Now - startTime;
    // Display time in label box
    txtTime.Text = Convert.ToString(new
TimeSpan(elapsedTime.Hours, elapsedTime.Minutes,
elapsedTime.Seconds));
}
```

Run the Project

Save your work. Run the project. Click **Start** to start the timer. Make sure the display updates every second. Here's a run I made:



Study the Tick event if you're unsure of how this is done – especially look at how to subtract two times, **DateTime** types, using the C# **TimeSpan** type to get the elapsed time. Click **Stop** to stop the timer. Make sure the **Reset** button works properly.

Other Things to Try

Many stopwatches allow you to continue timing after you've stopped one or more times. That is, you can measure total elapsed time in different segments. Modify this project to allow such measurement. You'll need a separate Stop button and a variable to keep track of total elapsed time. You'll also need to determine which buttons you want to have enabled at different times in the project. Add a "lap timing" feature by displaying the time measured in each segment (a segment being defined as the time between each Start and Stop click).