FOR 240 Homework – Assignment 5
Using VB Procedures and Functions
to Calculate basal area and volume of Trees
Introduction to Computing in Natural Resources

We have data of 10 trees in Table 1. Create a VB project to calculate basal area and volume for each tree and summarize the total basal area and volume of these 10 trees.
Hints: (1) You should implement an event procedure to sum the basal area and volume, respectively.

(2) Declare five arrays to hold tree data, basal area and volume in the General Declaration of your project.

Table 1. Tree data.

Tree	DBH (inches)	Merchantable height (Logs)
1	27	1
2	13	2
3	12	1
4	15	2.5
5	17	2
6	25	2
7	28	0.5
8	10	1
9	29	2.5
10	13	0.5

Basal area (BA) in ft^2:

$$BA = 0.005454154*(DBH)^2$$

Volume (V) in Doyle board foot:

```
V =   ((0.55743 * L ^ 2 + 41.51275 * L - 29.37337) +
      (2.78043 - 0.04516 * L ^ 2 - 8.77272 * L) * d +
      (0.04177 - 0.01578 * L ^ 2 + 0.59042 * L) * d ^ 2)
```

where L = number of logs;
d = DBH in inches;

Please provide me a typed summary report together with code listing for all the functions and procedures you have applied by the beginning of the class next week.

What we need to do are as follows:

(1) Use Notepad to create a file named TreeData.txt and save it in the directory of your VB project (…\for240\HW5\). The data must be delimited by comma.

1,27,1
2,13,2
3,12,1
4,15,2.5
5,17,2
6,25,2
7,28,0.5
8,10,1
9,29,2.5
10,13,0.5

(2) Start a new VB project and put the following controls on form1 (Figure 20.1):

a. Two labels
b. A text box
c. A list box
d. Four command buttons

(3) Table 20.1 shows the property setting of the form and other controls.

Table 20.1. Property settings.

Control	Property	Setting
Form	Text	Input and Output File
Label1	Text	Enter the File Name
Label2	Text	Tree Data
Button1	Text	Retrieve Tree Data
Button2	Text	Cal BA and Volume
Button3	Text	Save Result Data
Button4	Text	Close

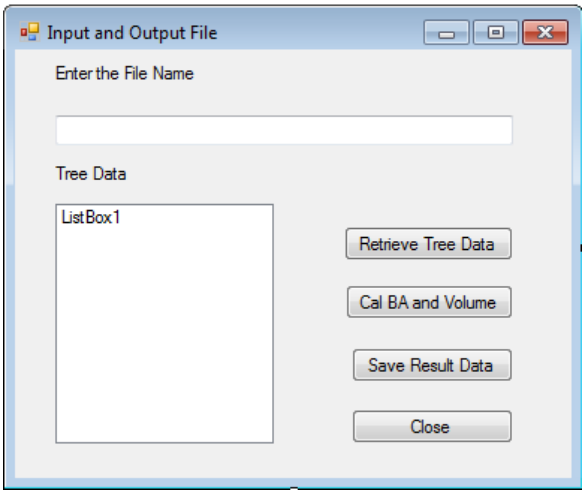

Figure 20.1. Interface for calculating BA and volume of trees.

(4) Add the following code to the project.

```
Public Class Form_input_output

   'General declaration
    Dim aryTreeNo()As Integer
    Dim aryDBH(), aryNLogs(), aryBA(), aryVol() As String
    Dim NofTrees As Integer

    'Function to calculate BA
    Private Function CalBA(ByVal dbh As Single) As Single

        CalBA = Math.Round(0.005454154 * dbh * dbh, 2)

    End Function

    'Function to calculate the volume
    Private Function CalVol(ByVal d As Single, ByVal l As Single) As
    Single

        CalVol = Math.Round(((0.55743 * l ^ 2 + 41.51275 * l –
                 29.37337) + (2.78043 - 0.04516 * l ^ 2 - 8.77272 * l)
                 * d + (0.04177 - 0.01578 * l ^ 2 + 0.59042 * l) *
                 d ^ 2), 2)
    End Function

    Private Sub Button1_Click(ByVal sender As System.Object, ByVal e As
    System.EventArgs) Handles Button1.Click

      Dim oRead As System.IO.StreamReader
      Dim n As Integer
      Dim str As String

        If System.IO.File.Exists(TextBox1.Text) then
            oRead = IO.File.OpenText(TextBox1.Text)
            str = oRead.ReadLine()
            While Not str Is Nothing
            ListBox1.Items.Add(str)
            n = n + 1
            ReDim Preserve aryTreeNo(n), aryDBH(n), aryNLogs(n)
            ReDim Preserve aryBA(n), aryVol(n)
            ‘Get the positions of the two commas in the current line
            Dim start1, start2 As Integer
            start1 = Microsoft.VisualBasic.InStr(1, str, ",",
                  CompareMethod.Text)
            start2 = Microsoft.VisualBasic.InStr(start1 + 1, str, ",",
                  CompareMethod.Text)
            aryTreeNo(n) = Convert.ToSingle(Microsoft.VisualBasic.Left(str,
      start1 - 1))

            aryNLogs(n) = Convert.ToSingle(Microsoft.VisualBasic.Right(str,
```

```
            Microsoft.VisualBasic.Len(str) - start2))

            aryDBH(n) = Convert.ToSingle(Microsoft.VisualBasic.Mid(str,
            start1 + 1, start2 - start1 - 1))
            str = oRead.ReadLine()
            End While

            NofTrees = n
            oRead.Close()
        Else
            Msgbos("You either entered a wrong file name or the file does not
            exist!")
       End If

    End Sub

    Private Sub Button2_Click(ByVal sender As System.Object, ByVal e As
    System.EventArgs) Handles Button2.Click

      Dim n As Integer
      For n = 1 To NofTrees
            aryBA(n) = CalBA(aryDBH(n))
            aryVol(n) = CalVol(aryDBH(n), aryNLogs(n))
      Next

      MsgBox("BA and Volumn were computed!")

    End Sub

    Private Sub Button3_Click(ByVal sender As System.Object, ByVal e As
    System.EventArgs) Handles Button3.Click
      'Create a text file
      Dim oWrite As System.IO.StreamWriter
      'Here you need to specify your own directory and text file name
      oWrite = IO.File.CreateText(My.Aaalication.Info.DirectoryPath &
      "Results.txt")

      'Write to the text file
      Dim i As Integer
      Dim str As String = Nothing
      For i = 1 To NofTrees
      str = aryTreeNo(i).ToString + "," + aryDBH(i).ToString + "," +
      aryNLogs(i).ToString + "," + CalBA(aryDBH(i)).ToString + "," +
      CalVol(aryDBH(i), aryNLogs(i)).ToString

      oWrite.WriteLine(str)
      oWrite.WriteLine()         'Write a blank line to the file
      Next

      'Close the text file
      oWrite.Close()
      MsgBox("Results were saved!")

    End Sub
```

```
    Private Sub Button4_Click(ByVal sender As System.Object, ByVal e As
      System.EventArgs) Handles Button4.Click

      End

    End Sub

End Class
```

(5) Run your application (Figure 20.2).

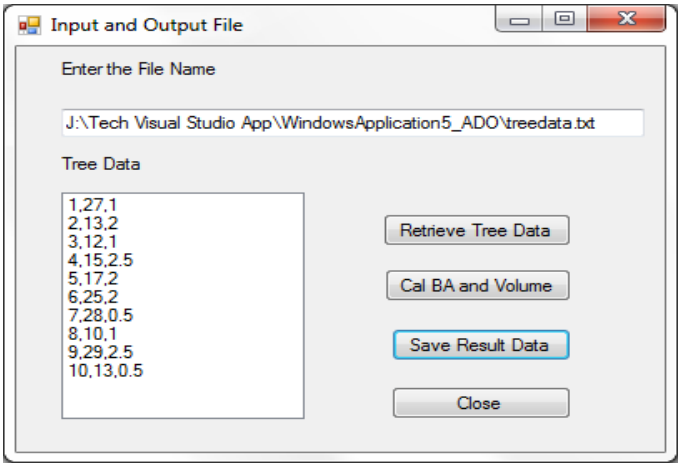

Figure 20.2. Display tree data and save results.

Your output file is TreeData.rlt that will look like that (Figure 20.3):

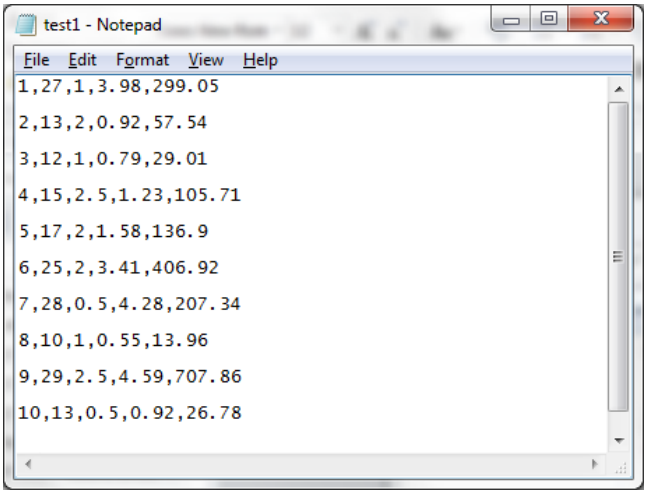

Figure 20.3. File output.