

ENG TECH 1PR3 Programming Principles

Selection and loop Structures

Assignment 01

Be sure to assign all input to appropriate variables. Do NOT use the control name directly in the calculations. Instead, assign the value of a control to a variable and use the variable in the calculations. Assign the result of the calculations to an appropriate form control. Ensure the forms are well-behaved. A form must contain an Exit button, sensible tabbing and alt-shortcuts where appropriate.

1. Create a VB application that will perform the following tasks.
 - a. The user will enter the number of seconds in the textbox.
 - b. Store the number of seconds in a minute as a constant and use it in the calculations.
 - c. Store the number of seconds in an hour in a constant and use it in the calculations.
 - d. Store the number of seconds in a day in a constant and use it in the calculations.
 - e. Calculate the number of Days, hours, minutes and seconds. For instance, if the user enters 95646 seconds, the Time Calculator will display the results:

1 day, 2 hours, 34 minutes, 6 seconds
 - f. Display the days, hours, minutes and seconds result in a label control as shown above.
 - g. Add a Clear button that will clear the textbox, and the label control.
 - h. Validate user input for nonnumeric and seconds ≥ 0 .
2. **Elastic Deformation:** Suppose a helicopter is using a steel cable to lift an object of mass m (in kg). The unstretched length of the cable is L (in m), and its radius is r (in m). Then the change in the cable's length, ΔL , when the jeep is hoisted straight upward with an acceleration of a_y (in m/s^2), is calculated as

$$\Delta L = \frac{m(a_y + g)L}{Y(\pi r^2)},$$

where $Y = 2.0 \times 10^{11} \text{ N/m}^2$ is constant called Young's modulus and g is the acceleration due to gravity.

Write a VB program that will calculate the change in cable's length for an object with mass varying from 1000 kg to 5000 with increment of 200 kg. When the user runs your program, it should display input boxes for L , a_y , and r . When the user clicks the calculate button, it should print user input, and m and ΔL in tabular form as shown below. Print ΔL in exponential format with 3 decimal places. Set display Font style as "Courier New". If the change in length is more than 0.3% of the actual length then the program should also display "***" beside the value of ΔL . Use the following values for the screen capture.

$$L = 16 \text{ m}, \quad a_y = 1.5 \text{ m/s}^2, \quad r = 5 \times 10^{-3} \text{ m}$$

Length = --- units	
Acceleration = --- units	
Radius = --- units	
Mass (kg)	ΔL (m)
1000	---
1200	---
:	:
:	:
4600	--- ***
4800	--- ***
5000	--- ***

3. Create a form for a child's multiplication table practise. The form will have the following functionality:

A label will contain an appropriate title for the form (Multiplication Practise!)

Use a *for* loop to populate a combo box with the values from 1 to 12.

Include an appropriate label instructing the user to select a value from the combo box and click a button to generate the multiplication table in a label control. For instance, if the user selects 3 and clicks the button, a label should contain the following:

1 x 3 =
 2 x 3 =
 3 x 3 =
 4 x 3 =
 5 x 3 =
 6 x 3 =
 ... and so forth to 12 x 3 =

Use a *while* loop to generate the multiplication statements (above and below).

Include a checkbox to view the answers. When the user checks the box, clear the multiplication table label, and display the 'answers' as follows:

1 x 3 = 3
 2 x 3 = 6
 3 x 3 = 9
 4 x 3 = 12
 5 x 3 = 15
 6 x 3 = 18
 ... and so forth to 12 x 3 = 36

When the user unchecks the box, clear the multiplication table and display the multiplication table without the answers.

Include a Clear button that will clear the multiplication label, clear the checkbox and reset the combo box to the first item.

Include an Exit button that will exit the application.

Test each of the combo box values to ensure the appropriate multiplication table is displayed. Be sure to check and uncheck the checkbox in your test as well. When the

checkbox is checked, the multiplication table should appear including the answers. When the checkbox is not checked, the multiplication table should appear without the answers.

Submitting the Lab

In order for your Lab/Assignment to be eligible for grading you must submit the following:

- The code must contain your Full Name and Student ID in a comment block at the top of each form module.
- A .zip compressed file containing the entire VB.NET project to AVENUE. Use .zip compression only (no RAR, TAR etc). If there is more than one project, create a separate .zip file for each individual project. Be sure to add all project files and folders to the .zip file. If the compressed file is missing files/folders such that the project will not open or run, the lab/assignment will receive a grade of 0.
- A Word .doc (or .docx) file containing:
 - A cover page that includes your name, Student ID, and MAC ID
 - The form code (event and other subprocedures and functions) including programmer's block
 - Screen captures of the form showing sample input and output.

Upload the Word file and .zip file(s) **separately** to the appropriate assignment drop-box on AVENUE.

Labs and assignments will not be accepted for evaluation if any of the above items are omitted and will result in a grade of 0.