A S S I G N M E N T

Information Technology II A

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Scenario

The quadratic equation ($ax^2+bx+c = 0$) solver was programmed to determine the number of roots the equation has as well as to compute the roots. It uses the determinant $b^2 - 4ac$ to solve the problems. If $b^2 - 4ac > 0$, then it has two roots and if $b^2 - 4ac = 0$, then it has one root, else it has no root. To obtain the roots, the program uses the standard quadratic formula:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

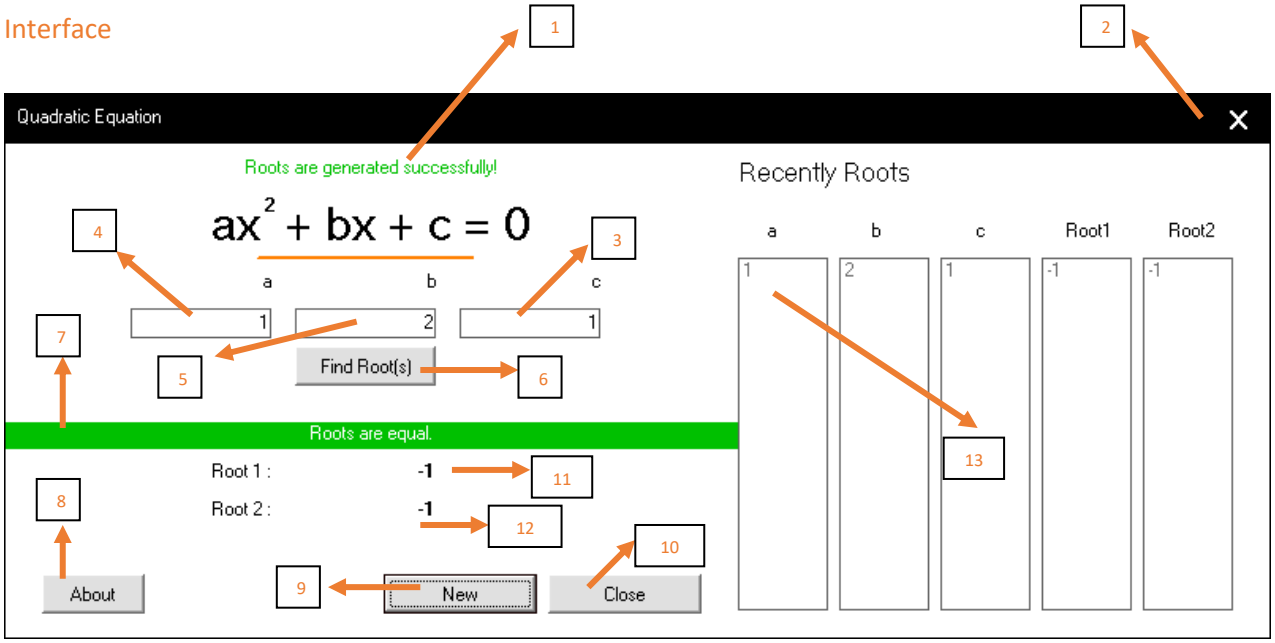
Design the following interface and write a program to solve the Quadratic Equation under the following criteria.

- $b^2 - 4ac > 0$ then status - " There are two roots"
- $b^2 - 4ac = 0$ then status - "Roots are equal"
- $b^2 - 4ac < 0$ then status - "No real solution"

Required Resources

- Computer
- Microsoft Visual Basic IDE

Interface



1. LblError
2. LblClose
3. TxtC
4. TxtA
5. TxtB
6. CmdResult
7. LblStatus
8. CmdAbout
9. CmdNew

10. CmdClose
11. LblRoot1
12. LblRoot2
13. List1, List2, List3, List4, List5

Procedure

- Interface was designed.
- Controls were named TxtA, LblStatus, CmdResult ... etc as there control(variable) names.
- Each Control events were coded.
- Functions were created and added to each events.
- Events and functions were tested and fixed there issues.
- The form file and project file were saved.
- The program was saved as an exe file.

Code section

Declarations

Dim a, b, c, X As Double

- Integers and decimal values can be assign for a, b, c.
- X = (b^2 - 4 * a * c)

Dim rootValue(1 To 2) As Double

- This is an array with 2 values.
- rootValue(1) = (-b + Sqr(x)) / 2 * a
- rootValue(2) = (-b - Sqr(x)) / 2 * a

Dim St As String

- St is a string which used for numeric validation.
- St = "1234567890."

Used controls

- TextBox (TxtA, TxtB, TxtC)
- Label (LblStatus, LblError, LblRoot1, LblRoot2)
- ListBox (Lisi1, List2, List3, List4, List5)
- Command Button (CmdResult, CmdClose, CmdNew)

Used Events

- Click
- LostFocus
- KeyPress
- Form_Load
- MouseMove
- MouseDown

User Defined Functions

Clear - Clearing all the text fields and notifications.

```
Public Function Clear()
   Msg = MsgBox("Are you sure to clean the previous values?", vbYesNo, "Clear")
   'Clearing the text fields when click yes
   If Msg = vbYes Then
      TxtA.Text = ""
      TxtB.Text = ""
      TxtC.Text = ""
      LblRoot1.Caption = "- -"
      LblRoot2.Caption = "- -"
      LblError.Caption = "Cleaned!"
      LblError.ForeColor = &HC000&
      LblStatus.Caption = "Status"
      LblStatus.BackColor = vbWhite
      TxtA.SetFocus 'focus on first text field again
   End If
End Function
```

DeltaX - Check b^2 - 4ac

```
Public Function DeltaX()
   Status = Array("There are 2 roots.", "Roots are equal.", "No real solution.", "Roots are generated
successfully!", "")
   X = b ^ 2 - 4 * a * c
   'check X value
   If X > 0 Then
      LblStatus.Caption = Status(0)
      LblStatus.BackColor = &HC000&
      root
      LblError.Caption = Status(3)
      LblError.ForeColor = &HC000&
   ElseIf X = 0 Then
      LblStatus.Caption = Status(1)
      LblStatus.BackColor = &HC000&
      root
      LblError.Caption = Status(3)
      LblError.ForeColor = &HC000&
   ElseIf X < 0 Then
      LblStatus.Caption = Status(2)
      LblStatus.BackColor = vbRed
      LblRoot1.Caption = "- -"
      LblRoot2.Caption = "- -"
      LblError.Caption = Status(4)
      CmdNew.SetFocus
```

```
    Else
        LblStatus.Caption = "Error"
    End If
End Function
```

Root - Find Roots.

```
Public Function root()
    rootValue(1) = (-b + Sqr(X)) / (2 * a)
    rootValue(2) = (-b - Sqr(X)) / (2 * a)
    'Roots send to the variables
    LblRoot1.Caption = Round(rootValue(1), 2)
    LblRoot2.Caption = Round(rootValue(2), 2)
    'focus on new button
    CmdNew.SetFocus
    'Listing to the recently data
    Listing
End Function
```

CheckingEmpty - Check Empty Text Fields.

```
Public Function CheckingEmpty()
    If Val(TxtA.Text) = 0 Or Val(TxtB.Text) = 0 Or Val(TxtC.Text) = 0 Then
        LblError.Caption = "Empty text fields found! or Press TAB to go to next TexxBox."
        LblError.ForeColor = vbRed
    End If
End Function
```

Listing - Show previous data as recently.

```
Public Function Listing()
    List1.AddItem a
    List2.AddItem b
    List3.AddItem c
    List4.AddItem Round(rootValue(1), 2)
    List5.AddItem Round(rootValue(2), 2)
End Function
```

About - Info about the owner and the program.

```
Public Function About()
    Owner = Array("Created By COLCE2020F056 K.R.MADHUSHANKHA.", "2nd Year 1st Semester.",
"Solution of Quadratic Equation Can be determined using this program.", "")
    MsgBox Owner(2) & vbCrLf & Owner(3) & vbCrLf & Owner(3) & vbCrLf & Owner(0) & vbCrLf &
Owner(1) & vbCrLf & Owner(3), vbOKOnly, "About"
End Function
```

SystemStart - Thing which what will be done when the program start.

```
Public Function SystemStart()
```

```
    LblError.Caption = ""
    LblStatus.BackColor = vbWhite
    St = "1234567890.-+"
End Function
```

SystemClose - Thing which what will be done when the program close.

```
Private Function SystemClose()
    Msg = MsgBox("Are You Sure?", vbYesNo, "Exit")
    'System exit when click yes
    If Msg = vbYes Then
        End
    End If
End Function
```

Validiation for Text Fields

```
'Validation for a
Private Sub TxtA_KeyPress(KeyAscii As Integer)
    If KeyAscii > 26 Then
        If InStr(St, Chr(KeyAscii)) = 0 Then
            KeyAscii = 0
            LblError.Caption = "Only numeric values will be allowed"
            LblError.ForeColor = vbRed
        Else
            LblError.Caption = ""
        End If
    End If
    'Submit
    If KeyAscii = 13 Then
        CheckingEmpty
    End If
End Sub
```

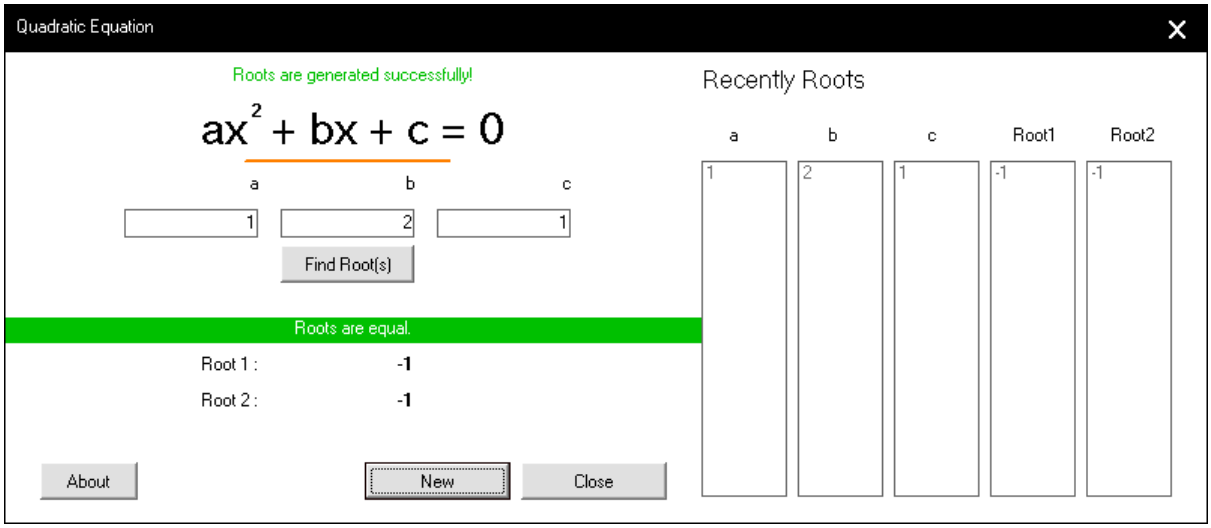
Calculations

```
X = (b^2 - 4 * a * c)
rootValue(1) = (-b + Sqr(x)) / 2 * a
rootValue(2) = (-b - Sqr(x)) / 2 * a
```

Testing

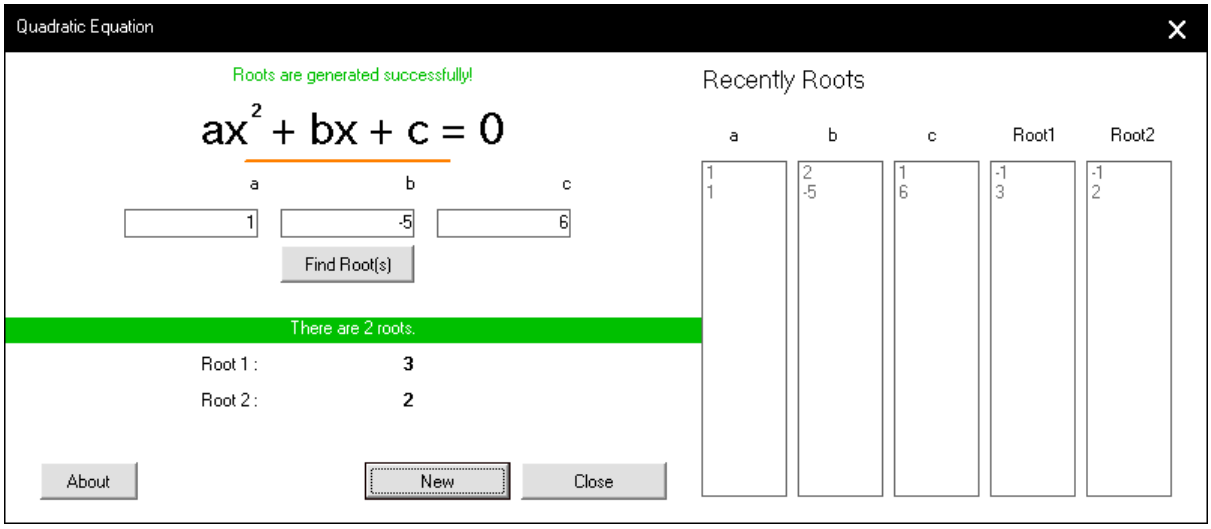
When roots are qual. (X = 0)

Input	a = 1, b = 2, c = 1
Output	rootValue(1) = -1, rootValue(2) = -1
Status	Roots are qual.



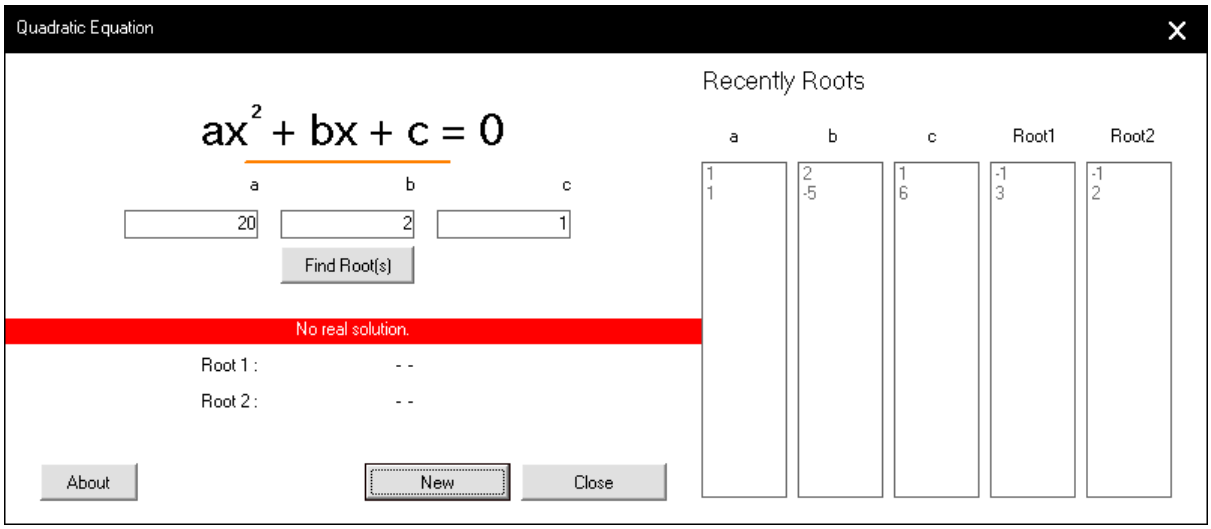
When 2 roots are there. (X > 0)

Input	a = 1, b = -5, c = 6
Output	rootValue(1) = 2, rootValue(2) = 3
Status	There are 2 roots.

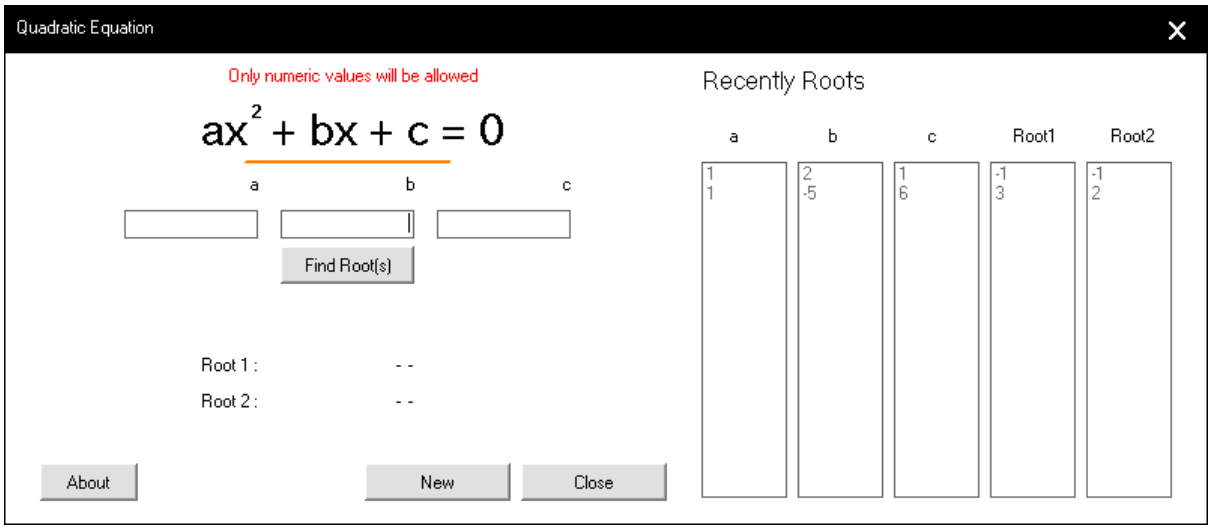


When roots are not real numbers. (X < 0)

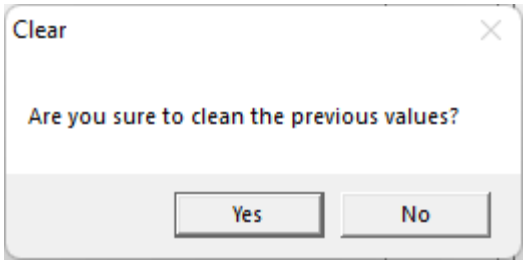
Input	a = 20, b = 2, c = 1
Output	rootValue(1) = - -, rootValue(2) = - -
Status	No real solution.



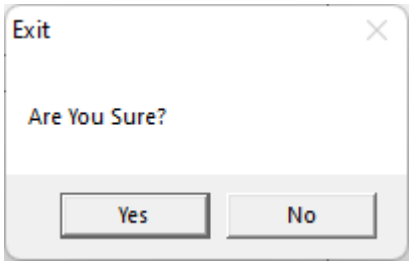
When user try to enter non-numeric values



When try to clean previous data



When try to exit program



Discussion

- Solution of Quadratic equation can be determined using this program.
- Recently roots section was added to see what the previous data which used are.
- Notification section was added to see what are the errors which done by user.
- Default form border was removed and a custom title bar and control buttons were added.
- User defined functions and Arrays were added to reduce the code lines and time.
- Dialog boxes were added before clearing and exit program to make sure to do that from user.

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