

Tic-Tac-Toe

A complex game like this should be approached as a series of smaller steps. Using the code from lesson 12-2 we are able to create a 3 X 3 grid of buttons that trigger a message box showing the array indices (index plural) when a button is clicked.

```
Public Class Form1
    Dim square(3, 3) As Button
    Dim row As Integer
    Dim column As Integer
    Dim x As Integer
    Dim y As Integer

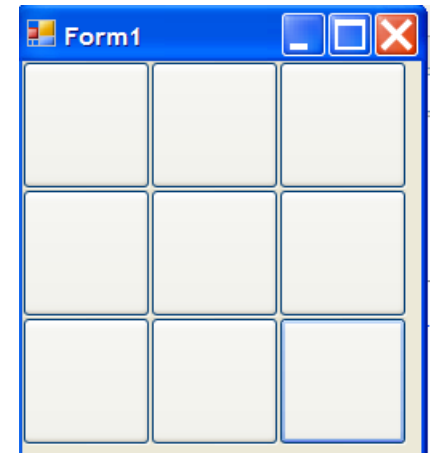
    Private Sub Form1_Load(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles MyBase.Load

        For row = 0 To 2
            For column = 0 To 2
                square(row, column) = New Button

                square(row, column).Tag = CStr(row & ", " & column)
                AddHandler square(row, column).Click, AddressOf ButtonHandler

                square(row, column).Size = New System.Drawing.Size(80, 80)
                square(row, column).Location = New Point(x, y)
                Me.Controls.Add(square(row, column))
                x = x + 80
            Next column
            y = y + 80
            x = 0
        Next row
    End Sub

    Public Sub ButtonHandler(ByVal sender As System.Object, ByVal e As System.EventArgs)
        MsgBox("Button number " & CType(sender, Button).Tag & " was clicked")
    End Sub
End Class
```



Whose Turn Is It?

The game of Tic-Tac-Toe involves 2 players who alternate turns. It is necessary to know whose turn it is so that X's alternate with O's. One way to do this is to keep a running count of how many turns have been taken.

If the number of turns divides evenly by two (that is no remainder) then it is player one's turn, otherwise it is player two's turn.

Write a separate mini program whose purpose is to display whose turn it is.

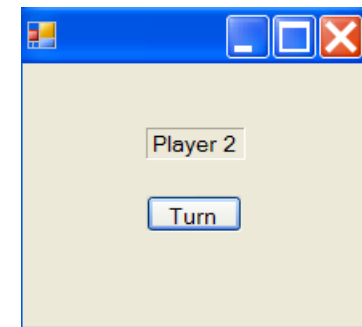
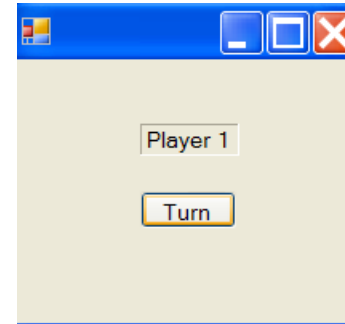
```
Public Class Form1
    Dim lblDisplay As String
    Dim turn As Integer = 0
    Dim player As Integer



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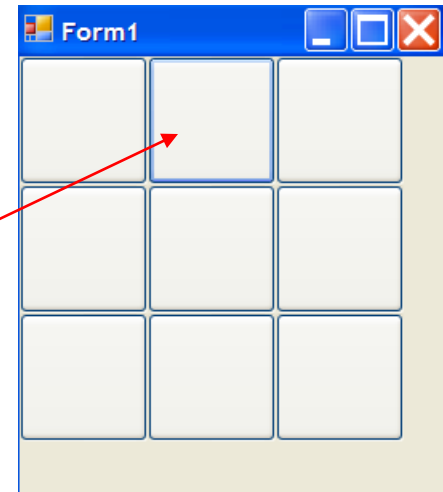
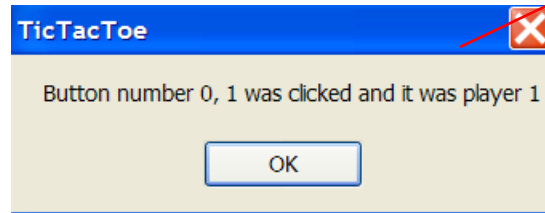
    Private Sub btnTurn_Click(ByVal sender
        Dim remainder As Integer
        remainder = turn Mod 2
        lblDisplay = "Player: "
        If (remainder = 0) Then
            player = 1
        Else
            player = 2
        End If
        lblTurn.Text = "Player " & player
        turn = turn + 1
    End Sub
End Class
```



Change Mini-Program to a Sub()

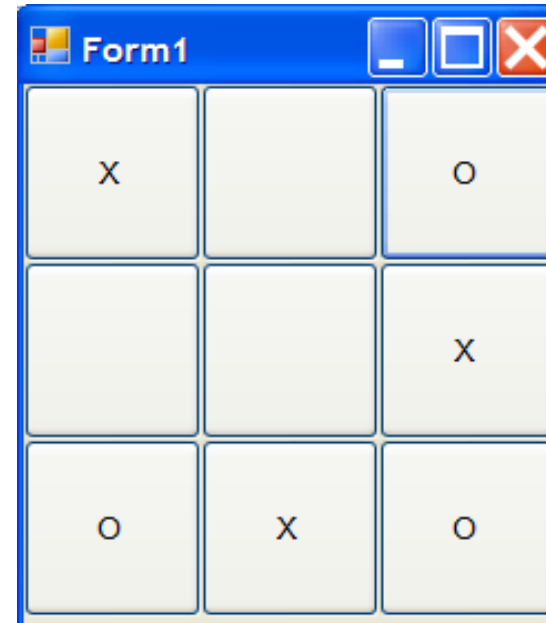
```
Public Sub ButtonHandler(ByVal sender As System.Object, ByVal e As System.EventArgs)  
    WhoseTurn()  
    MsgBox("Button number " & CType(sender, Button).Tag & " was clicked and it was player " & player)  
End Sub
```

```
Sub WhoseTurn()  
    Dim remainder As Integer  
    remainder = turn Mod 2  
  
    If (remainder = 0) Then  
        player = 1  
    Else  
        player = 2  
    End If  
  
    turn = turn + 1  
End Sub
```



Draw X or O

```
Sub WhoseTurn()  
    Dim remainder As Integer  
    remainder = turn Mod 2  
  
    If (remainder = 0) Then  
        player = 1  
        mark = "X"  
    Else  
        player = 2  
        mark = "O"  
    End If  
  
    turn = turn + 1  
End Sub
```



```
Public Sub ButtonHandler(ByVal sender As System.Object, ByVal e As System.EventArgs)  
    WhoseTurn()  
    MsgBox("Button number " & CType(sender, Button).Tag & " was clicked and it was player " & player)  
    CType(sender, Button).Text = mark  
End Sub
```

Problems, Modifications Improvements

Do not allow a square to be overwritten. (Each square can only be clicked once)

Use Images for X's and O's

Have program recognize when a game is won or drawn.

Have a Reset Button, allow multiple games and keep score.

Program Part 1

```
Public Class Form1
    Dim square(3, 3) As Button
    Dim row As Integer
    Dim column As Integer
    Dim x As Integer
    Dim y As Integer
    Dim turn As Integer
    Dim player As Integer
    Dim mark As String


---


    Private Sub Form1_Load(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles MyBase.Load

        For row = 0 To 2
            For column = 0 To 2
                square(row, column) = New Button

                square(row, column).Tag = CStr(row & ", " & column)
                AddHandler square(row, column).Click, AddressOf ButtonHandler

                square(row, column).Size = New System.Drawing.Size(80, 80)
                square(row, column).Location = New Point(x, y)
                Me.Controls.Add(square(row, column))
                x = x + 80
            Next column
            y = y + 80
            x = 0
        Next row
    End Sub


---


    Public Sub ButtonHandler(ByVal sender As System.Object, ByVal e As System.EventArgs)
        WhoseTurn()
        'MsgBox("Button number " & CType(sender, Button).Tag & " was clicked and it was player " & player)
        CType(sender, Button).Text = mark
        CType(sender, Button).Enabled = False

    End Sub
```

Part 2

```
Public Sub ButtonHandler(ByVal sender As System.Object, ByVal e As System.EventArgs)
    WhoseTurn()
    'MsgBox("Button number " & CType(sender, Button).Tag & " was clicked and it was player " & player)
    CType(sender, Button).Text = mark
    CType(sender, Button).Enabled = False
End Sub
```

```
Sub WhoseTurn()
    Dim remainder As Integer
    remainder = turn Mod 2
    If (remainder = 0) Then
        player = 1
        mark = "X"
    Else
        player = 2
        mark = "O"
    End If
    turn = turn + 1
End Sub
End Class
```