USING VISUAL BASIC FOR APPLICATIONS (VBA)

Jake Blanchard

University of Wisconsin

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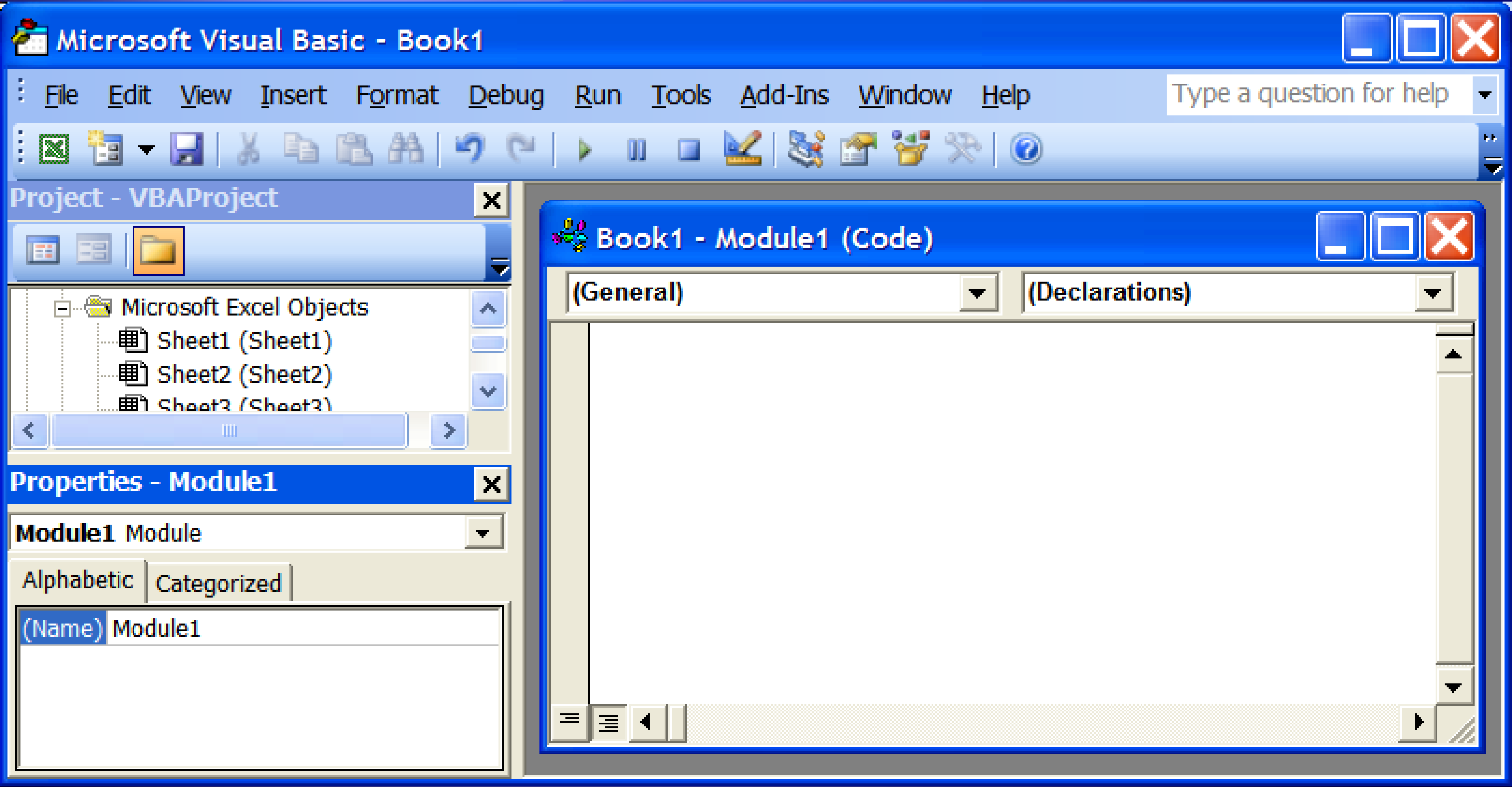
VBA Macros

- Macros allow one to add significant power to Excel
- They are small programs that can be called from a spreadsheet
- You can create functions or subroutines
- If you want to get fancy, you can add a user interface as well

Using Macros

- Macros are written in a Basic-like language called Visual Basic for Applications
- Excel comes with a separate macro editor
- To create a macro, go to Tools/Macro/Visual Basic Editor, then within the Editor go to Insert/Module

You should get this…

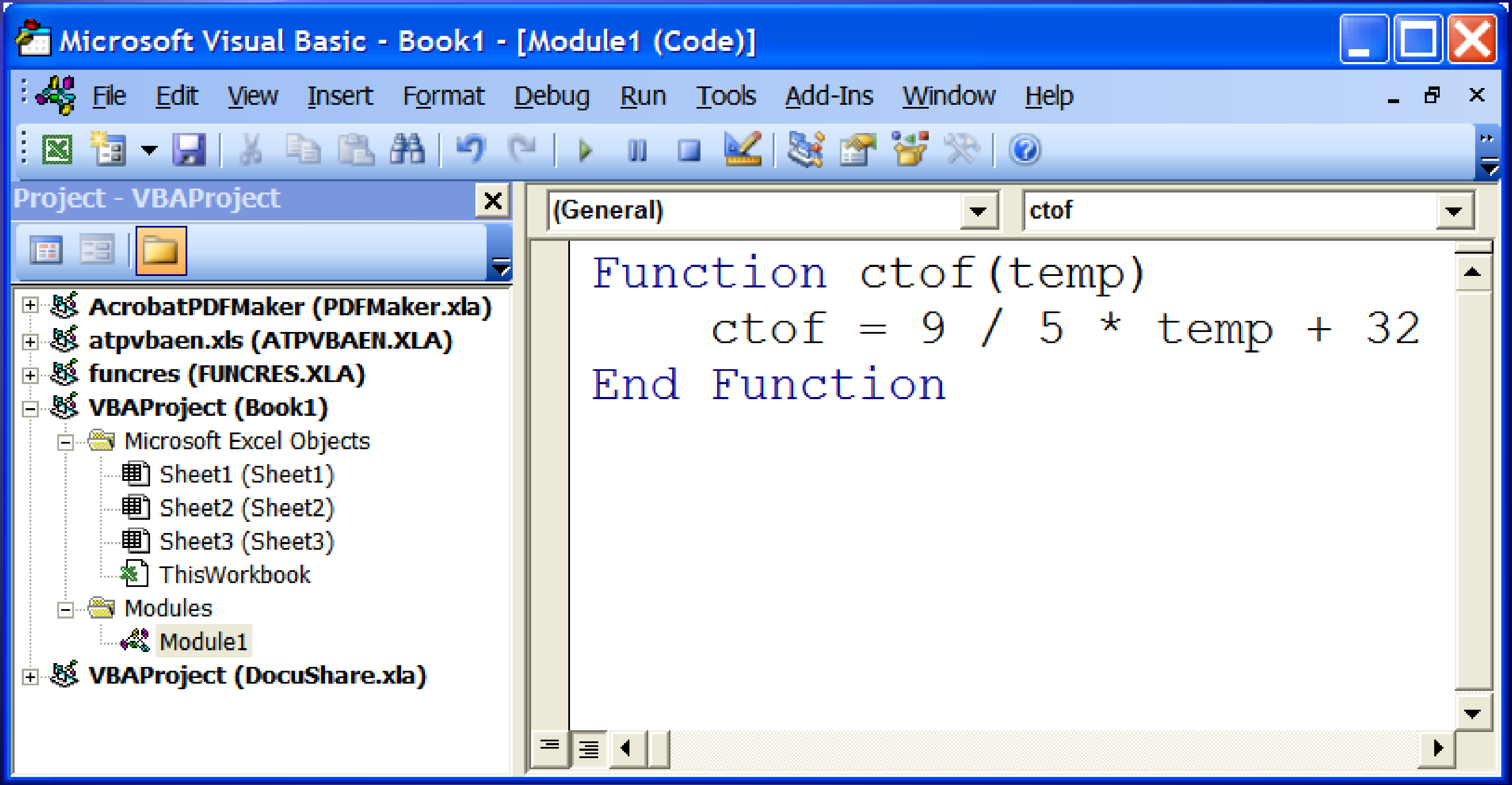


Creating a Function

- Suppose we want to create an Excel function that takes a temperature in Celsius and converts to Fahrenheit
- We would type the following in a module:

```
Function ctof(temp)
    ctof = 9 / 5 * temp + 32
End Function
```

Now we have this…


Microsoft Visual Basic - Book1 - [Module1 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Project - VBAProject
AcrobatPDFMaker (PDFMaker.xla)
atpvbaen.xls (ATPVBAEN.XLA)
funcres (FUNCRES.XLA)
VBAProject (Book1)
Microsoft Excel Objects
Sheet1 (Sheet1)
Sheet2 (Sheet2)
Sheet3 (Sheet3)
ThisWorkbook
Modules
Module1
VBAProject (DocuShare.xla)
(General)
ctof

```
Function ctof(temp)
    ctof = 9 / 5 * temp + 32
End Function
```

Using the function

- Now go to the spreadsheet and type =ctof(100)
- Or, you can put the value of “100” into cell A1 and then type =ctof(A1) into some other cell
- In fact, this function can be used just as any built-in Excel function can be used

The Macro Language

- Operators: +, -, *, /, ^, Mod
- Comparison: =, <, >, <=, >=, <>
- Logical Operators: And, Eqv, Imp, Not, Or, Xor
- Intrinsic Functions: Abs, Cos, Sin, Tan, Atn (arc tangent), Exp, Log (natural), Sgn, Sqr (square root), Rnd (random number)

Flow Control

```
If condition Then
        statements
Else
    statements
End If

If x=0 Then
        f=1
Else
    f=sin(x)/x
End If
```

Flow Control

```
For counter=start To end
    statements
Next

For i=1 To 100
    sum=sum+i
Next
```

Flow Control

```
Do Until condition
    statements
Loop

i=1
x=1
Do Until i=50
    x=x*i
    i=i+1
Loop
```

Flow Control

```
Do While condition
    statements
Loop

i=1
x=1
Do While i<50
    x=x*i
    i=i+1
Loop
```

Practice

- Write an Excel function that calculates the sum of cubes of the first N integers
- Then write an Excel function that calculates the sum of cubes of the first N even integers

My solution

```
Function sumofcubes(N)
    ans = 0
    For i = 1 To N
        ans = ans + i ^ 3
    Next
    sumofcubes = ans
End Function
```

Another Solution

```
Function moresumofcubes(N)
    ans = 0
    i = 1
    Do Until i = N + 1
        ans = ans + i ^ 3
        i = i + 1
    Loop
    moresumofcubes = ans
End Function
```

Sum of Even Cubes

```
Function sumofevencubes(N)
    ans = 0
    For i = 1 To 2 * N
        If (i Mod 2) = 0 Then
            ans = ans + i ^ 3
        End If
    Next
    sumofevencubes = ans
End Function
```

Creating a Subroutine

- Subroutines don’t return values…they carry out duties
- We’ll look at an example

Example Sub

```
Sub writeit()
    NumPoints = 21
    XNot = 0
    dX = 0.1
    ActiveCell.Value = "X"
    ActiveCell.Offset(0, 1).Value = ”Sin(X)"
    x = XNot
    For i = 1 To NumPoints
        ActiveCell.Offset(i, 0).Value = x
        ActiveCell.Offset(i, 1).Value = Sin(x)
        x = x + dX
    Next
End Sub
```

Running the Macro

- Type the macro into a module in the Visual Basic Editor
- Return to a spreadsheet
- Create an active cell by clicking into some cell below which you don't mind Excel writing some data
- Go to Tools/Macro/Macros, then click the name of the macro and click Run

Another Way to Run a Macro

- Go to View/Toolbars/Forms
- From this Toolbar, click on the button (row 2, column 2) and then trace out a button on a spreadsheet
- Assign the writeit macro to the button
- Now click the button

Macro Explanation

- First 3 lines define constants
- The next 2 lines write column labels back to the spreadsheet (ActiveCell is the highlighted cell in the spreadsheet)
- The other lines step through the points, incrementing x and calculating sin(x)
- The offset writes each result one row below the previous result

Summary and Conclusions

- VBA is Excel's macro language
- Functions return values
- Subroutines carry out procedures