Variables in VB

Keeping Track
Variables

- Variables are named places in the computer memory that hold information.
- Variables hold only a single value at a time. Assigning a new value to them causes the old value to disappear.
- Values are assigned to a variable using an equals sign

\[ A = 5 \]

assigns the value 5 to the variable A
What Variables Are

- Variables are named locations in memory.
- We could use 1’s and 0’s.
- Text Names are Easier

87

or

011001100010011010010010011001100010011010010010

Grade_Average
Memory with Variables

![Memory with Variables Diagram]
Looking at Contents

Address: 010111
Name: fleeb
Value: 65
Type: Integer

System Memory
Variable Names

- Consist of letters, numbers and a few special characters.
  - They must begin with a letter.
  - They can’t have more than 40 letters
  - They can’t have an embedded period - this differentiates them from properties.
  - They can’t be names already in use.
- Dim True False
Example Names

Acceptable:

Fred
Fred_Flintstone
Dimensional
Times7

Unacceptable:

Dim
7times
Here.There
There+Goes
What does 1000001 mean?

- 65?
- “A”?
- Nothing?
- Context is the difference between data and information.
- Variable Types give us context.
What are Variable Types?

• Context used to interpret data.
• A variable of type `Integer` holding `1000001` is 65 because we view it as a binary number.
• A variable of type `String` holding `1000001` is an “A” because we view it as an ASCII character.
• Code used to represent characters.
• UNICODE is now being promoted as a replacement.
• ASCII does English (and Romance languages)
• UNICODE does all languages
Question:

• We know the binary value 10010010 in a byte is:
  – A: The number 146
  – B: The number 152
  – C: The number 15.3
  – D: The character ‘C’
  – E: None of the Above
Variables in Visual Basic

- **String**   Widely used.
- **Integer**  Widely used.
- **Single**   Widely used.
- **Long**     Frequently used.
- **Double**  Occasionally used.
- **Currency** Occasionally used.
- **Variant**  Not to be used.
Strings

• Hold character data
• Cannot be used for calculations.
• Are limited to between zero and approximately 2 billion letters.
• Use one byte per character plus 10 bytes for the string.
**Integer**

- Holds whole numbers (e.g. 1,2,3,4.....)
- Cannot hold fractional values (e.g. 3.2)
- Is limited to values between -32,768 and 32,767
- Uses 2 bytes
Single

• “Single Precision Floating Point Number”
• Holds numbers with a decimal part
• Actually holds an approximation.
  – Difference is irrelevant for most purposes
• Is limited to values between
  – -3.402E38 to -1.401E-45 for negative numbers
  – 1.401E-45 to 3.403E38 for positive numbers.
• Uses 4 bytes.
• The number 8.5 can be stored in:
  A. An Integer
  B. A 35 gallon cooler, provided there is enough ice to prevent spoilage.
  C. A Single
Double

• “Double Precision Floating Point Number”
• Larger and More Precise Than Single
• Operations with these variables are much slower than with single precision.
• Is limited to values between
  – -1.798E308 to -4.9407E-324 for negatives
  – 4.9407E-324 to 1.7977E308 for positive
• Uses 8 bytes
Long

- Long integers are used for storing larger integer values.
- Is limited to whole numbers from -2,147,483,648 to 2,147,483,647
- Uses 4 bytes.
Currency

• Used to hold amounts of money.
  – A very long integer that has been shifted four decimal places to the right.
  – Gives 4 decimal places of accuracy.
  – Is limited to numbers with 4 decimal places of accuracy.

• Is limited to values between
The number 98,943 can be stored in:

- A. An Integer
- B. A Single
- C. A Double
- D. A Long
- E. Currency
Variant

- This variable can become any of the other types, depending on the value assigned to it.
- We try not to use these because they can cause problems.
• Put Option Explicit in your code from the editor.

• Causes an error at compile time if you haven’t declared a variable.
Declaration of Variables

• The computer should know about variables before we use them.
• We do this using the declaration statement:
  
  Dim Fred As Single

• This declares one variable called Fred of type Single
More Declarations

- Dim Mary as Integer
- Dim Profit as Currency
- Dim FirstName as String
• How many bytes does a variable of type single take?
  – A. 1
  – B. 2
  – C. 3
  – D. 4
  – E. 8
Object Variables

• A special kind of variable that holds portions of the Object Model.

• Workbooks, Worksheets, and Ranges are all examples

• Object variables have properties, identified by the period operator.
The Range Type

- The Range is an Object Variable
- Ranges have:
  - Value
  - Formula
  - Count
  - Interior
Declaring a Range

- Same as other variables:
  - Dim r As Range
  - Dim GivenRange as Range
Range Example

- Changing the Range’s Value:
  - GivenRange.Value = 5

- Copying the value from one Range to another:
  OldRange.Value = NewRange.Value
Getting a Range

• Can be passed into a function.
  – Function Fleeb (R as Range)
  – User gives us R as a Range and we can refer to it.

• We can determine it ourselves

Dim NewR as Range
Set NewR = Worksheets("S1").Range("A1")
Worksheets

- Worksheet is another type of object variable.
- Worksheets have:
  - Range
  - Cells
- ActiveSheet is the sheet that is currently selected.
Using Worksheets

• Getting a cell from a Worksheet
  – Worksheet(“Sheet 1”).Cells(1,2)

• Getting a cell from the ActiveSheet
  – ActiveSheet.Cells(1,4)