

# Debugging in the Visual Basic Integrated Development Environment (VB IDE)

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Jan. 21, 2009

## What is Debugging?

- Debugging is a **methodical** process of finding and reducing the number of bugs, or defects, in a computer program or a piece of electronic hardware thus making it behave as expected.  
(Wikipedia, 1/16/2009)
- Successful debugging depends on the **skill** of the programmer.

## Types of Errors

- Compile Time (syntax)
  - VB error scanning detects errors made on a single line.
- Run Time
  - Failure during run time (eg. divide by zero)
  - IDE gives an error message and highlights offending line.
- Logical
  - Program doesn't behave as expected.

## Steps in Debugging

- 1) Reproduce the bug, and identify conditions which produce it.
- 2) Simplify the program to isolate the bug.
- 3) Investigate program's execution.
  - a) Use tracing (i.e. print statements)
  - b) Use debugger tools provided by IDE

## Tracing - Print & Assert

Syntax: `Debug.Print expression`

Behavior: Prints values of variables or expressions as text in the “Immediate” window.

Syntax: `Debug.Assert (expression)`

Behavior: Forces a design-time break at the Assert statement when the expression evaluates to False. If the expression evaluates as True, program operation continues.

## Debugger Tools

- Control the program’s execution:
  - Step Into/Over/Out
  - Breakpoints
  - Drag yellow highlight bar in code
- Investigate the values of variables and expressions:
  - Watch Window
  - Local Window
  - Report over cursor
- All available through menu, toolbar, keyboard shortcuts, right-click menu

## Step Into/Over/Out

- Step Into starts program then stops before 1st executable, or steps line by line. Enters subroutines and functions.
- Step Over skips current line (but not its execution). Doesn't enter subroutines or functions.
- Step Out leaves current subroutine and pauses at next expression in the calling code.

## Breakpoints

- Internal stopping or pausing place in a program
- Run to breakpoint, then examine variable values. Easier than stepping.
- Multiple ways to “toggle” on/off

## Watches

- Real-time report of a variable or value of an expression
- Local window shows all variables in subroutine.
- If that's too many, add select variables to Watch window.
- Quick Watch adds variables quickly to Watch window.

## Sources of Information

- VB IDE help [F1] (Print and Assert)
- Web based tutorials
  - <http://www.virtualsplat.com/tips/visual-basic-debugging.asp>
- Microsoft Support
  - Overview of Visual Basic Editor Debugging Tools (<http://support.microsoft.com/kb/165517>)
  - Tips for Debugging Visual Basic for Applications Code (<http://support.microsoft.com/kb/142999>) - old Access
- ESRI Support
  - [http://edndoc.esri.com/arcobjects/8.3/gettingstarted/vbspecifics.htm#Debugging\\_Visual\\_Basic\\_Code](http://edndoc.esri.com/arcobjects/8.3/gettingstarted/vbspecifics.htm#Debugging_Visual_Basic_Code)