

Debugging Workshop

Data Structures and Algorithms

What is a Debugger? Why Use it?

Debuggers are tools built-into (or separate from) IDEs.

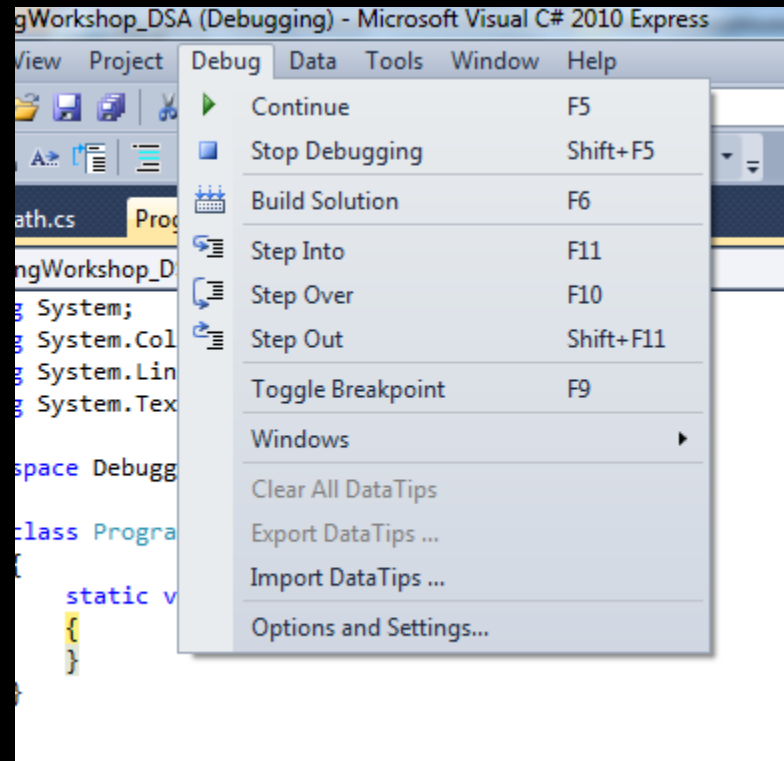
A debugger's goal is to help locate bugs.

They accomplish this by allowing you to trace the execution of a program at runtime.

The Visual Studio IDE contains one of the most powerful debuggers available.

Debugging Menu

Used to control movement while debugging:



Follow the Yellow Arrow

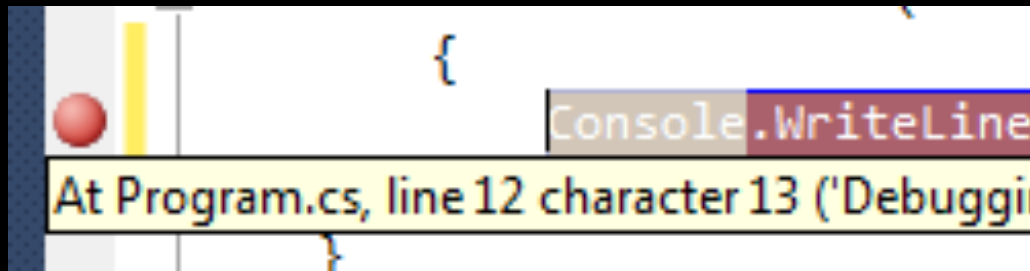


```
class Program
{
    static void Main(string[] args)
    {
    }
```

Breakpoints

Tell the debugger where to pause execution.
Pauses before executing the marked line.

Click the left margin to "toggle" (set/unset) breakpoints in Visual Studio:



Can be toggled anytime.

Different Movement Options

"Continue Debugging" - Next breakpoint or error.

"Step Into" - Execute statement and go to next. If another routine is called, go there.

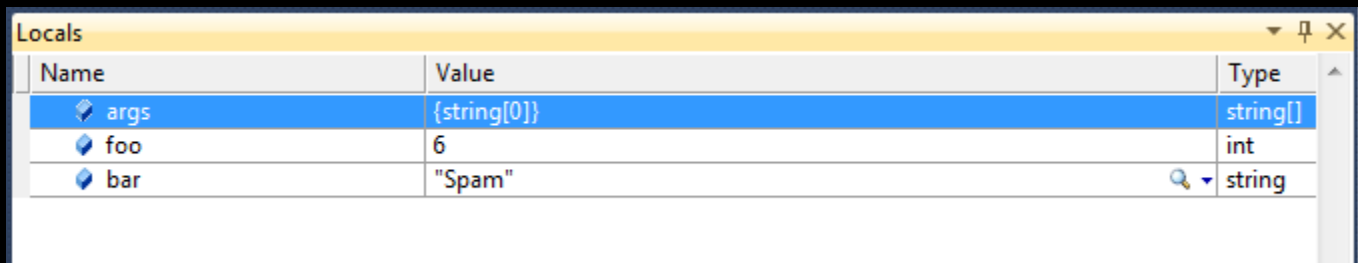
"Step Over" - Like "Step Into" but doesn't leave current routine.

"Step Out" - Executes rest of routine and all called routines.

Note: Debugger always stops at breakpoints!

Menus for Watching Variables

Locals - Shows Local variable's values:



Name	Value	Type
args	{string[0]}	string[]
foo	6	int
bar	"Spam"	string

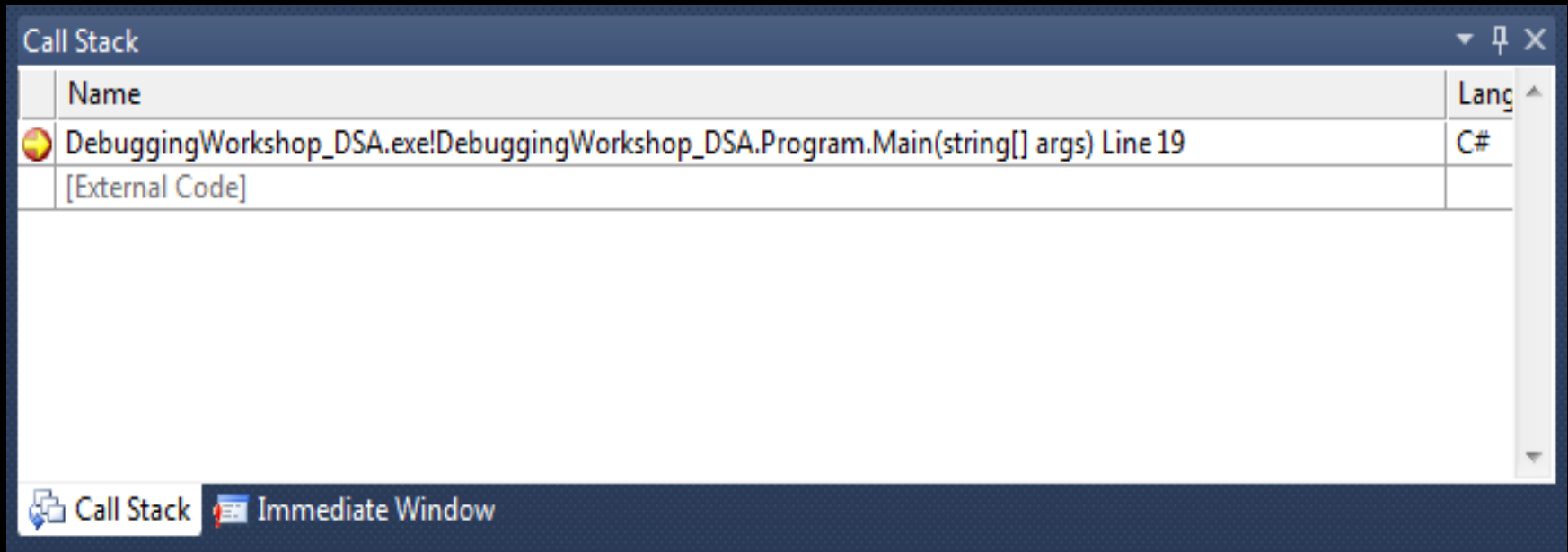
Watch - Programmer specified expressions:



Name	Value	Type
"Got here"	"Got here"	string
bar.Length	4	int
foo	6	int

Call Stack

Shows where you are in execution (in terms of Namespaces, classes, methods/functions)



Demo

Slides and code available at:

<https://github.com/mjgpy3/DebuggingWorkshopDSA>