Debugging

Debugging

Debugging is the process of detecting and removing of existing and potential errors (also called as 'bugs') in a software code that can cause it to behave unexpectedly or crash

Debugging: Semantic Errors

It does not mean syntax errors, with which the application cannot be compiled, but it means logical or semantic errors.

Debugging: Working Example

Imagine You are a developer in a Space Station. Your job is to debug the code and fix any errors. Remember, the lives of the crew rest squarely upon your shoulders. Your directions are as follows:

- Launch the shuttle only if the fuel, crew and computer all check out OK.
- If a check fails, print that information to the console and scrub the launch (then scrub the deck).
- If all checks be successful, print a countdown to the console, then below "Liftoff!"

Debugging: Working Example

Luckily, Before Launching the Shuttle, you have run your code in a simulation and your Shuttle has crashed.

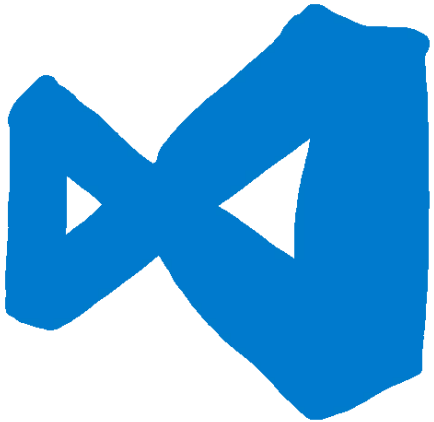
Now, it's your responsibility to find the error in the code

```
static bool shuttleLaunch(int fuelLevel, string computerStatus, bool crewStatus)
{
  bool launchReady = false;
  if (fuelLevel >= 20000)
  {
    Console.WriteLine("Fuel level cleared.");
    launchReady = true;
  }
  else
  {
    Console.WriteLine("WARNING: Insufficient fuel!");
    launchReady = false;
  }
  if (crewStatus && computerStatus == "green")
  {
    Console.WriteLine("Crew & computer cleared.");
    launchReady = true;
  }
  else
  {
    Console.WriteLine("WARNING: Crew or computer not ready!");
    launchReady = false;
  }
  return launchReady;
}
```

```
static void Main(string[] args)
{
 bool launchReady = shuttleLaunch(17000, "green", true);
 Console.WriteLine(launchReady);
 Console.ReadKey();
}
```

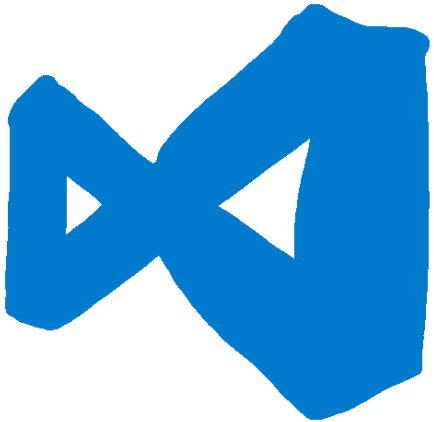
Debugging: Working Example

Visual Studio gives us a built-in debugger, thanks to which we can place breakpoints at places we have chosen and stop the execution of the code to see the values in the variables.

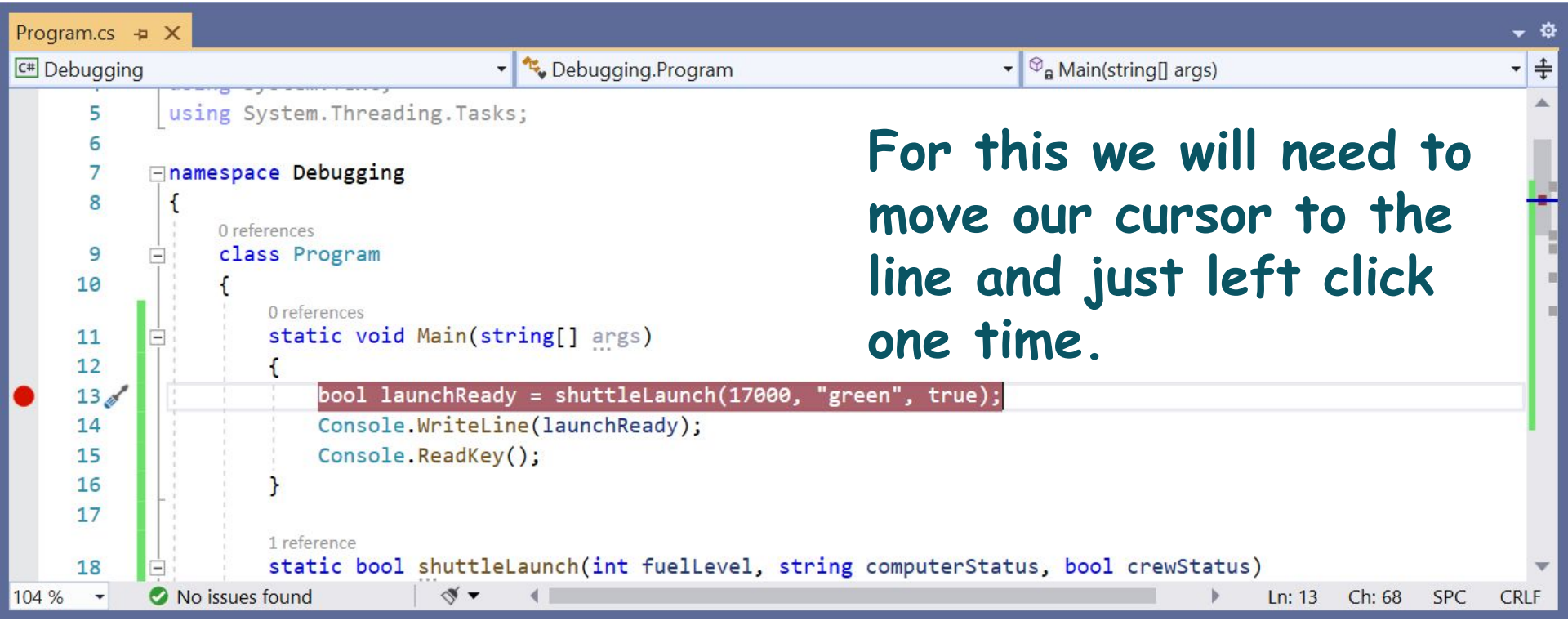


Debugging: Working Example

When it reaches a breakpoint, the program stops running and allows step-by-step running of the remaining lines.

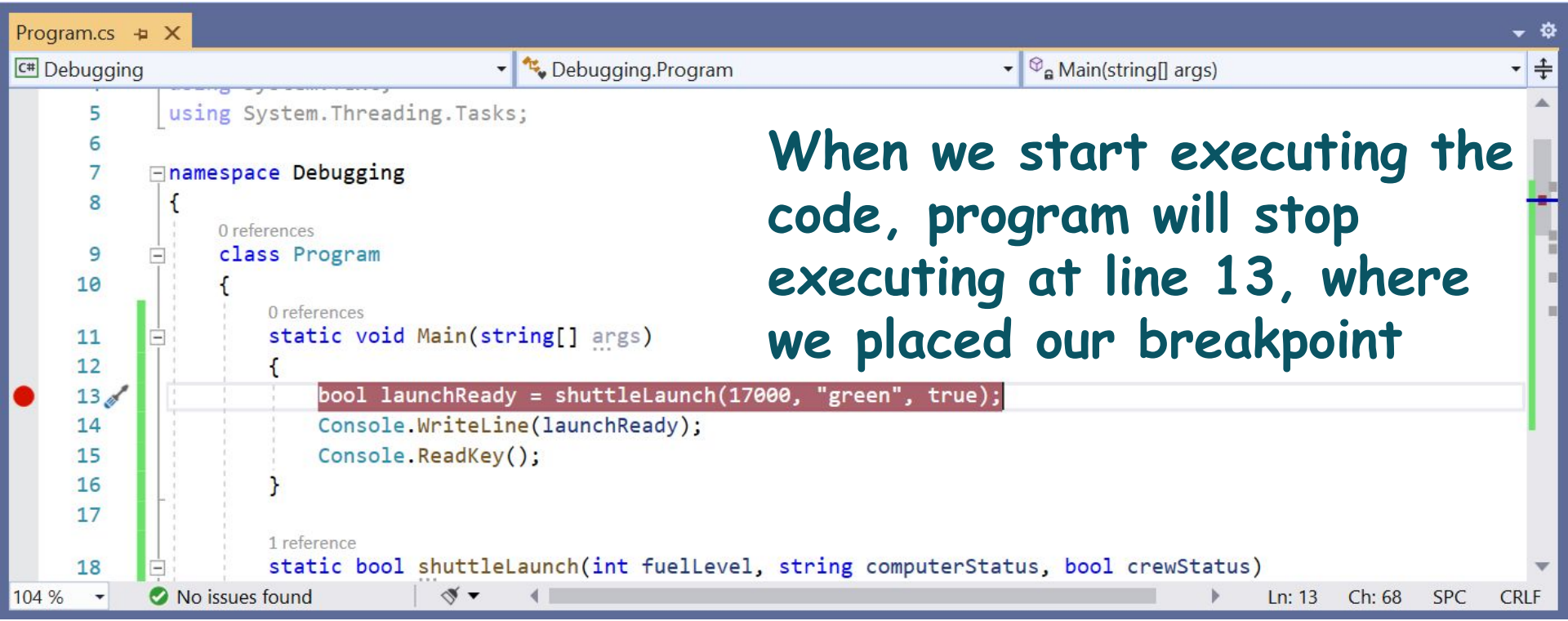


Debugging: Breakpoint



For this we will need to move our cursor to the line and just left click one time.

Debugging: Breakpoint



When we start executing the code, program will stop executing at line 13, where we placed our breakpoint

Debugging: Navigating the Code

We have three options when navigating through our code: Step Into, Step Over, and Step Out.

Debugging: Step Into

Step Into causes the debugger to go inside the method call on the current line and pause the execution there.

Debugging: Step Over

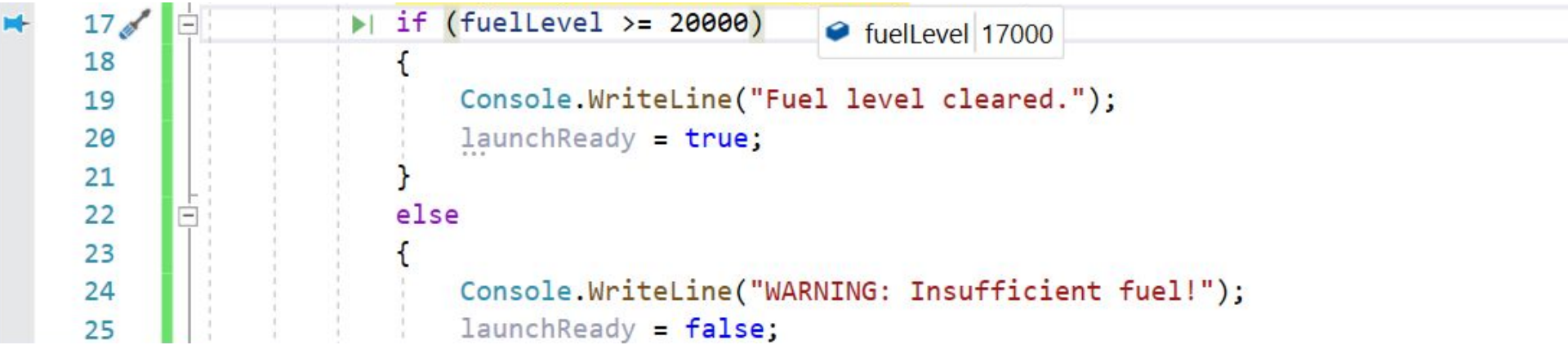
Step Over advances the debugger to the next line without stepping into any method call.

Debugging: Step Out

Step Out causes the debugger to continue executing the current function and pause the execution when it returns.

Debugging: Find the value of a variable

The simplest way to find the value of a variable at any particular time of execution is to just hover over them.



Debugging: Working Example

The value of launchReady assigned in the first if/else block got changed in the second if/else block.

Since the issue is with launchReady, ONE way to fix the logical error is to use a different variable to store the fuel check result. Update your code to do this.

Debugging: Working Example

Add a final if/else block to print a countdown and "Liftoff!" if all the checks pass, or print "Launch scrubbed" if any check fails.

Conclusion

- Debugging is the process of detecting and removing of existing and potential errors (also called as 'bugs') in a software code that can cause it to behave unexpectedly or crash
- A breakpoint is a point in the program where the code will stop executing.
- When it reaches a breakpoint, the program stops running and allows step-by-step running of the remaining lines.
- We have three options when navigating through our code: Step Into, Step Over, and Step Out.

Learning Objective

Debug the Programs to find Semantic errors in the Code.