



edunet
foundation

Directorate General of Training



LAB MANUAL

Python

Practicing Debugging Using IDE

Objective:

To learn how to debug Python code in VS Code using breakpoints, step execution, and variable inspection.

Equipment Required:

1. Install VS Code - <https://code.visualstudio.com/download>
2. Download Python Installer File - <https://www.python.org/downloads/>

Prerequisites:

- Basic familiarity with Python syntax and program execution.
- Experience running Python scripts in VS Code or other IDEs.

Duration: 2 hr

Problem Statement:

Students will debug a Python program using VS Code. They will configure the debugger, use breakpoints, step through the code, inspect variables, and fix bugs.

Procedure:

Step 1: Create a Python File

Step 2: Set a Breakpoint

Step 3: Start Debugging

Step 4: Control Execution

Step 5: Inspect Variables

Step 6: Fix the Bugs

Step 7: Run Again

Step 1: Create a Python File

1. Open VS Code.
2. Create a new file → save as **debug_lab.py**.
3. Write this buggy program into it:

```
1 # Program to compute average of numbers
2
3 def calculate_average(nums):
4     total = 0
5     for n in nums:
6         total += n
7     average = total / len(nums)    # △ Might cause ZeroDivisionError
8     return avg      # △ Wrong variable name (should be average)
9
10 def main():
11     values = input("Enter numbers separated by commas: ").split(',')
12     numbers = [int(n.strip()) for n in values]  # △ Will crash if input not numbers
13     avg = calculate_average(numbers)
14     print("Average is:", avg)
15
16 if __name__ == "__main__":
17     main()
```

Step 2: Set a Breakpoint

1. In VS Code, look at the line numbers on the left.
2. Click next to the line `average = total / len(nums)`.
 - A red dot will appear → this is a breakpoint.

Step 4: Start Debugging

1. Press F5 (or go to top menu → Run > Start Debugging).
2. VS Code will ask for a configuration → select Python: Current File or Python Debugger.
3. Program starts and stops at your breakpoint.
4. Enter the Values separated by commas and press Enter to execute.
5. After you press Enter, the program will stop at the line with the red dot.
6. Check the **VARIABLES** panel on the left — you should see `nums`, `total`, etc.

Step 5: Control Execution

Use the debug toolbar (appears at the top):

- **Continue (F5):** Run until the next breakpoint.
- **Step Over (F10):** Run current line, go to next.
- **Step Into (F11):** Go inside a function call.
- **Step Out (Shift+F11):** Exit current function.
- **Stop (Shift+F5):** End debugging.

When you reach return avg, the debugger will throw an error because avg is not defined.

```

1  # Program to compute average of numbers
2
3  def calculate_average(nums):
4      total = 0
5      for n in nums:
6          total += n
7      average = total / len(nums) # & Might cause ZeroDivisionError average = 20.0, total = 60, nums = [10,
8  return avg # & Wrong variable name (should be average)

Exception has occurred: NameError
name 'avg' is not defined
File "C:\Users\Edunet Foundation\Desktop\prog.py", line 8, in calculate_average
    return avg # & Wrong variable name (should be average)
...
File "C:\Users\Edunet Foundation\Desktop\prog.py", line 13, in main
    avg = calculate_average(numbers)
File "C:\Users\Edunet Foundation\Desktop\prog.py", line 17, in <module>
    main()
NameError: name 'avg' is not defined

9
10 def main():
11     values = input("Enter numbers separated by commas: ").split(',')
12     numbers = [int(n.strip()) for n in values] # & Will crash if input not numbers
13     avg = calculate_average(numbers)

(base) PS C:\Users\Edunet Foundation\Desktop> cd 'C:\Users\Edunet Foundation\Desktop'; & 'C:\Users\Edunet Foundation\AppData\Local\Programs\Python\Python311\python.exe' 'C:\Users\Edunet Foundation\.vscode\extensions\ms-python.python-2025.16.0-win32-x64\handled\lib\debugpy\launcher' '56299' '--' 'C:\Users\Edunet Foundation\Desktop\prog.py'
Enter numbers separated by commas: 10, 20, 30

```

This is the bug you are supposed to find.

Step 6: Fix the Bugs

1. Change return avg → return average.

Step 7: Run Again

1. Save the file (Ctrl+S).
2. Run again with F5.
3. Enter input as:
10, 20, 30
4. Output:
Average is: 20.0

The screenshot shows a code editor with a Python script named `calculate_average.py`. The script contains a function to calculate the average of a list of numbers. A breakpoint is set at the line where the variable `avg` is assigned. The terminal below shows the execution of the script, a NameError, and the correct output.

```
C:\>Users>Edunet Foundation>Desktop>◆ progrpy>calculate_average.py
 1  # Program to compute average of numbers
 2
 3  def calculate_average(nums):
 4      total = 0
 5      for n in nums:
 6          total += n
 7      average = total / len(nums)  # △ Might cause ZeroDivisionError
 8      return average  # △ Wrong variable name (should be avg)
 9
10  def main():
11      values = input("Enter numbers separated by commas: ").split(',')
12      numbers = [int(n.strip()) for n in values] # △ Will crash if input not numbers
13      avg = calculate_average(numbers)
14      print("Average is:", avg)
15
16  if __name__ == "__main__":
17      main()
18
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS JUPYTER

```
NameError: name 'avg' is not defined
(base) PS C:\Users\Edunet Foundation\Desktop> cd 'c:\Users\Edunet Foundation\Desktop'; & "c:\Users\Edunet Foundation\AppData\Local\Programs\Python\Python310\python.exe" "c:\Users\Edunet Foundation\.vscode\extensions\ms-python.python.debugpy-2025.10.0-win32-x64\bundled\libs\debugpy\launcher" '--' 'c:\Users\Edunet Foundation\Desktop\progr...
E:Py'
Enter numbers separated by commas: 18, 20, 38
Average is: 26.0
(base) PS C:\Users\Edunet Foundation\Desktop>
```

Python Python Dels. Python Python Deb... Python Deb...

You have successfully practiced debugging with breakpoints in VS Code