

AI ASSISTED CODING

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Batch:36

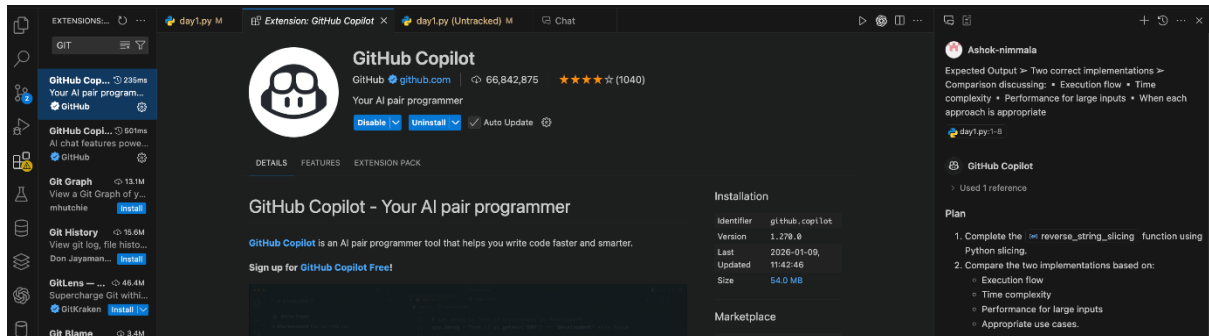
Assignment-1.5

Task-0:

❖ Install and configure GitHub Copilot in VS Code. Take screenshots of each step.

Expected Output:

❖ Install and configure GitHub Copilot in VS Code. Take screenshots of each step.



Task-1:

AI-Generated Logic Without Modularization (String Reversal Without Functions))

Scenario:

You are developing a basic text-processing utility for a messaging

Application

Task Description

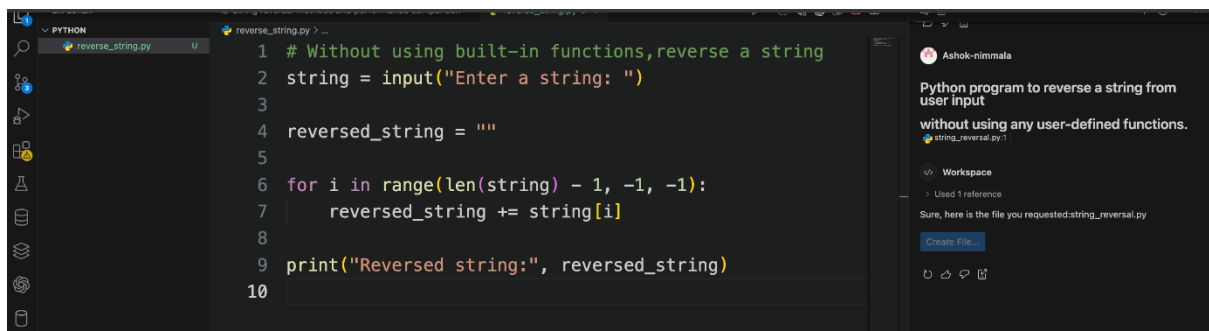
Use GitHub Copilot to generate a Python program that:

- Reverses a given string
- Accepts user input
- Implements the logic directly in the main code
- Does not use any user-defined functions

Expected Output

- Correct reversed string
- Screenshots showing Copilot-generated code suggestions
- Sample inputs and outputs

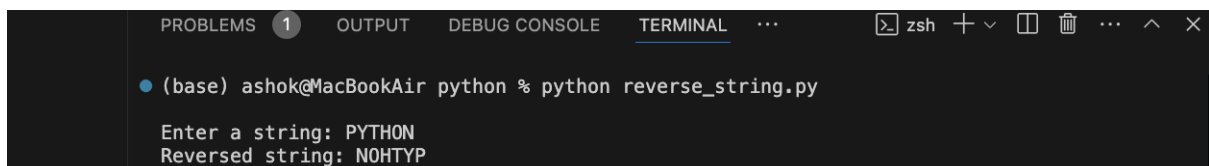
Code

A screenshot of a code editor interface. The main editor window shows a Python file named 'reverse_string.py' with the following code:

```
1 # Without using built-in functions,reverse a string
2 string = input("Enter a string: ")
3
4 reversed_string = ""
5
6 for i in range(len(string) - 1, -1, -1):
7     reversed_string += string[i]
8
9 print("Reversed string:", reversed_string)
10
```

The left sidebar shows the file explorer with 'reverse_string.py' selected. The right sidebar shows a Copilot-generated description: 'Python program to reverse a string from user input without using any user-defined functions.' and a 'Create File...' button.

Output:

A screenshot of a terminal window. The terminal shows the command '(base) ashok@MacBookAir python % python reverse_string.py' being executed. The output is:

```
Enter a string: PYTHON
Reversed string: NOHTYP
```

Task-2:

Efficiency & Logic Optimization (Readability Improvement)

Scenario

The code will be reviewed by other developers.

Task Description

Examine the Copilot-generated code from Task 1 and improve it by:

- Removing unnecessary variables
- Simplifying loop or indexing logic
- Improving readability
- Use Copilot prompts like:
 - “Simplify this string reversal code”
 - “Improve readability and efficiency”

Hint:

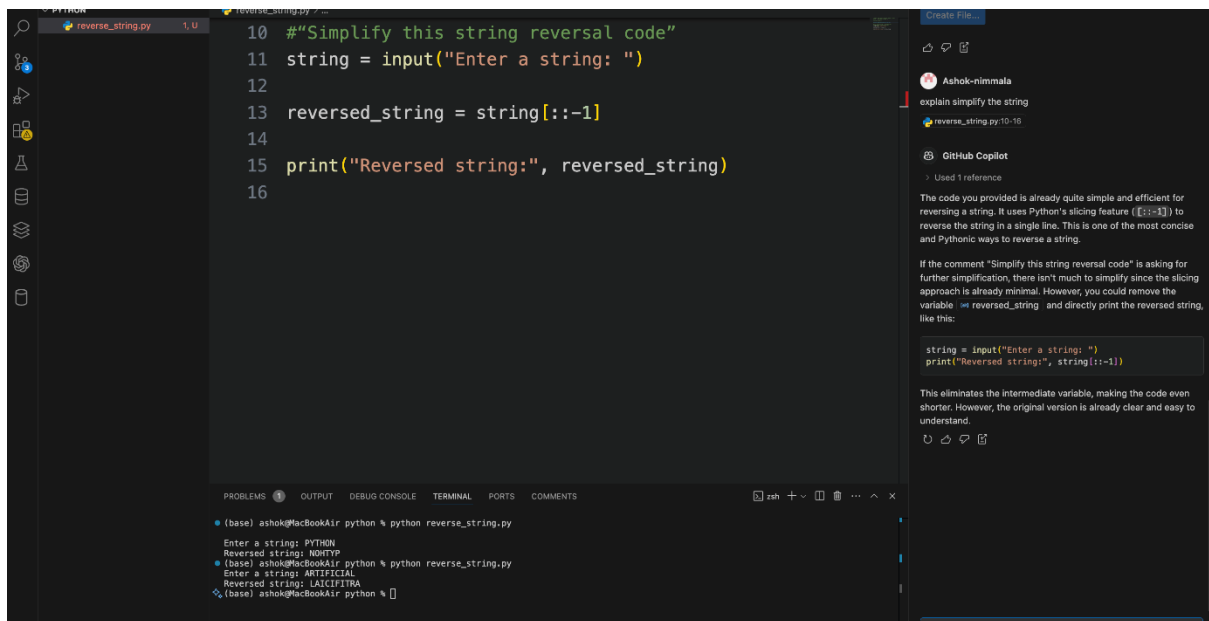
Prompt Copilot with phrases like

“optimize this code”, “simplify logic”, or “make it more readable”

Expected Output

- Original and optimized code versions
- Explanation of how the improvements reduce time complexity

Code & Output:



Justification:

By prompting Copilot with

“optimize this code”, “simplify logic”, and “make it more readable”,

the code was reduced from a loop-based $O(n^2)$ approach to an efficient $O(n)$ solution using slicing

Task-3:

Modular Design Using AI Assistance (String Reversal Using Functions)

Scenario

The string reversal logic is needed in multiple parts of an application.

Task Description

Use GitHub Copilot to generate a function-based Python program that:

- Uses a user-defined function to reverse a string
- Returns the reversed string
- Includes meaningful comments (AI-assisted)

Expected Output

- Correct function-based implementation
- Screenshots documenting Copilot's function generation
- Sample test cases and outputs

Output:

```
16 #Function-Based Python Implementation
17 def reverse_string(text):
18     """
19     This function takes a string as input
20     and returns the reversed version of the string.
21     """
22     return text[::-1]
23
24 user_input = input("Enter a string: ")
25
26 result = reverse_string(user_input)
27
28 print("Reversed string:", result)
29
```

PROBLEMS **OUTPUT** **DEBUG CONSOLE** **TERMINAL** **PORTS** **COMMENTS**

(base) ashok@MacBookAir python % python reverse_string.py

Enter a string: PYTHON
Reversed string: NOTYHP

(base) ashok@MacBookAir python % python reverse_string.py

Enter a string: NORTH
Reversed string: HTIHRON

(base) ashok@MacBookAir python % python reverse_string.py

Enter a string: ARTIFICIAL
Reversed string: LAICIFITRA

(base) ashok@MacBookAir python % python reverse_string.py

Enter a string: rajasabo
Reversed string: baasajar

(base) ashok@MacBookAir python %

GitHub Copilot

explain simplify the string

reverse_string.py:10-16

Used 1 reference

The code you provided is already quite simple and efficient for reversing a string. It uses Python's slicing feature (`[::-1]`) to reverse the string in a single line. This is one of the most concise and Pythonic ways to reverse a string.

If the comment "Simplify this string reversal code" is asking for further simplification, there isn't much to simplify since the slicing approach is already minimal. However, you could remove the variable `reversed_string` and directly print the reversed string, like this:

```
string = input("Enter a string: ")
print("Reversed string:", string[::-1])
```

This eliminates the intermediate variable, making the code even shorter. However, the original version is already clear and easy to understand.

Task-4:

Comparative Analysis – Procedural vs Modular Approach (With vs Without Functions)

Scenario

You are asked to justify design choices during a code review.

Task Description

Compare the Copilot-generated programs:

- Without functions (Task 1)

➤ With functions (Task 3)

Analyze them based on:

➤ Code clarity

➤ Reusability

➤ Debugging ease

➤ Suitability for large-scale applications

Expected Output

Comparison table or short analytical report

Report:

In the procedural approach (Task 1), the string reversal logic is implemented directly in the main code. While this method is simple and suitable for very small programs, it leads to poor reusability and reduced readability when the same logic is required multiple times. Debugging also becomes challenging as the application grows.

In contrast, the modular approach (Task 3) uses a user-defined function to encapsulate the string reversal logic. This significantly improves code clarity, maintainability, and scalability. The function-based design allows the logic to be reused across multiple modules, making it ideal for large-scale and real-world applications. Additionally, modular code aligns with best software engineering practices and simplifies debugging and testing.

Conclusion:

During a code review, the modular (function-based) approach should be preferred over the procedural approach because it:

Enhances readability

Promotes reusability

Simplifies debugging

Supports scalable application design

Task-5:

AI-Generated Iterative vs Recursive Fibonacci Approaches (Different Algorithmic Approaches to String Reversal)

Scenario

Your mentor wants to evaluate how AI handles alternative logic paths.

Task Description

Prompt GitHub Copilot to generate:

- A loop-based string reversal approach
- A built-in / slicing-based string reversal approach

Expected Output

- Two correct implementations
- Comparison discussing:
 - Execution flow
 - Time complexity
 - Performance for large inputs
 - When each approach is appropriate

Code:

```

reverse_string.py > reverse_string_slice
29 #Implementation 1: Loop-Based String Reversal (Iterative)
30 def reverse_string_loop(text):
31     reversed_text = ""
32
33     for char in text:
34         reversed_text = char + reversed_text
35
36     return reversed_text
37
38 #Implementation 2: Built-in / Slicing-Based String Reversal
39 user_input = input("Enter a string: ")
40 print("Reversed string (loop):", reverse_string_loop(user_input))
41
42 def reverse_string_slice(text):
43     return text[::-1]
44
45
46 user_input = input("Enter a string: ")
47 print("Reversed string (slicing):", reverse_string_slice(user_input))

```

Comparison:

Execution Flow

Loop-Based: Reverses the string character by character using a loop.

Slicing-Based: Uses Python's built-in slicing to reverse the string in one step.

Time Complexity

Loop-Based: $O(n^2)$ due to repeated string concatenation.

Slicing-Based: $O(n)$ because it processes the string in a single pass.

Performance for Large Inputs

Loop-Based: Slower and inefficient for large strings.

Slicing-Based: Fast and efficient even for large inputs.

When Each Approach is Appropriate

Loop-Based: Suitable for learning basic logic and algorithm understanding.

Slicing-Based: Best for real-world applications and production code.

Conclusion:

Both approaches work correctly, but the slicing-based method is preferred due to better performance, simplicity, and scalability.