

# AI ASSISTED CODING

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Batch:36

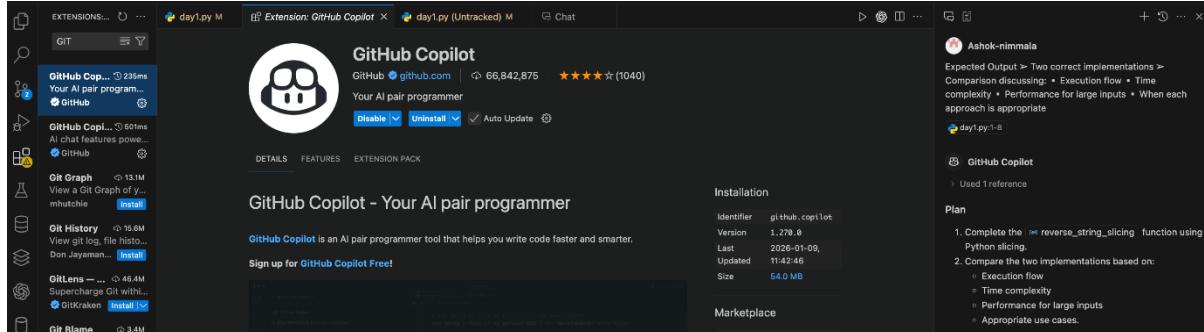
## Assignment-1.5

### 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

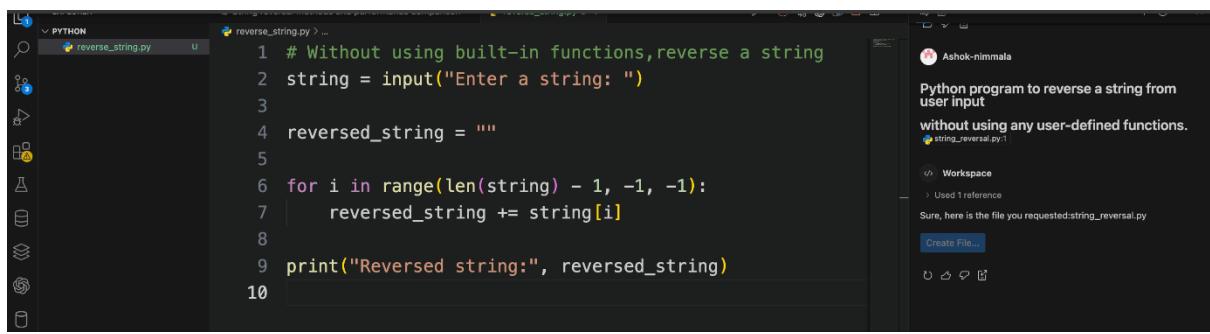
Use GitHub Copilot to generate a Python program that:

- 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



```
# Without using built-in functions, reverse a string
string = input("Enter a string: ")
reversed_string = ""
for i in range(len(string) - 1, -1, -1):
    reversed_string += string[i]
print("Reversed string:", reversed_string)
```

Ashok-nimmala  
Python program to reverse a string from user input  
without using any user-defined functions.  
string\_reversal.py

## Output:



```
(base) ashok@MacBookAir python % python reverse_string.py
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:**

```
reverse_string.py
10  #"Simplify this string reversal code"
11  string = input("Enter a string: ")
12
13  reversed_string = string[::-1]
14
15  print("Reversed string:", reversed_string)
16
```

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.

```
(base) ashok@MacBookAir python % python reverse_string.py
Enter a string: PYTHON
Reversed string: NOHTYP
(base) ashok@MacBookAir python % python reverse_string.py
Enter a string: ARTIFICIAL
Reversed string: IAICIFITRA
(base) ashok@MacBookAir python %
```

## 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:

```
reverse_string.py > ...
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
```

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.