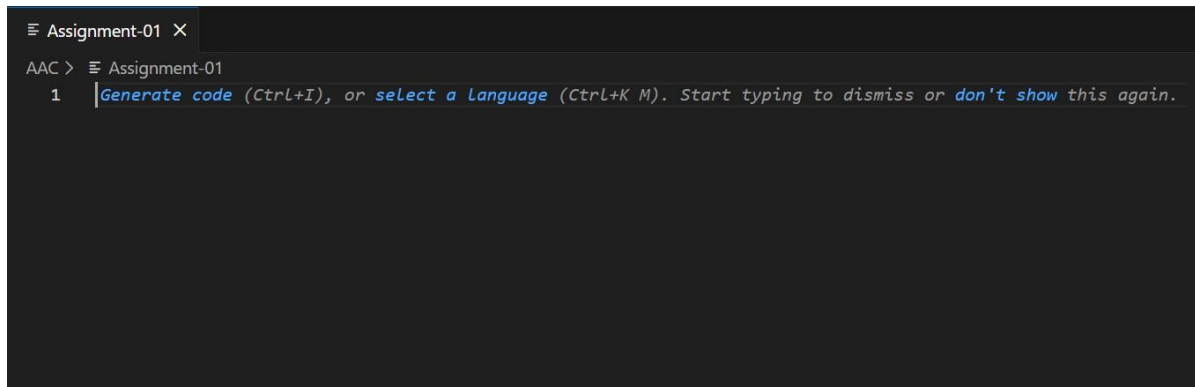


**ASSIGNMENT-01**  
**HT.NO: 2303A52295**  
**BATCH: 45**

**Task-0:**



**Task-01:**

**Question:**

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

**Prompt:**

generate a python code for reverse of string without functions

### Generated Code:

```
# Reverse a string without using built-in functions

string = input("Enter a string: ")

reversed_string = ""

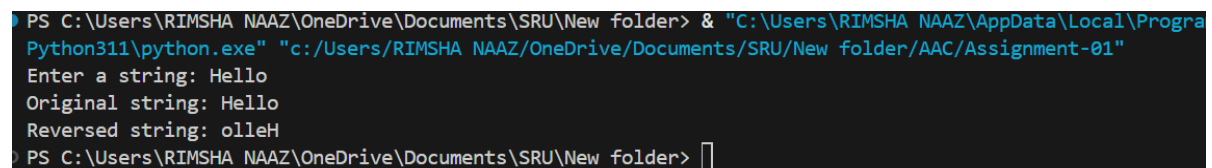
for i in range(len(string) - 1, -1, -1):

    reversed_string += string[i]

print("Original string:", string)

print("Reversed string:", reversed_string)
```

### Output:



```
PS C:\Users\RIMSHA NAAZ\OneDrive\Documents\SRU\New folder> & "C:\Users\RIMSHA NAAZ\AppData\Local\Programs\Python\Python311\python.exe" "c:/Users/RIMSHA NAAZ/OneDrive/Documents/SRU/New folder/AAC/Assignment-01"
Enter a string: Hello
Original string: Hello
Reversed string: olleH
PS C:\Users\RIMSHA NAAZ\OneDrive\Documents\SRU\New folder> █
```

### Explanation:

In this program it stores the string given by the user during runtime of code  
It builds a new empty string  
for loop is used to iterate from last character to first character  
Each loop adds the current character to the new string reversing the order  
Finally it prints the original string and reversed string

### Task-02:

#### Question:

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”

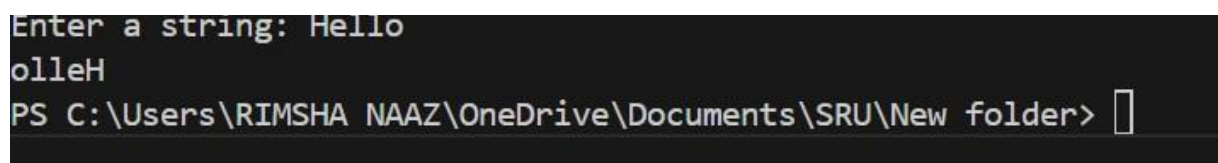
### **Prompt:**

Optimize this code by removing unnecessary variables, simplifying the logic, and improving overall readability

### **Generated Code:**

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

### **Output:**



```
Enter a string: Hello
olleH
PS C:\Users\RIMSHA NAAZ\OneDrive\Documents\SRU\New folder>
```

### **Explanation:**

First line of the code reads the string from the user during runtime and stores it in a variable

`reversed_string = string[::-1]` makes a new word from string but backwards.

`[::-1]` means take the characters from end to start.

Example: if string is "cat", `reversed_string` becomes "tac".

### **Task-03:**

**Question:**

ask 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)

**Prompt:**

Create a Python function to reverse a string, return the result, add meaningful comments, and show sample test cases.

**Generated Code:**

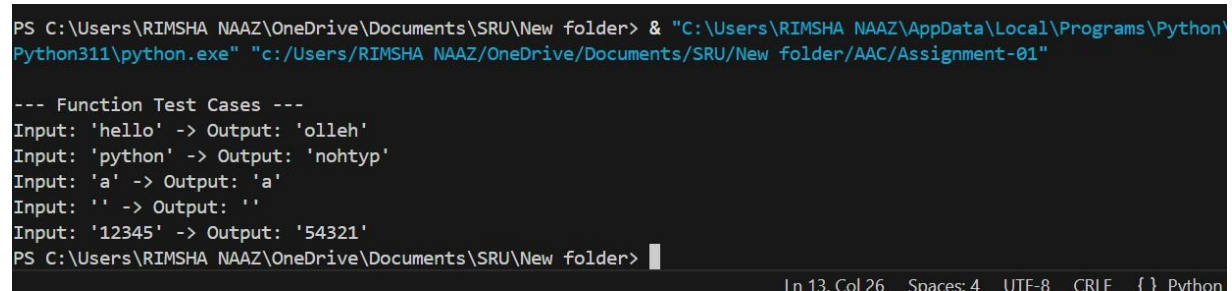
```
def reverse_string(s):  
    """  
    Reverse a string using slicing.  
  
    Args:  
        s (str): The string to reverse  
  
    Returns:  
        str: The reversed string  
    """  
    return s[::-1]  
  
# Test cases  
print("\n--- Function Test Cases ---")  
test_cases = ["hello", "python", "a", "", "12345"]
```

for test in test\_cases:

    result = reverse\_string(test)

    print(f'Input: '{test}' -> Output: '{result}')

## Output:



```
PS C:\Users\RIMSHA_NAAZ\OneDrive\Documents\SRU\New folder> & "C:\Users\RIMSHA_NAAZ\AppData\Local\Programs\Python\Python311\python.exe" "c:/Users/RIMSHA_NAAZ/OneDrive/Documents/SRU/New folder/AAC/Assignment-01"

--- Function Test Cases ---
Input: 'hello' -> Output: 'olleh'
Input: 'python' -> Output: 'nohtyp'
Input: 'a' -> Output: 'a'
Input: '' -> Output: ''
Input: '12345' -> Output: '54321'
PS C:\Users\RIMSHA_NAAZ\OneDrive\Documents\SRU\New folder>
```

## Explanation:

The function reverse\_string(s) takes a word or sentence s.

return s[::-1] makes a new string with characters in reverse order.

The test loop runs several example inputs through reverse\_string.

Each print shows the input and its reversed output (e.g., "hello" -> "olleh").

## Task-04:

### Question:

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

**Prompt:**

Compare procedural and function-based string reversal programs based on clarity, reusability, debugging, and scalability.

**Generated Code:**

```
# Comparison: Procedural vs Function-based String Reversal
```

```
print("\n--- COMPARISON ANALYSIS ---\n")
```

```
    # PROCEDURAL APPROACH
```

```
print("1. PROCEDURAL APPROACH:")
```

```
print("  Clarity: Code is straightforward but scattered")
```

```
print("  Reusability: Must rewrite logic each time")
```

```
print("  Debugging: Harder to isolate and fix issues")
```

```
print("  Scalability: Difficult to extend with new features")
```

```
string = input("Enter a string: ")
```

```
reversed_string = ""
```

```
for i in range(len(string) - 1, -1, -1):
```

```
    reversed_string += string[i]
```

```
print(f'Reversed: {reversed_string}\n')
```

```
# FUNCTION-BASED APPROACH
```

```
print("2. FUNCTION-BASED APPROACH:")
```

```
print(" Clarity: Logic encapsulated, self-documenting")
print(" Reusability: Call function anywhere, anytime")
print(" Debugging: Test and fix in one location")
print(" Scalability: Easy to add validation, logging, etc.\n")
```

```
def reverse_string(s):
    """Reverse a string using slicing."""
    return s[::-1]
```

```
string = input("Enter a string: ")
print(f'Reversed: {reverse_string(string)}\n')
```

```
# VERDICT
```

```
print("RECOMMENDATION: Use function-based approach for production code")
print("- Better code organization")
print("- Easier unit testing")
print("- Improved maintainability")
```

**Output:**

```
PS C:\Users\RIMSHA NAAZ\OneDrive\Documents\SRU\New folder> & "C:\Users\RIMSHA NAAZ\AppData\Local\Programs\Python\Python311\python.exe" "c:/User/RIMSHA NAAZ/OneDrive/Documents/SRU/New folder/AAC/Assignment-01"
```

#### 1. PROCEDURAL APPROACH:

Clarity: Code is straightforward but scattered

Reusability: Must rewrite logic each time

Debugging: Harder to isolate and fix issues

Scalability: Difficult to extend with new features

Enter a string: hello

Reversed: olleh

#### 2. FUNCTION-BASED APPROACH:

Clarity: Logic encapsulated, self-documenting

Reusability: Call function anywhere, anytime

Debugging: Test and fix in one location

Scalability: Easy to add validation, logging, etc.

Enter a string: world

Reversed: dlrow

RECOMMENDATION: Use function-based approach for production code

- Better code organization
- Easier unit testing
- Improved maintainability

```
PS C:\Users\RIMSHA NAAZ\OneDrive\Documents\SRU\New folder> █
```

### Explanation:

**Procedural way** The reversal loop is written directly—easy to see how it works but hard to reuse elsewhere.

**Function way** The reversal is wrapped inside a `reverse_string()` function—it can be called anywhere without rewriting the code.

**The verdict:** Functions are better for real projects because the code is organized, easier to fix bugs, and simpler to test and update.

### TASK-05:

#### Question:

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

### **Prompt:**

Write loop-based and slicing-based string reversal programs in Python.

### **Generated Code:**

```
# BONUS: Side-by-side comparison of both methods
```

```
print("\n--- METHOD COMPARISON ---\n")
```

```
test_string = input("Enter a string for method comparison: ")
```

```
# Loop-based approach
```

```
reversed_loop = ""
```

```
for i in range(len(test_string) - 1, -1, -1):
```

```
    reversed_loop += test_string[i]
```

```
# Slicing-based approach
```

```
reversed_slice = test_string[::-1]
```

```
print(f"Original string: '{test_string}'")
```

```
print(f"Loop-based result: '{reversed_loop}'")
```

```
print(f"Slicing-based result: '{reversed_slice}'")
```

```
print(f"Both methods match: {reversed_loop == reversed_slice}")
```

### Output:

```
Enter a string: Hello
Reversed: olleH

RECOMMENDATION: Use function-based approach for production code
- Better code organization
- Easier unit testing
- Improved maintainability

--- METHOD COMPARISON ---

Enter a string for method comparison: World
Original string: 'World'
Loop-based result: 'dlrow'
Slicing-based result: 'dlrow'
Both methods match: True
PS C:\Users\RIMSHA NAAZ\OneDrive\Documents\SRU\New folder> 
```

### Explanation:

The code gets a string from input.

It reverses the string two ways: first using a loop then using slicing.

Both results are printed side-by-side to show what each method produces.

The last line checks if both methods give the same answer—they always do, proving both approaches work.