AI-Assisted String Reversal Using GitHub Copilot

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Task 1: AI-Generated Logic Without Modularization

Scenario

A basic text-processing utility is developed for a messaging application.

Copilot Prompt Used

```
# write a code to reverse a string without using any functions
# accept user input for the string to be reversed
```

Task1.py

```
# task1
# write a code to reverse a string without using any functions
# accept user input for the string to be reversed

input_string = input("Enter a string to reverse: ")
reversed_string = ""

for char in input_string:
    reversed_string = char + reversed_string

print("Reversed string (without functions):", reversed_string)
```

Sample Output

Explanation

The program reads user input and reverses the string using a loop without defining any functions. The logic is implemented directly in the main code.

Task 2: Efficiency & Logic Optimization

Scenario

The code is reviewed for readability and efficiency.

Copilot Prompt Used

```
#simplify this string reversal code and improve its performance and  readabilit
y
```

Task2.py

```python
# task2
# simplify this string reversal code and improve its performance and readability

input_string = "Hello, World!"
reversed_string = input_string[::-1]
print(reversed_string)

```

Sample Output

!dlrow ,olleH

Explanation

The slicing method simplifies the logic and removes unnecessary variables and loops.

The slicing method is faster in practice due to internal optimizations in Python.

Readability is significantly improved.

Task 3: Modular Design Using Functions

Scenario

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

Copilot Prompt Used

```
# write code with function to reverse a string and comment each line and function call and no sample input and output
```

Code

Task3.py

```python
# task3
# write code with function to reverse a string and comment each line and function call
# no sample input and output

def reverse_string(s):
    # Initialize an empty string to hold the reversed string
    reversed_s = ""

    # Loop through each character in the input string
    for char in s:
        # Prepend the character to the reversed string
        reversed_s = char + reversed_s

    # Return the reversed string
    return reversed_s

# Test case
print(reverse_string("Hello World"))

```

Sample Output
dlrow olleH

Explanation

Using a function improves reusability, readability, and maintainability. The logic can now be reused across different modules.

Task 4: Comparative Analysis – With vs Without Functions

Procedural vs Modular Approach □With vs Without Functions

Copilot Prompt Used

#Create a Python program that prints a formatted comparison table showing the advantages of using functions over not using functions, and display a final recommendation.

```
#Task4
#Create a Python program that prints a formatted comparison table showing the advantages of using functions over not using fun
print("\n" + "="*80)
print("ANALYSIS: WITH vs WITHOUT FUNCTIONS")
print("="*80)
comparison_data = {
"Criteria": ["Code Clarity", "Reusability", "Debugging Ease", "Large-Scale Suitability"],
"Without Functions": [
"Low - inline logic is scattered",
"Poor - must rewrite code each time",
"Difficult - hard to isolate errors",
"Not viable - code duplication"
],
"With Functions": [
"High - logic is encapsulated",
"Excellent - call function multiple times",
"Easy - test individual functions",
"Ideal - modular and maintainable"
]
}

# Print comparison table

print(f"\n{'Criteria':25}{'Without Functions':<35}{'With Functions':<35}")
print("-"*95)
for i, criteria in enumerate(comparison_data["Criteria"]):
    print(f"{criteria:<25} {comparison_data['Without Functions'][i]:<35} {comparison_data['With Functions'][i]:<35}")
print("\n" + "="*80)
print("RECOMMENDATION: Use functions for better maintainability and scalability")
print("="*80)
```

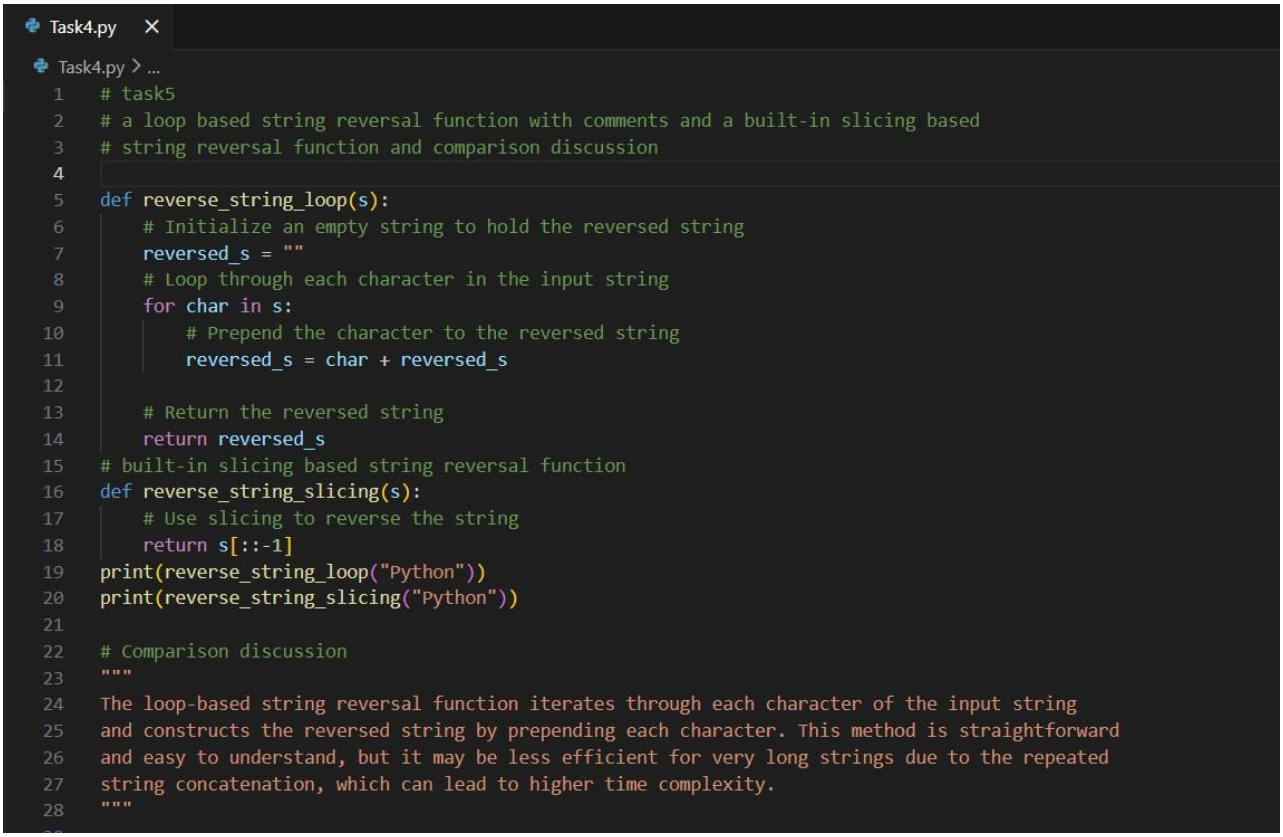
```
================================================================================
ANALYSIS: WITH vs WITHOUT FUNCTIONS
================================================================================

Criteria                 Without Functions                 With Functions
-----------------------------------------------------------------------------------------------
Code Clarity              Low - inline logic is scattered     High - logic is encapsulated
Reusability               Poor - must rewrite code each time  Excellent - call function multiple times
Debugging Ease            Difficult - hard to isolate errors  Easy - test individual functions
Large-Scale Suitability   Not viable - code duplication       Ideal - modular and maintainable

================================================================================
RECOMMENDATION: Use functions for better maintainability and scalability
================================================================================
```

Conclusion

Function-based design is preferred for large-scale applications due to better organization and reusability.

Task 5: Loop-Based vs Built-In String Reversal Copilot

Prompt Use



```python
# task5
# a loop based string reversal function with comments and a built-in slicing based
# string reversal function and comparison discussion

def reverse_string_loop(s):
    # Initialize an empty string to hold the reversed string
    reversed_s = ""
    # Loop through each character in the input string
    for char in s:
        # Prepend the character to the reversed string
        reversed_s = char + reversed_s

    # Return the reversed string
    return reversed_s
# built-in slicing based string reversal function
def reverse_string_slicing(s):
    # Use slicing to reverse the string
    return s[::-1]
print(reverse_string_loop("Python"))
print(reverse_string_slicing("Python"))

# Comparison discussion
"""
The loop-based string reversal function iterates through each character of the input string
and constructs the reversed string by prepending each character. This method is straightforward
and easy to understand, but it may be less efficient for very long strings due to the repeated
string concatenation, which can lead to higher time complexity.
"""
```

Output:

nohtyp

nohtyp

Comparison Discussion

The loop-based approach reverses the string by checking each character one by one. It helps beginners understand how string reversal works.

The slicing-based approach uses Python's built-in feature to reverse the string. It is shorter and easier to read.

Both methods take the same amount of time, which is **O(n)**, where *n* is the length of the string.

However, slicing works faster for large strings because it is optimized inside Python.

The loop-based method is good for learning, while the slicing method is better for real applications.

Conclusion

GitHub Copilot helped in writing, improving, and comparing different string reversal programs. Using functions and built-in features makes the code easier to read, faster, and better for large programs.

Declaration

All the code and explanations were created using GitHub Copilot and were checked manually to ensure correctness.