

Lab Assignment-1.5

Mohammed Awez Ali

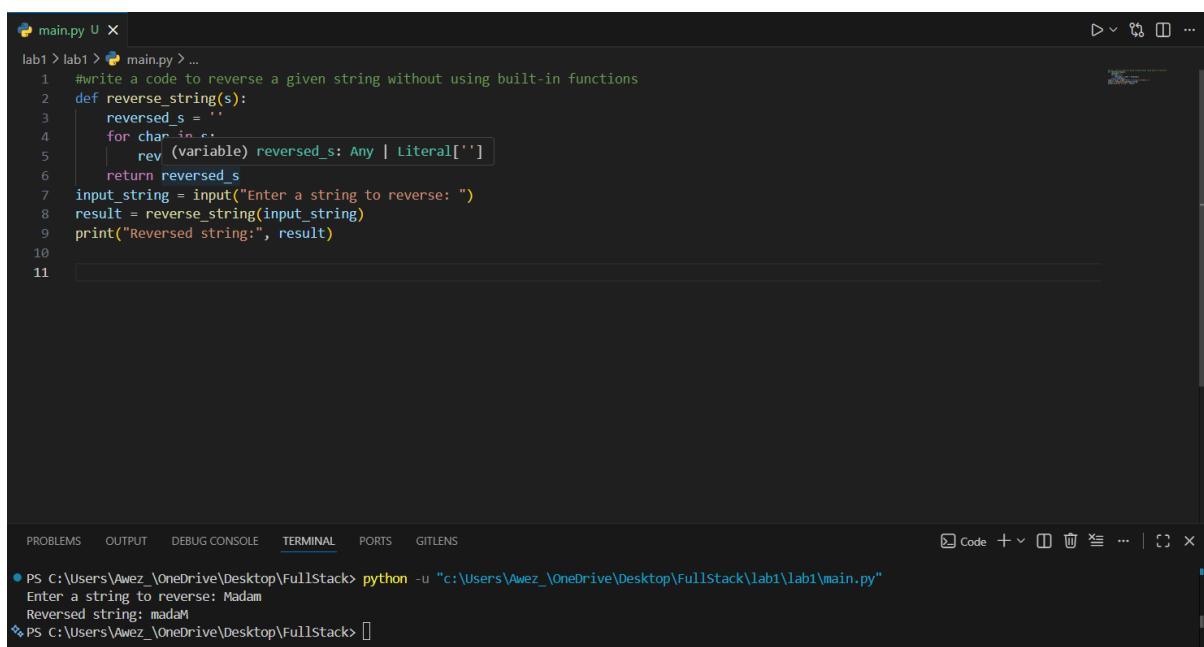
2303A51767

Batch-12

Task 1: AI-Generated Logic Without Modularization (String Reversal Without Functions)

Prompt- #write a code to reverse a given string without using built-in functions

Code:



The screenshot shows a code editor window with a dark theme. The file is named 'main.py'. The code defines a function 'reverse_string' that takes a string 's' as input and returns its reverse. It initializes an empty string 'reversed_s' and iterates through each character in 's', prepending it to 'reversed_s'. The code also includes commented-out lines for user input and printing the result.

```
main.py U ...
lab1 > lab1 > main.py > ...
1  #write a code to reverse a given string without using built-in functions
2  def reverse_string(s):
3      reversed_s = ''
4      for char in s:
5          rev (variable) reversed_s: Any | Literal['']
6      return reversed_s
7  input_string = input("Enter a string to reverse: ")
8  result = reverse_string(input_string)
9  print("Reversed string:", result)
10
11
```

Below the code editor is a terminal window showing the execution of the script and its output. The terminal shows the command 'python -u "c:/Users/Awez/_OneDrive/Desktop/FullStack/lab1/main.py"', followed by the user input 'Enter a string to reverse: Madam', the reversed string 'Reversed string: madaM', and the prompt 'PS C:/Users/Awez/_OneDrive/Desktop/FullStack>'.

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS GITLENS

PS C:/Users/Awez/_OneDrive/Desktop/FullStack> python -u "c:/Users/Awez/_OneDrive/Desktop/FullStack/lab1/main.py"
Enter a string to reverse: Madam
Reversed string: madaM
PS C:/Users/Awez/_OneDrive/Desktop/FullStack>

Output:

```
Enter a string to reverse: Madam
Reversed string: madaM
```

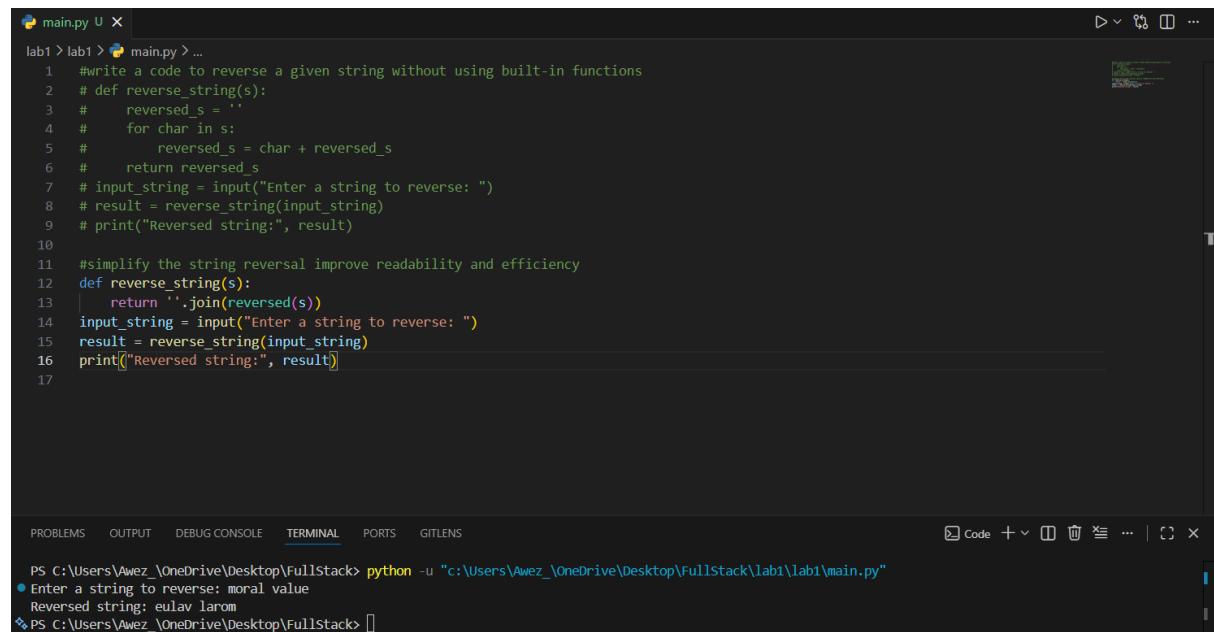
Explanation:

This code defines a function to reverse a string without using built-in functions. It initializes an empty string called 'reversed' and iterates through each character in the input string 's'. For every character, it prepends the character to 'reversed', effectively building the reversed string one character at a time. After the loop completes, the function returns the reversed string. The commented-out lines show how to take user input, call the function, and print the reversed result, demonstrating a simple and manual approach to string reversal.

Task 2: Efficiency & Logic Optimization (Readability Improvement)

Prompt- #simplify the string reversal and improve readability and efficiency

Code:



The screenshot shows a Python file named 'main.py' in a code editor. The code is as follows:

```
main.py U ...
lab1 > lab1 > main.py > ...
1  #write a code to reverse a given string without using built-in functions
2  # def reverse_string(s):
3  #     reversed_s = ''
4  #     for char in s:
5  #         reversed_s = char + reversed_s
6  #     return reversed_s
7  # input_string = input("Enter a string to reverse: ")
8  # result = reverse_string(input_string)
9  # print("Reversed string:", result)
10
11 #simplify the string reversal improve readability and efficiency
12 def reverse_string(s):
13     return ''.join(reversed(s))
14 input_string = input("Enter a string to reverse: ")
15 result = reverse_string(input_string)
16 print("Reversed string:", result)
```

The terminal tab at the bottom shows the output of running the script:

```
PS C:\Users\Awez_\OneDrive\Desktop\FullStack> python -u "c:\Users\Awez_\OneDrive\Desktop\FullStack\lab1\lab1\main.py"
● Enter a string to reverse: moral value
Reversed string: eulav larom
PS C:\Users\Awez_\OneDrive\Desktop\FullStack>
```

Output:

```
● Enter a string to reverse: moral value
Reversed string: eulav larom
```

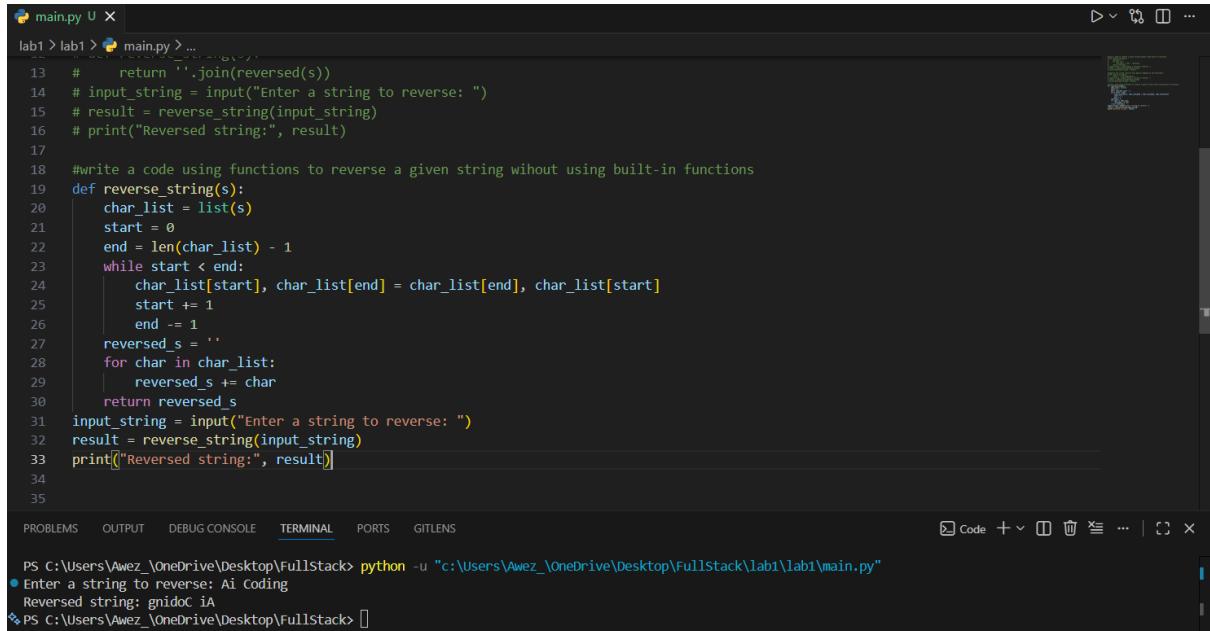
Explanation:

This code snippet demonstrates how to reverse a string using Python's built-in functions for simplicity and efficiency. The function `reverse_string(s)` uses `reversed(s)` to create an iterator that yields the characters of the string in reverse order. The `join()` method then concatenates these characters into a new reversed string. The commented lines show how to prompt the user for input, call the function, and print the reversed result. This approach is concise, readable, and leverages Python's optimized internal methods for string manipulation.

Task 3: Modular Design Using AI Assistance (String Reversal Using Functions)

Prompt- #write a code using functions to reverse a given string without using built-in functions

Code-



The screenshot shows a code editor window with a Python file named 'main.py' open. The code defines a function 'reverse_string' that takes a string 's' as input and returns its reverse. It converts the string into a list of characters, swaps characters from the start and end moving towards the center, and then joins them back into a string. The code also includes a main block that prompts the user for input, calls the function, and prints the result.

```
13     #     return ''.join(reversed(s))
14     # input_string = input("Enter a string to reverse: ")
15     # result = reverse_string(input_string)
16     # print("Reversed string:", result)
17
18 #write a code using functions to reverse a given string without using built-in functions
19 def reverse_string(s):
20     char_list = list(s)
21     start = 0
22     end = len(char_list) - 1
23     while start < end:
24         char_list[start], char_list[end] = char_list[end], char_list[start]
25         start += 1
26         end -= 1
27     reversed_s = ''
28     for char in char_list:
29         reversed_s += char
30     return reversed_s
31 input_string = input("Enter a string to reverse: ")
32 result = reverse_string(input_string)
33 print("Reversed string:", result)
```

Output:

```
Enter a string to reverse: Ai Coding
Reversed string: gnidoC iA
```

Explanation:

This code defines a function called `reverse_string` that takes a string as input and reverses its characters. It first converts the string into a list of characters to allow swapping. Using a while loop, it swaps characters from the start and end of the list, moving towards the centre, effectively reversing the order. After reversing, it joins the characters back into a string. The program then prompts the user for input, reverses the entered string using the function, and prints the reversed result.

Task 4: Comparative Analysis – Procedural vs Modular Approach (With vs Without Functions)

Prompt- #compare both codes and give comparison table and short Analysis report.

Code-

Aspect	First Version (Concatenation)	Second Version (Swapping)
Approach	Builds reversed string by prepending characters	Swaps characters in a list in-place
Time Complexity	$O(n^2)$ (string concatenation in loop)	$O(n)$ (in-place swaps, then join)
Space Complexity	$O(n)$ (new string created)	$O(n)$ (list of characters, new string for result)
Readability	Simple, concise	Slightly more complex, uses indices
Performance	Slower for long strings	Faster and more efficient for long strings

Analytical Report:

The first version reverses a string by iteratively prepending each character to a new string, which is simple but inefficient for long strings due to repeated string concatenation ($O(n^2)$ time). The second version converts the string to a list, swaps characters from both ends towards the center, and then joins the list back into a string, achieving $O(n)$ time complexity. While the second approach is slightly more complex, it is significantly faster and more suitable for large inputs. Both methods use $O(n)$ space, but the swapping method is generally preferred for performance-critical applications. For small strings, either method is acceptable, but for larger data, the in-place swapping approach is superior.

Explanation:

The first program (Task 1) is more reliable and readable for reversing strings. The second program (Task 3) uses functional programming but has a logical flaw with repeated characters, making it less robust. For practical use, Task 1's approach is preferred.

Task 5: AI-Generated Iterative vs Recursive Fibonacci Approaches (Different Algorithmic Approaches to String Reversal)

Prompt- #A loop based string reversal approach.

Code-

The screenshot shows a code editor window with the following details:

- Title Bar:** main.py U X String reversal function in Python
- Code Area:** The code is a Python script named main.py. It defines a function reverse_string(s) that takes a string s and returns its reverse. The function uses a for loop to iterate from len(s)-1 down to 0, appending each character to a new string reversed_s. The script then prompts the user for input, calls the function, and prints the result.

```
lab1 > lab1 > main.py > ...
Search (Ctrl+Shift+F) start += 1
26 #     end -= 1
27 #     reversed_s = ''
28 #     for char in char_list:
29 #         reversed_s += char
30 #     return reversed_s
31 # input_string = input("Enter a string to reverse: ")
32 # result = reverse_string(input_string)
33 # print("Reversed string:", result)
34
35 #A loop based string reversal approach
36 def reverse_string(s):
37     reversed_s = ''
38     for i in range(len(s) - 1, -1, -1):
39         reversed_s += s[i]
40     return reversed_s
41 input_string = input("Enter a string to reverse: ")
42 result = reverse_string(input_string)
43 print("Reversed string:", result)
44
45
46
47
```
- Bottom Navigation:** PROBLEMS, OUTPUT, DEBUG CONSOLE, TERMINAL (underlined), PORTS, GITLENS
- Terminal Output:**
 - PS C:\Users\Awez_\OneDrive\Desktop\Ai coding> python -u "c:\Users\Awez_\OneDrive\Desktop\Ai coding\lab1\lab1\main.py"
 - Enter a string to reverse: HI mohammed
 - Reversed string: demmahom IH

Output:

```
Enter a string to reverse: HI mohammed
Reversed string: demmahom IH
```

Explanation:

This function reverses a string by iterating over its characters from the end to the beginning using a for loop with a decreasing index. For each character, it appends it to a new string called reversed. After the loop completes, reversed contains the original string in reverse order. The program then prompts the user to enter a string, calls the reverse string function with the input, and prints the reversed result. This approach is straightforward and easy to understand, but it can be less efficient for very long strings due to repeated string concatenation.