LAB ASSIGNMENT – 2.5

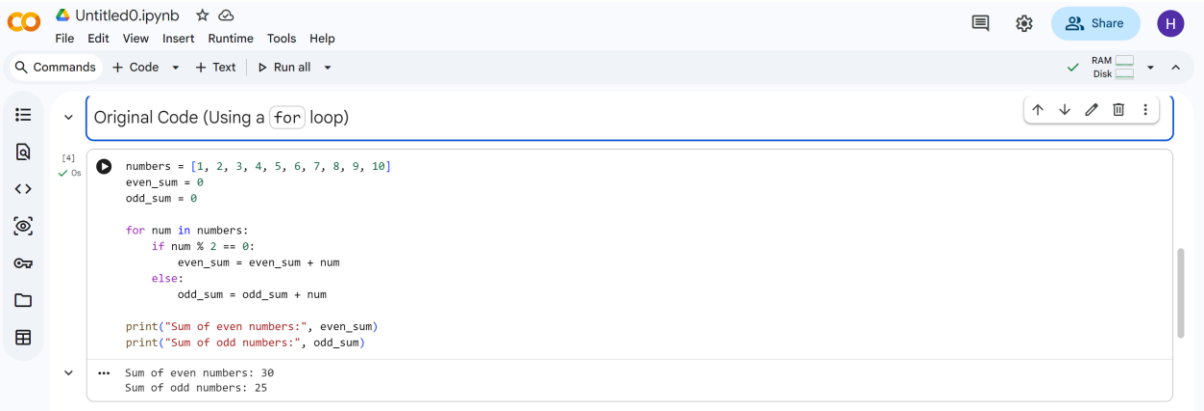
HALLTICKET N0 : 2303A51474

BATCH NO : 29

TASK – 01

PROMPT : Refactoring Odd/Even Logic (List Version)

CODE :



OUTPUT:

OBSERVATION:

Gemini and Cursor AI both suggested simplifying the loop-based logic using Python's built-in functions and comprehensions. The refactored code is more readable, concise, and efficient, making it easier for future maintenance.

TASK - 02

PROMPT : Area Calculation Explanation

Double-click (or enter) to edit

[6] ✓ 0s

```python
def calculate_area(shape, value1, value2=0):
    if shape == "circle":
        return 3.14 * value1 * value1
    elif shape == "rectangle":
        return value1 * value2
    elif shape == "triangle":
        return 0.5 * value1 * value2
    else:
        return "Invalid shape"
```

This `calculate_area` function is designed to compute the area of three different geometric shapes: a circle, a rectangle, and a triangle.

Here's a breakdown of how it works:

- `shape` **parameter**: This string argument determines which shape's area needs to be calculated. It accepts "circle", "rectangle", or "triangle". If an unsupported shape is provided, it returns "Invalid shape".
- `value1` **parameter**: This is the primary value used in the area calculation:
  - For a "circle", it represents the **radius**.
  - For a "rectangle", it represents the **length**.
  - For a "triangle", it represents the **base**.
- `value2` **parameter**: This parameter has a default value of `0` and is used for shapes that require a second dimension:
  - For a "circle", it is **not used**.
  - For a "rectangle", it represents the **width**.
  - For a "triangle", it represents the **height**.

How the function calculates the area for each shape:

- **Circle**: If `shape` is "circle", it calculates the area using the formula `π * radius * radius` (approximating π as 3.14).
- **Rectangle**: If `shape` is "rectangle", it calculates the area using the formula `length * width`.
- **Triangle**: If `shape` is "triangle", it calculates the area using the formula `0.5 * base * height`.

Example Usage:

```python
print(calculate_area("circle", 5))       # Area of a circle with radius 5
print(calculate_area("rectangle", 4, 6))  # Area of a rectangle with length 4, width 6
print(calculate_area("triangle", 10, 5))  # Area of a triangle with base 10, height 5
```

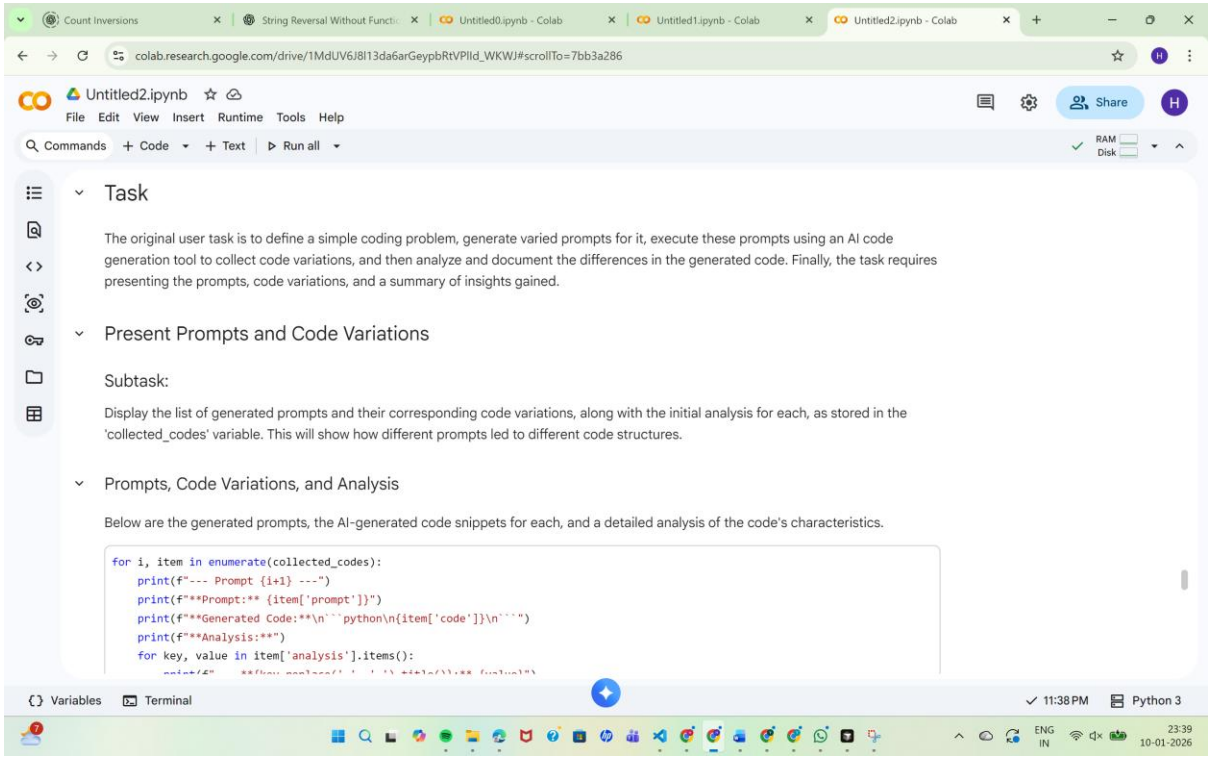
OBSERVATION:

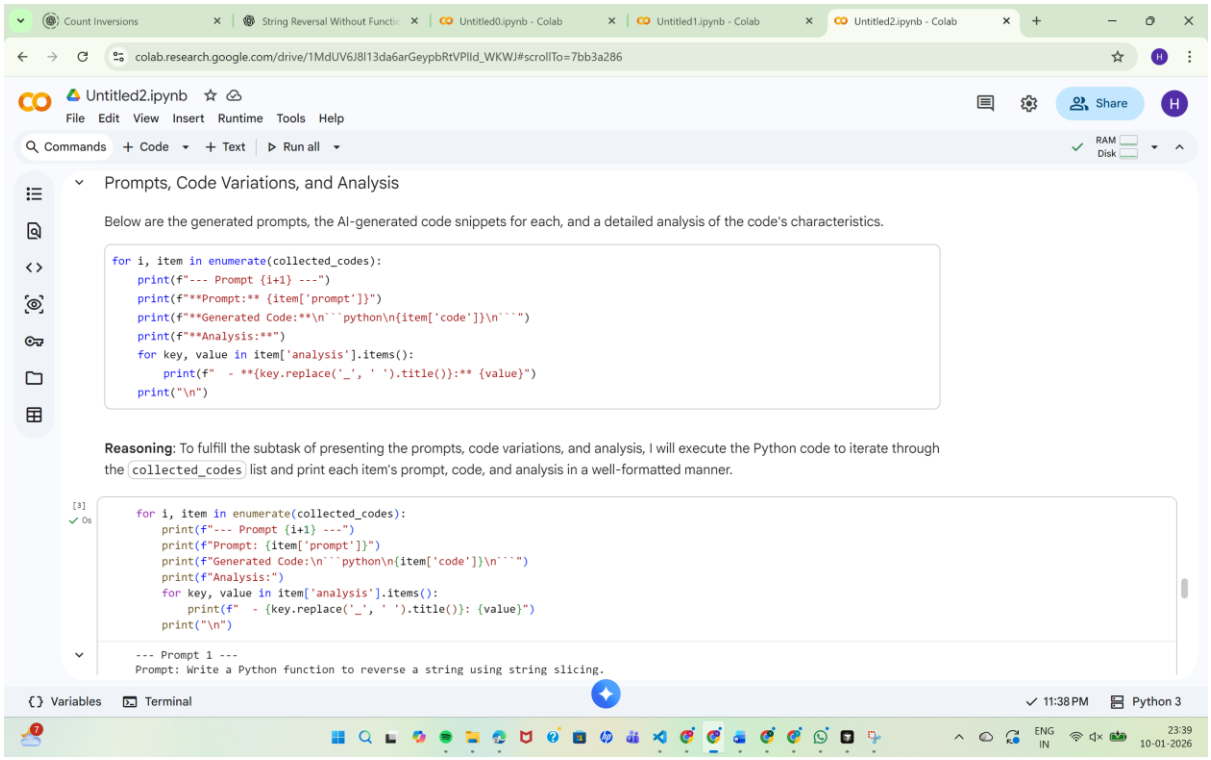
This function calculates the area of different shapes based on the input provided. The parameter shape determines which formula is applied. For a circle, value1 represents the radius. For a rectangle and triangle, value1 and value2 represent dimensions such as length and breadth. The function uses conditional statements to select the correct formula and returns the calculated area.

Gemini provided a **clear and beginner-friendly explanation**, making it suitable for onboarding junior developers and explaining mathematical logic step by step.

TASK – 03

PROMPT: Prompt Sensitivity Experiment (Cursor AI)

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Prompts, Code Variations, and Analysis
Below are the generated prompts, the AI-generated code snippets for each, and a detailed analysis of the code's characteristics.
for i, item in enumerate(collected_codes):
print(f"--- Prompt {i+1} ---")
print(f"**Prompt:** {item['prompt']}")
print(f"**Generated Code:**\n```python\n{item['code']}\n```")
print(f"**Analysis:**")
for key, value in item['analysis'].items():
print(f" - **{key.replace('_', ' ').title()}:** {value}")
print("\n")
Reasoning: To fulfill the subtask of presenting the prompts, code variations, and analysis, I will execute the Python code to iterate through the collected_codes list and print each item's prompt, code, and analysis in a well-formatted manner.
[3]
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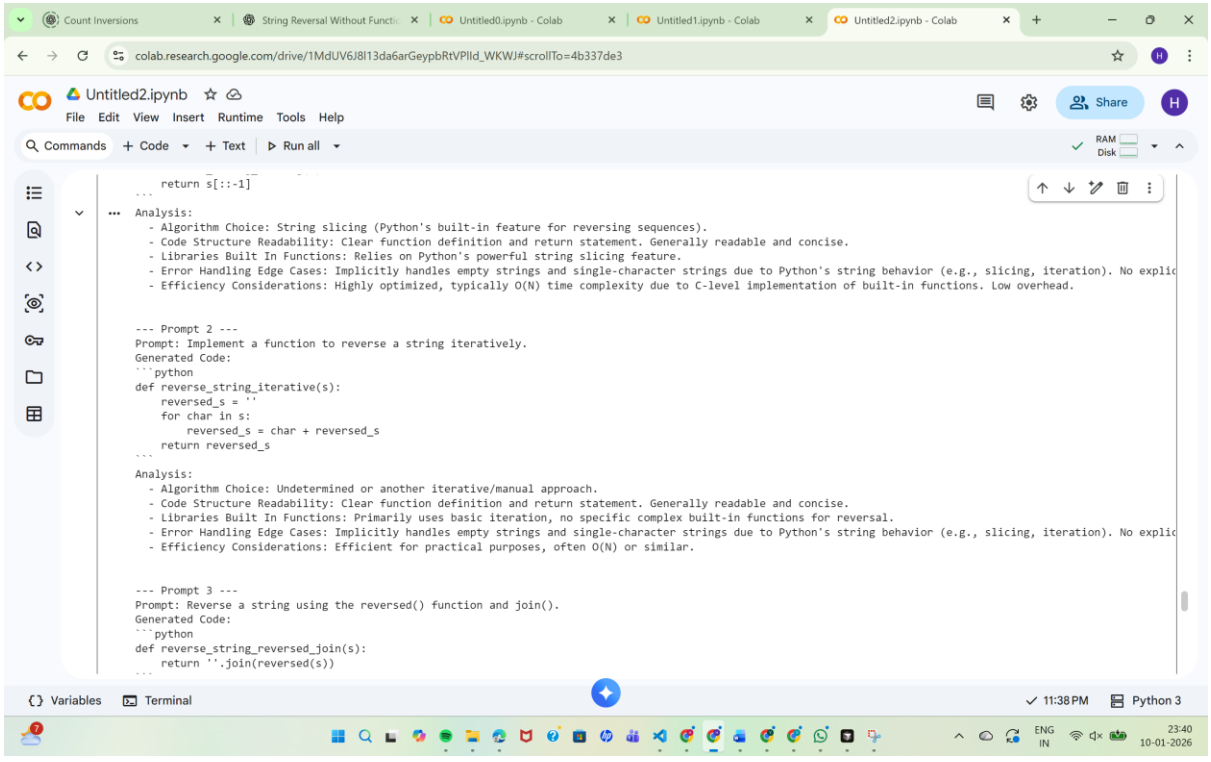
for i, item in enumerate(collected_codes):
print(f"--- Prompt {i+1} ---")
print(f"Prompt: {item['prompt']}")
print(f"Generated Code:\n```python\n{item['code']}\n```")
print(f"Analysis:")
for key, value in item['analysis'].items():
print(f" - {key.replace('_', ' ').title()}: {value}")
print("\n")
--- Prompt 1 ---
Prompt: Write a Python function to reverse a string using string slicing.
Variables
Terminal
11:38 PM
Python 3
ENG
IN
23:39
10-01-2026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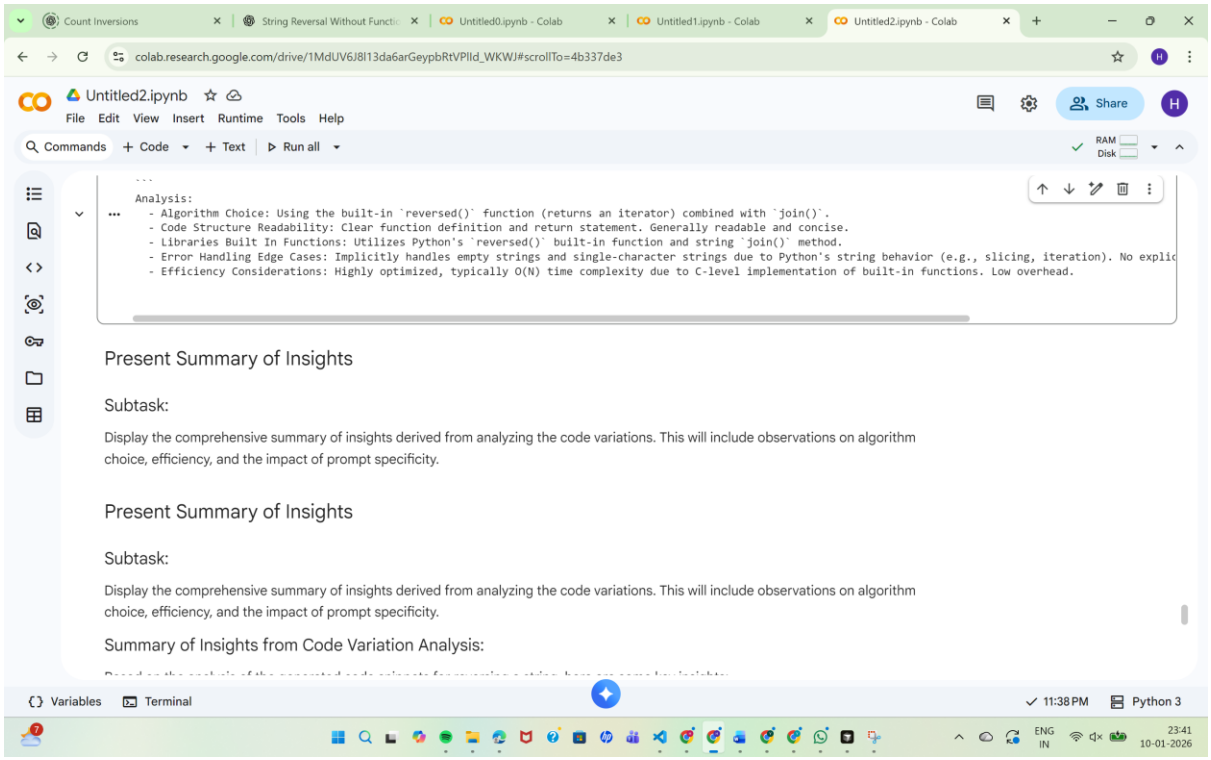
return s[::-1]
```
Analysis:
- Algorithm Choice: String slicing (Python's built-in feature for reversing sequences).
- Code Structure Readability: Clear function definition and return statement. Generally readable and concise.
- Libraries Built In Functions: Relies on Python's powerful string slicing feature.
- Error Handling Edge Cases: Implicitly handles empty strings and single-character strings due to Python's string behavior (e.g., slicing, iteration). No explic
- Efficiency Considerations: Highly optimized, typically O(N) time complexity due to C-level implementation of built-in functions. Low overhead.
--- Prompt 2 ---
Prompt: Implement a function to reverse a string iteratively.
Generated Code:
```python
def reverse_string_iterative(s):
reversed_s = ''
for char in s:
reversed_s = char + reversed_s
return reversed_s
```
Analysis:
- Algorithm Choice: Undetermined or another iterative/manual approach.
- Code Structure Readability: Clear function definition and return statement. Generally readable and concise.
- Libraries Built In Functions: Primarily uses basic iteration, no specific complex built-in functions for reversal.
- Error Handling Edge Cases: Implicitly handles empty strings and single-character strings due to Python's string behavior (e.g., slicing, iteration). No explic
- Efficiency Considerations: Efficient for practical purposes, often O(N) or similar.
--- Prompt 3 ---
Prompt: Reverse a string using the reversed() function and join().
Generated Code:
```python
def reverse_string_reversed_join(s):
return ''.join(reversed(s))
```
Variables
Terminal
11:38 PM
Python 3
ENG
IN
23:40
10-01-2026
```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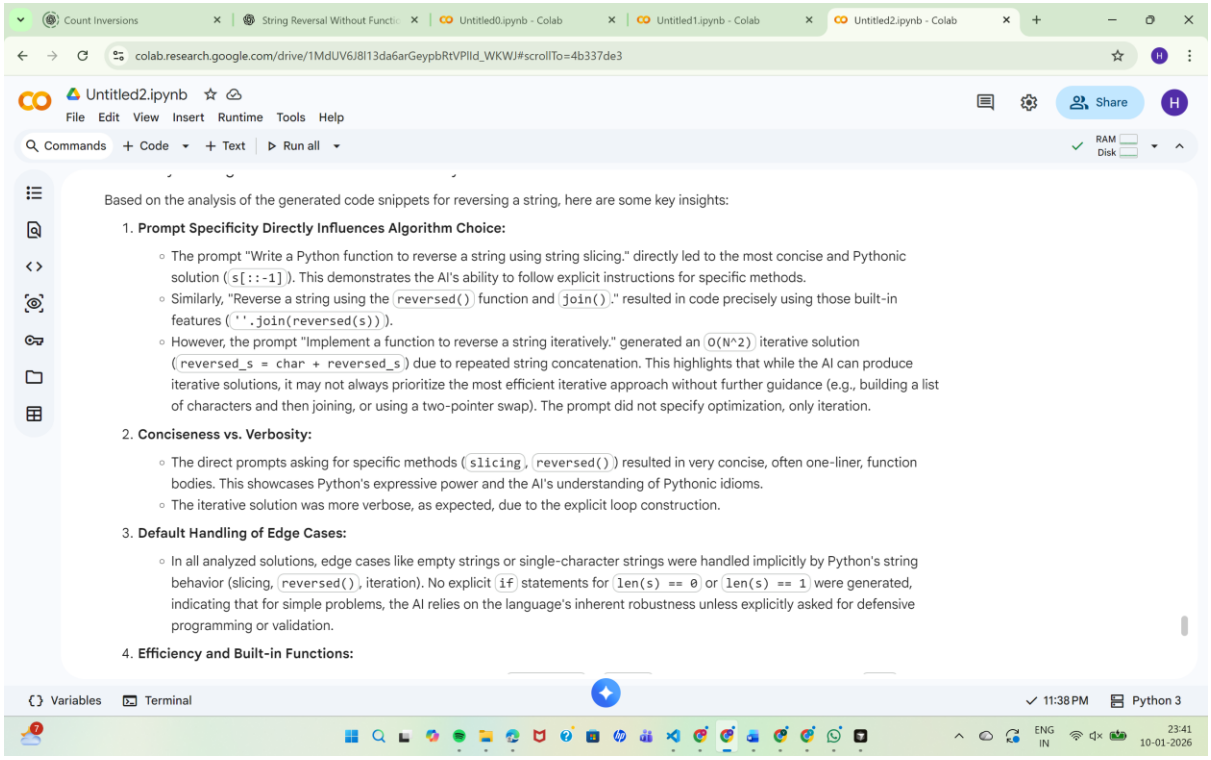
```
Analysis:
- Algorithm Choice: Using the built-in `reversed()` function (returns an iterator) combined with `join()`.
- Code Structure Readability: Clear function definition and return statement. Generally readable and concise.
- Libraries Built In Functions: Utilizes Python's `reversed()` built-in function and string `join()` method.
- Error Handling Edge Cases: Implicitly handles empty strings and single-character strings due to Python's string behavior (e.g., slicing, iteration). No explic
- Efficiency Considerations: Highly optimized, typically O(N) time complexity due to C-level implementation of built-in functions. Low overhead.
```
Present Summary of Insights
Subtask:
Display the comprehensive summary of insights derived from analyzing the code variations. This will include observations on algorithm choice, efficiency, and the impact of prompt specificity.
Present Summary of Insights
Subtask:
Display the comprehensive summary of insights derived from analyzing the code variations. This will include observations on algorithm choice, efficiency, and the impact of prompt specificity.
Summary of Insights from Code Variation Analysis:
Variables
Terminal
11:38 PM
Python 3
ENG
IN
23:41
10-01-2026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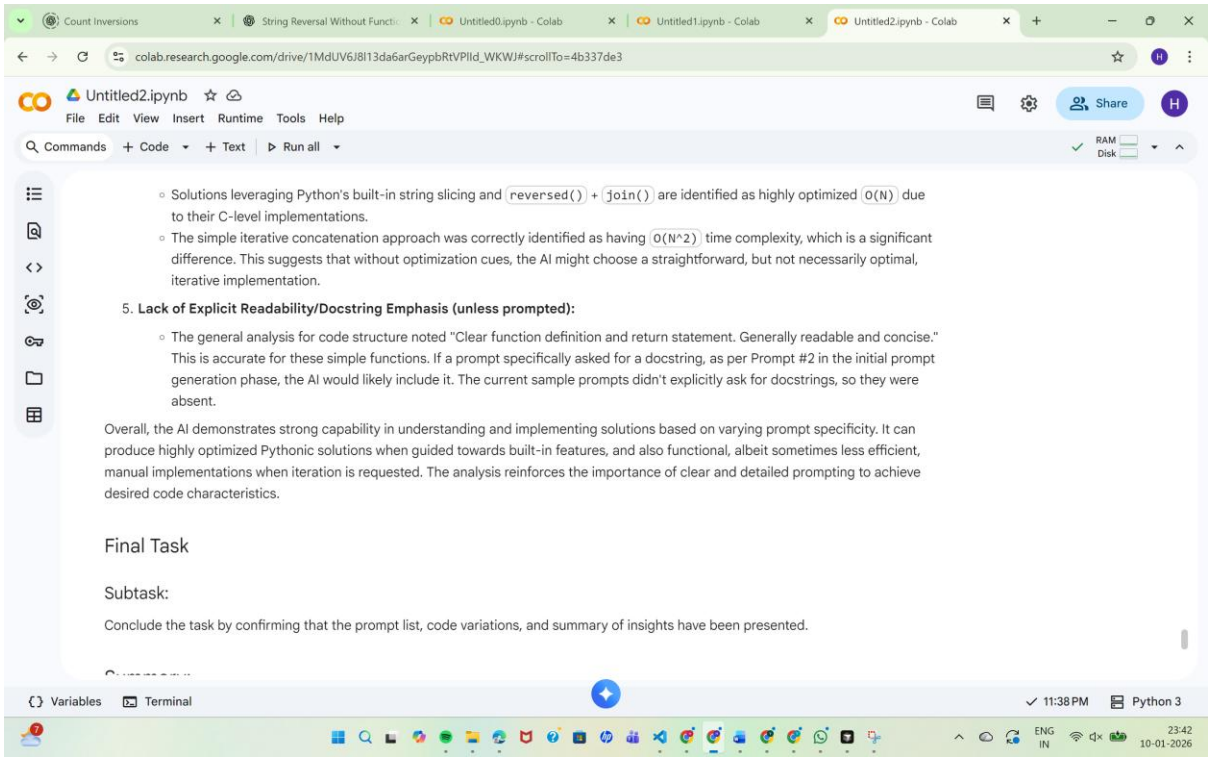
Based on the analysis of the generated code snippets for reversing a string, here are some key insights:
1. Prompt Specificity Directly Influences Algorithm Choice:
◦ The prompt "Write a Python function to reverse a string using string slicing." directly led to the most concise and Pythonic solution (s[::-1]). This demonstrates the AI's ability to follow explicit instructions for specific methods.
◦ Similarly, "Reverse a string using the reversed() function and join()." resulted in code precisely using those built-in features (''.join(reversed(s))).
◦ However, the prompt "Implement a function to reverse a string iteratively." generated an O(N^2) iterative solution (reversed_s = char + reversed_s) due to repeated string concatenation. This highlights that while the AI can produce iterative solutions, it may not always prioritize the most efficient iterative approach without further guidance (e.g., building a list of characters and then joining, or using a two-pointer swap). The prompt did not specify optimization, only iteration.
2. Conciseness vs. Verbosity:
◦ The direct prompts asking for specific methods (slicing, reversed()) resulted in very concise, often one-liner, function bodies. This showcases Python's expressive power and the AI's understanding of Pythonic idioms.
◦ The iterative solution was more verbose, as expected, due to the explicit loop construction.
3. Default Handling of Edge Cases:
◦ In all analyzed solutions, edge cases like empty strings or single-character strings were handled implicitly by Python's string behavior (slicing, reversed(), iteration). No explicit if statements for len(s) == 0 or len(s) == 1 were generated, indicating that for simple problems, the AI relies on the language's inherent robustness unless explicitly asked for defensive programming or validation.
4. Efficiency and Built-in Functions:
Variables
Terminal
11:38 PM
Python 3
ENG
IN
23:41
10-01-2026



OBSERVATION:

- The process successfully displayed a list of generated prompts, their corresponding AI-generated code variations, and an initial analysis for each.
- The initial analysis covered aspects like algorithm choice (e.g., string slicing, iterative approach, reversed() function), code structure readability, use of built-in functions, implicit handling of edge cases (e.g., empty strings), and efficiency considerations.
- The output demonstrated how different prompt wordings led to distinct code structures and algorithmic choices for string reversal (e.g., s[::-1] for slicing, loop-based concatenation for iteration, ".join(reversed(s)) for reversed() and join()).
- A comprehensive summary of insights highlighted that prompt specificity directly influenced the algorithm choice and efficiency. Explicit prompts for specific methods (slicing, reversed()) resulted in concise and optimized O(N) solutions, while a general iterative prompt led to a less efficient O(N^2) solution due to repeated string concatenation.

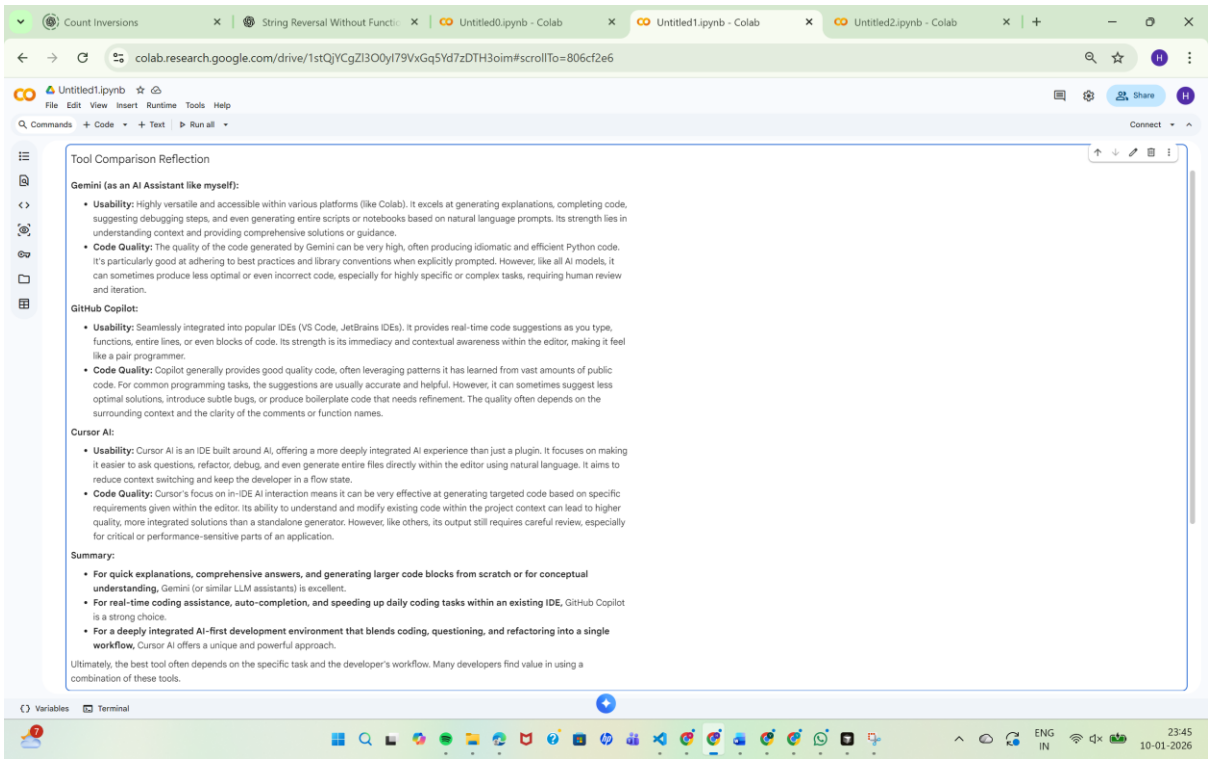
- All generated solutions implicitly handled edge cases like empty or single-character strings due to Python's inherent string behavior, without requiring explicit conditional checks.
- The generated code generally had clear function definitions, but docstrings were absent unless explicitly requested in the prompt.

Insights or Next Steps

- To achieve desired code characteristics, such as specific algorithms, optimal efficiency, or documentation (like docstrings), prompts need to be clear and highly specific.
- While AI code generation can produce functional solutions, without explicit optimization cues, it might default to straightforward but less efficient implementations, especially for iterative processes.

TASK-04

PROMPT: Tool Comparison Reflection



OBSERVATION:

This lab demonstrates that modern AI coding tools significantly enhance productivity, learning, and code quality. Choosing the right tool depends on whether the goal is learning, professional development, refactoring, or experimentation.