AI ASSISTANT CODING

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Batch: 35

Q.No. Question Expected

Time

to

complete

1

Lab 1: Environment Setup – GitHub Copilot and VS Code Integration +

Understanding AI-assisted Coding Workflow

Lab Objectives:

❖ To install and configure GitHub Copilot in Visual Studio Code.

Week1 -

Monday

❖ To explore AI-assisted code generation using GitHub Copilot.

❖ To analyze the accuracy and effectiveness of Copilot's code suggestions.

❖ To understand prompt-based programming using comments and code

context

Lab Outcomes (LOs):

After completing this lab, students will be able to:

❖ Set up GitHub Copilot in VS Code successfully.

❖ Use inline comments and context to generate code with Copilot.

❖ Evaluate AI-generated code for correctness and readability.

❖ Compare code suggestions based on different prompts and programming

styles.

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

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

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

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

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

Note: Report should be submitted as a word document for all tasks in a

single document with prompts, comments & code explanation, and output

and if required, screenshots.

Solutions:

```
# Python program to reverse a string


user_input = input("Enter a string to reverse: ")

print(f"Original: {user_input}\nReversed: {user_input[::-1]}")


# Python program to reverse a string using a user-defined function

# Demonstrates function-based approach with proper documentation


def reverse_string(text):
    """
    Reverses the given string using Python's slicing technique.


    Args:
        text (str): The input string to be reversed
    Returns:
        str: The reversed string
    """
    return text[::-1]

# Main program execution
if __name__== "__main__":
    # Prompt user for input
    user_input = input("Enter a string to reverse: ")

    # Call the function to get reversed string
    result = reverse_string(user_input)

    # Display the results
    print(f"Original: {user_input}")
    print(f"Reversed: {result}")
```

## 1. CODE CLARITY

### Without Functions (Task 1)

```python
# Python program to reverse a string

user_input = input("Enter a string to reverse: ")
print(f"Original: {user_input}\nReversed: {user_input[::-1]}")
```

Observations:

- ✓ Extremely concise (4 lines)

- ✓ Easy to understand at a glance

- ✗ Mixes input/output logic with core functionality

- ✗ No documentation of what the reversal does

### With Functions (Task 3)

```python
def reverse_string(text):
    """
    Reverses the given string using Python's slicing technique.
    ...
    """
    return text[::-1]

if __name__ == "__main__":
```

    user_input = input("Enter a string to reverse: ")

    result = reverse_string(user_input)

    print(f"Original: {user_input}\nReversed: {result}")
```

**Observations:**

- ✓ Clear separation of concerns

- ✓ Comprehensive docstring documentation

- ✓ Explicit function purpose and behavior

- ✗ More verbose (27 lines with documentation)

- ✓ Follows Python best practices with `if __name__ == "__main__":`

**Winner: Task 3** - Better documentation and separation of concerns make intent clearer.

---

## 2. REUSABILITY

### Without Functions (Task 1)

**Reusability Score: 1/5**
```

- + Cannot reuse the reversal logic in other parts of the program

- + Cannot import and use in other modules

- + Must duplicate code if reversal is needed elsewhere

- + Tightly coupled with input/output operations

Example Problem:

```python
# To reverse multiple strings, must repeat the logic
string1_reversed = string1[::-1]
string2_reversed = string2[::-1]
string3_reversed = string3[::-1]
```

### With Functions (Task 3)

Reusability Score: 5/5

- √ Function can be imported into other modules

- √ Can reverse any number of strings without duplication

- √ Logic is isolated and independent

- √ Can be used in different contexts (APIs, GUIs, batch processing)

Example Benefit:

```python
from reverse_string_function import reverse_string

strings = ["hello", "world", "python"]
reversed_strings = [reverse_string(s) for s in strings]
# Result: ['olleh', 'dlrow', 'nohtyp']
```

Winner: Task 3 - Dramatically superior for code reuse and modularity.

## 3. DEBUGGING EASE

### Without Functions (Task 1)

Debugging Score: 2/5

- + Hard to isolate which part has issues

- + No clear entry/exit points for testing

- + Cannot debug the reversal logic independently

- + Changes require modifying the entire script

Challenges:

```python
# Is the problem in input handling or reversal logic?
print(f"Original: {user_input}\nReversed: {user_input[::-1]}")
# Difficult to pinpoint issues
```

### With Functions (Task 3)

Debugging Score: 5/5

- ✓ Can test the function independently

- ✓ Can add breakpoints specifically in the function

- ✓ Unit testing is straightforward

- ✓ Can isolate bugs to specific sections

Example Testing:

```python
# Easy to test the function directly
assert reverse_string("hello") == "olleh"
assert reverse_string("world") == "dlrow"
assert reverse_string("") == ""
```

Winner: Task 3 - Function-based design enables systematic debugging and testing.

## 4. SUITABILITY FOR LARGE-SCALE APPLICATIONS

### Without Functions (Task 1)

Large-Scale Suitability: 1/5

- + Not scalable to larger applications

- + No code organization or structure

- + Impossible to maintain in teams

- + Cannot be part of a larger project

- + No testing framework compatibility

Why It Fails:

- Single-purpose scripts only

- Cannot integrate with frameworks

- No separation of business logic from I/O

- Violates Single Responsibility Principle

### With Functions (Task 3)

Large-Scale Suitability: 5/5

- ✓ Easily integrates into larger projects

- ✓ Follows software engineering principles

- ✓ Compatible with unit testing frameworks (pytest, unittest)

- ✓ Can be part of modules and packages

- ✓ Supports code organization and architectural patterns

Enterprise-Ready Features:

```python
# Can be used in web frameworks
from flask import Flask
from reverse_string_function import reverse_string

app = Flask(__name__)

@app.route('/reverse/<text>')
def api_reverse(text):
    return {"reversed": reverse_string(text)}

# Can be tested with pytest
```

```
def test_reverse_string():
    assert reverse_string("test") == "tset"

# Can be integrated into larger modules
# from utils.string_operations import reverse_string
```

Winner: Task 3 - Essential for professional, scalable software development.

## SUMMARY COMPARISON TABLE

Criterion	Task 1 (No Functions)	Task 3 (With Functions)
Lines of Code	4	27
Code Clarity	★★★ (Concise)	★★★★★ (Well-documented)
Reusability	★ (None)	★★★★★ (Excellent)
Debugging Ease	★★ (Difficult)	★★★★★ (Easy)

| **Large-Scale Apps** | ★ (Not suitable) | ★★★★★ (Ideal) |

| **Testing** | + (Not testable) | ✓ (Fully testable) |

| **Maintenance** | + (Difficult) | ✓ (Easy) |

## CONCLUSION

### Use Task 1 (No Functions) When:

- Writing quick, throwaway scripts
- Learning Python basics
- One-time utility tasks
- Minimal complexity required

### Use Task 3 (With Functions) When:

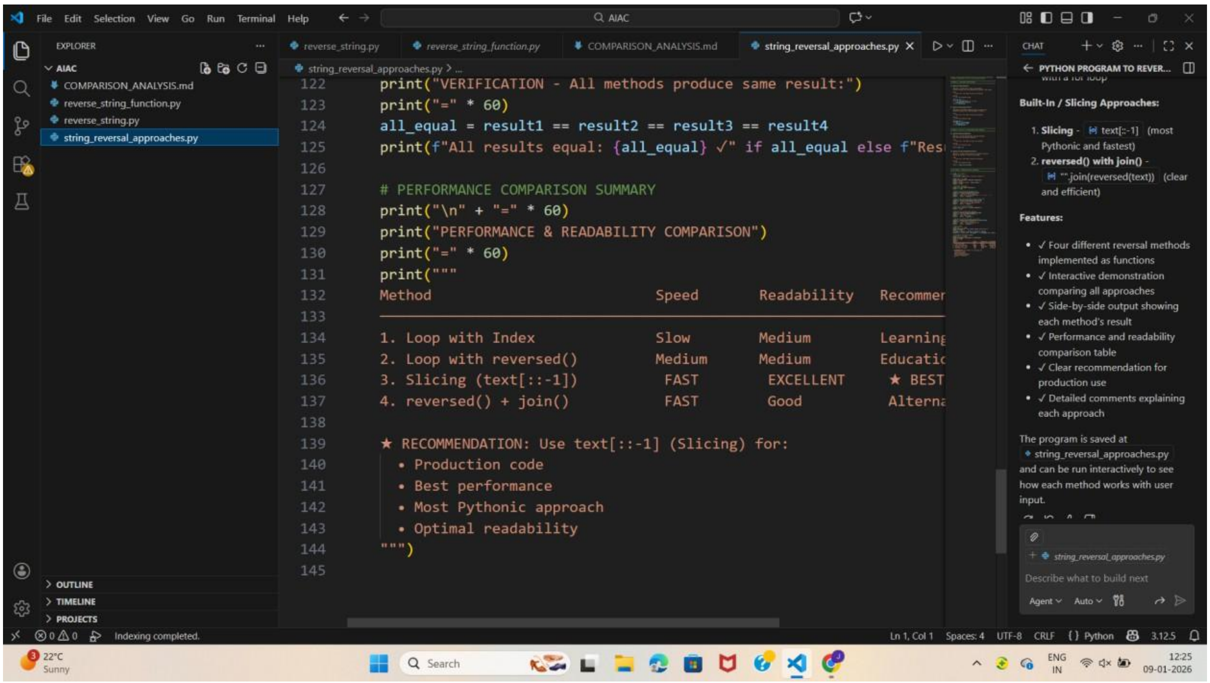
- Building production code
- Working in teams
- Planning to extend the application
- Requiring code quality and maintainability
- Needing unit tests
- Integrating into larger projects

Best Practice Recommendation: **Task 3 is the professional standard.** Even for simple programs, using functions establishes good habits and makes code enterprise-ready. The minimal overhead of function definition pays dividends in reusability, testing, and maintenance.

```
# Python program demonstrating different string reversal approaches
# Compares loop-based vs built-in/slicing-based methods


# ==============================================================================
# APPROACH 1: LOOP-BASED STRING REVERSAL
# ==============================================================================


def reverse_string_loop(text):
    """
    Reverses a string using a manual loop approach.
    Iterates through the string backwards and builds a new string.
    Args:
        text (str): The input string to be reversed

    Returns:
        str: The reversed string
    """
    reversed_text = ""
    for i in range(len(text) - 1, -1, -1):
        reversed_text += text[i]
    return reversed_text

def reverse_string_loop_alt(text):
    """
    Alternative loop-based approach using a for-each loop.
    Converts string to list, then iterates in reverse.

    Args:
        text (str): The input string to be reversed

    Returns:
        str: The reversed string
    """
    reversed_text = ""
    for char in reversed(text):
        reversed_text += char
    return reversed_text

#
=====================================================
===========================
# APPROACH 2: BUILT-IN / SLICING-BASED STRING REVERSAL
#
=====================================================
===========================

def reverse_string_slicing(text):
    """
    Reverses a string using Python's slicing technique.
    Most efficient and Pythonic approach.

    Args:
        text (str): The input string to be reversed

    Returns:
        str: The reversed string
    """
    return text[::-1]

def reverse_string_reversed_builtin(text):
    """
    Reverses a string using the built-in reversed() function.
    Returns an iterator, so needs to be joined.

    Args:
        text (str): The input string to be reversed

    Returns:
        str: The reversed string
    """
    return "".join(reversed(text))

#
===================================================
==========================
# MAIN PROGRAM - DEMONSTRATION AND COMPARISON
```

```
#
==================================================
==========================

if __name___== "__main__":
    # Test string
    test_string = input("Enter a string to reverse: ")

    print("\n" + "=" * 60)
    print("STRING REVERSAL APPROACHES COMPARISON")
    print("=" * 60)
    print(f"\nOriginal String: '{test_string}'")
    print("-" * 60)

    # LOOP-BASED APPROACHES
    print("\n1. LOOP-BASED APPROACHES:")
    print("-" * 60)

    # Approach 1a: Manual index-based loop
    result1 = reverse_string_loop(test_string)
    print(f"\n   Loop with Index (range):")
    print(f"   Code: for i in range(len(text) - 1, -1, -1): ...")
    print(f"   Result: '{result1}'")

    # Approach 1b: Using reversed() function with loop
    result2 = reverse_string_loop_alt(test_string)
    print(f"\n   Loop with reversed() function:")
    print(f"   Code: for char in reversed(text): ...")
    print(f"   Result: '{result2}'")

    # BUILT-IN / SLICING APPROACHES
    print("\n\n2. BUILT-IN / SLICING APPROACHES:")
    print("-" * 60)

    # Approach 2a: Slicing (Most Pythonic)
    result3 = reverse_string_slicing(test_string)
    print(f"\n   Slicing (MOST PYTHONIC):")
    print(f"   Code: text[::-1]")
    print(f"   Result: '{result3}'")

    # Approach 2b: Using reversed() with join()
    result4 = reverse_string_reversed_builtin(test_string)
    print(f"\n   reversed() + join():")
    print(f"   Code: ''.join(reversed(text))")
```

```
    print(f"   Result: '{result4}'")

    # VERIFICATION
    print("\n" + "=" * 60)
    print("VERIFICATION - All methods produce same result:")
    print("=" * 60)
    all_equal = result1 == result2 == result3 == result4
    print(f"All results equal: {all_equal} ✓" if all_equal else f"Results differ: FAILED ✗")

    # PERFORMANCE COMPARISON SUMMARY
    print("\n" + "=" * 60)
    print("PERFORMANCE & READABILITY COMPARISON")
    print("=" * 60)
    print("""
    Method                      Speed      Readability   Recommendation
    ────────────────────────────────────────────────────────────────────────────────
    1. Loop with Index          Slow       Medium        Learning/Detailed
    2. Loop with reversed()     Medium     Medium        Educational
    3. Slicing (text[::-1])        FAST      EXCELLENT    ★ BEST CHOICE
    4. reversed() + join()         FAST      Good         Alternative

    ★ RECOMMENDATION: Use text[::-1] (Slicing) for:
      • Production code
      • Best performance
      • Most Pythonic approach
      • Optimal readability
    """)
```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```python
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    ★ RECOMMENDATION: Use text[::-1] (Slicing) for:
      • Production code
      • Best performance
      • Most Pythonic approach
      • Optimal readability
    """)

```

with a for loop

Built-In / Slicing Approaches:

1. **Slicing** - text[::-1] (most Pythonic and fastest)
2. **reversed() with join()** - "".join(reversed(text)) (clear and efficient)

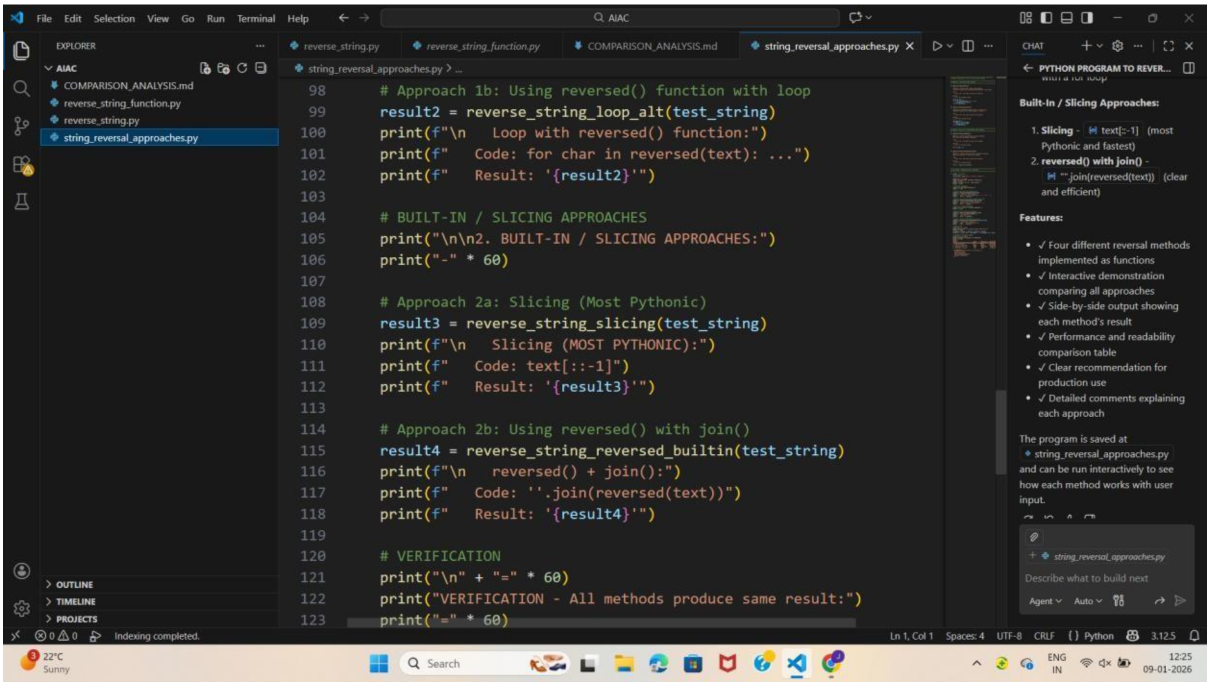
Features:

- ✓ Four different reversal methods implemented as functions
- ✓ Interactive demonstration comparing all approaches
- ✓ Side-by-side output showing each method's result
- ✓ Performance and readability comparison table
- ✓ Clear recommendation for production use
- ✓ Detailed comments explaining each approach

The program is saved at string_reversal_approaches.py and can be run interactively to see how each method works with user input.

string_reversal_approaches.py

Describe what to build next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```python
    # Approach 1b: Using reversed() function with loop
    result2 = reverse_string_loop_alt(test_string)
    print(f"\n   Loop with reversed() function:")
    print(f"   Code: for char in reversed(text): ...")
    print(f"   Result: '{result2}'")

    # BUILT-IN / SLICING APPROACHES
    print("\n\n2. BUILT-IN / SLICING APPROACHES:")
    print("-" * 60)

    # Approach 2a: Slicing (Most Pythonic)
    result3 = reverse_string_slicing(test_string)
    print(f"\n   Slicing (MOST PYTHONIC):")
    print(f"   Code: text[::-1]")
    print(f"   Result: '{result3}'")

    # Approach 2b: Using reversed() with join()
    result4 = reverse_string_reversed_builtin(test_string)
    print(f"\n   reversed() + join():")
    print(f"   Code: ''.join(reversed(text))")
    print(f"   Result: '{result4}'")

    # VERIFICATION
    print("\n" + "=" * 60)
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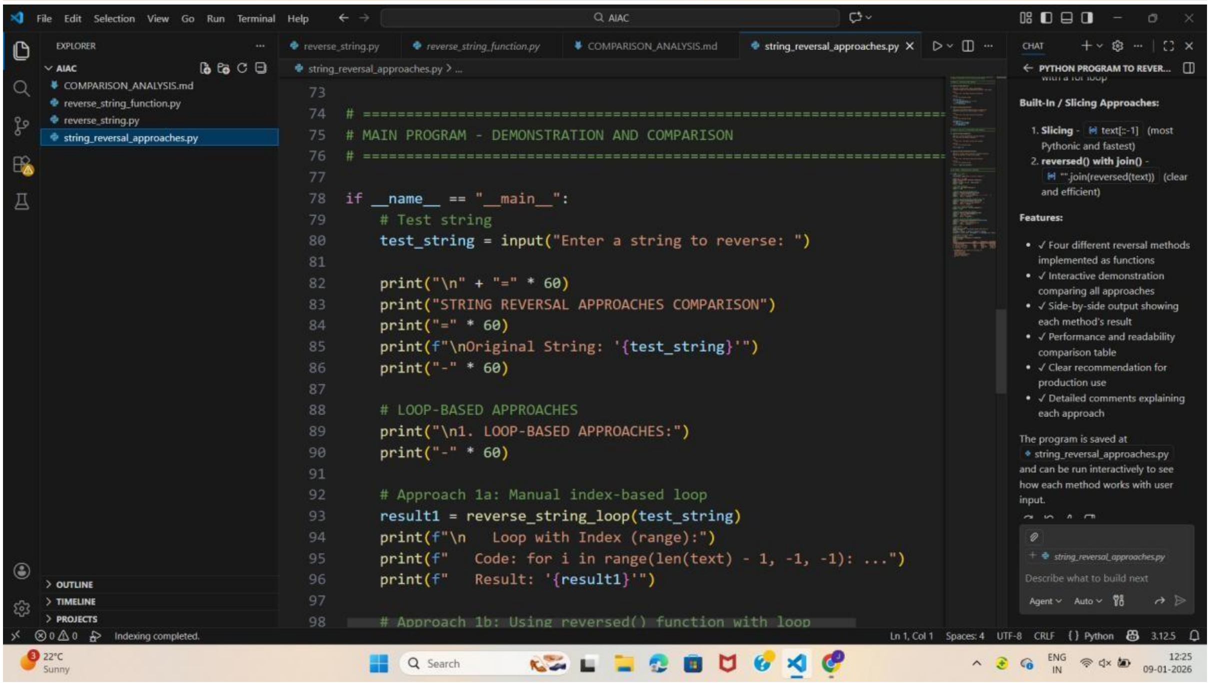
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    # LOOP-BASED APPROACHES
    print("\n1. LOOP-BASED APPROACHES:")
    print("-" * 60)

    # Approach 1a: Manual index-based loop
    result1 = reverse_string_loop(test_string)
    print(f"\n   Loop with Index (range):")
    print(f"   Code: for i in range(len(text) - 1, -1, -1): ...")
    print(f"   Result: '{result1}'")

    # Approach 1b: Using reversed() function with loop
```

Built-In / Slicing Approaches:

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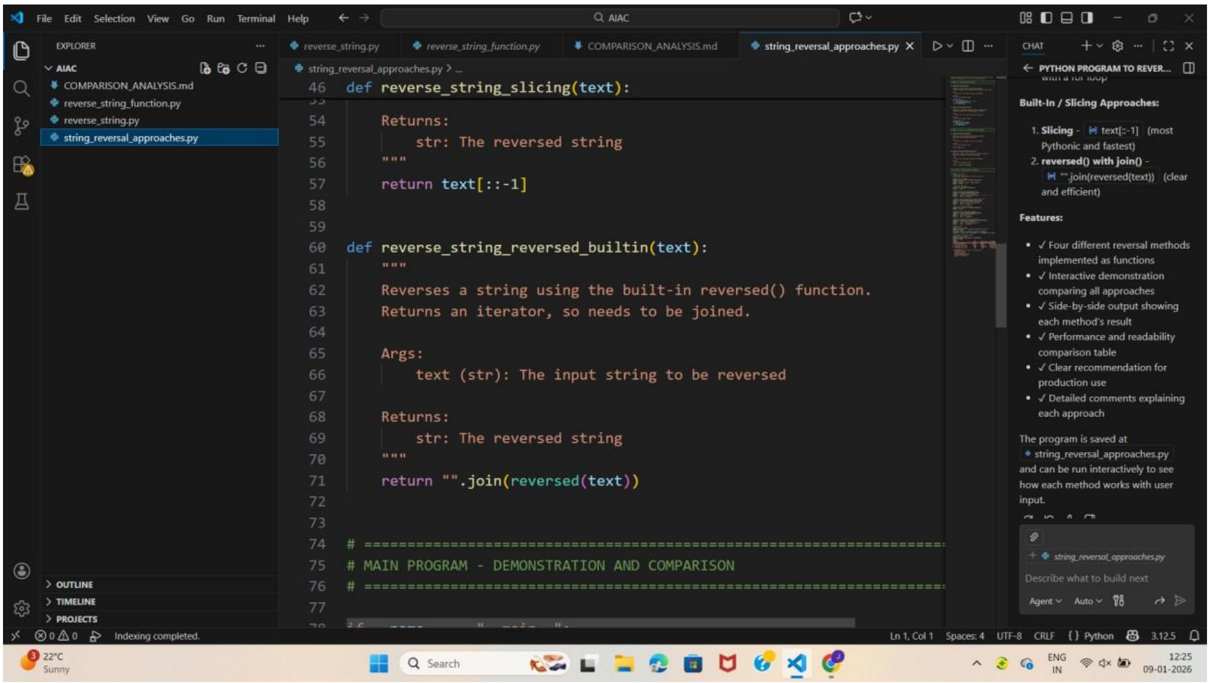

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    Returns an iterator, so needs to be joined.

    Args:
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    Returns:
        str: The reversed string
    """
    return "".join(reversed(text))


# ======================================================================
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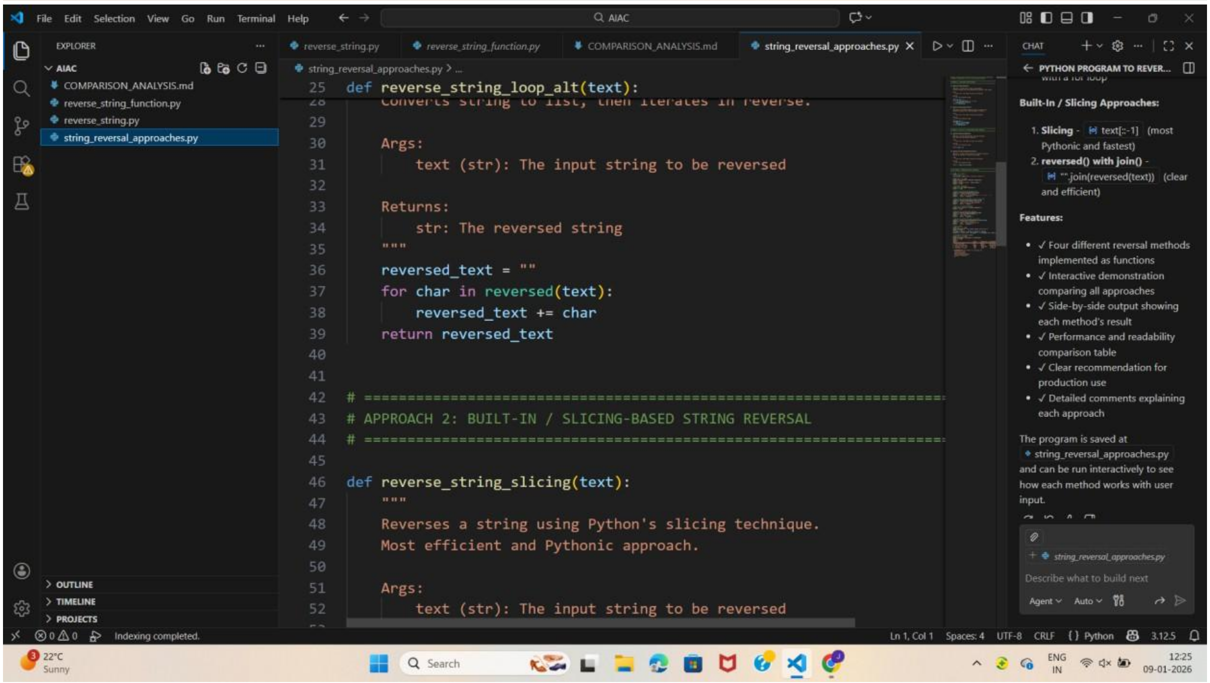

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def reverse_string_loop_alt(text):
    Converts string to list, then iterates in reverse.

    Args:
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    Returns:
        str: The reversed string
    """
    reversed_text = ""
    for char in reversed(text):
        reversed_text += char
    return reversed_text


# ======================================================================
# APPROACH 2: BUILT-IN / SLICING-BASED STRING REVERSAL
# ======================================================================

def reverse_string_slicing(text):
    """
    Reverses a string using Python's slicing technique.
    Most efficient and Pythonic approach.

    Args:
        text (str): The input string to be reversed
```

Built-In / Slicing Approaches:

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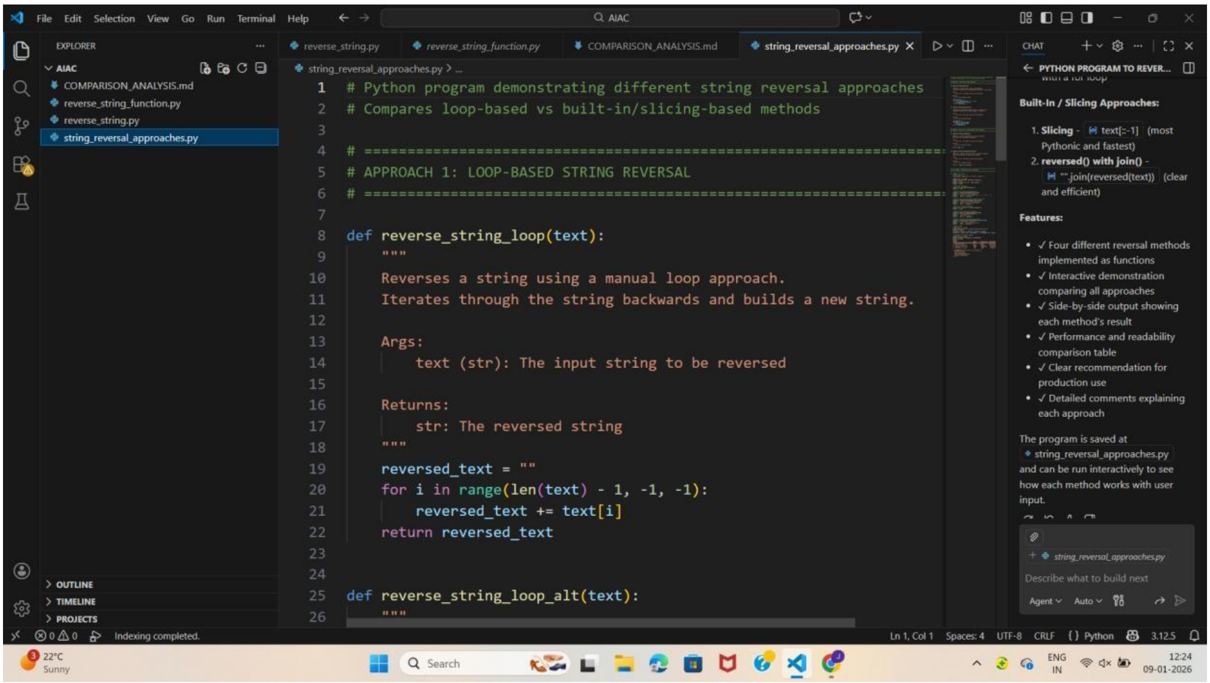

string_reversal_approaches.py

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# Python program demonstrating different string reversal approaches
# Compares loop-based vs built-in/slicing-based methods

# ============================================================================
# APPROACH 1: LOOP-BASED STRING REVERSAL
# ============================================================================

def reverse_string_loop(text):
    """
    Reverses a string using a manual loop approach.
    Iterates through the string backwards and builds a new string.

    Args:
        text (str): The input string to be reversed

    Returns:
        str: The reversed string
    """
    reversed_text = ""
    for i in range(len(text) - 1, -1, -1):
        reversed_text += text[i]
    return reversed_text


def reverse_string_loop_alt(text):
    """
```

PYTHON PROGRAM TO REVER...

Built-In / Slicing Approaches:

1. **Slicing** - `text[::-1]` (most Pythonic and fastest)
2. **reversed() with join()** - `"".join(reversed(text))` (clear and efficient)

Features:

- ✓ Four different reversal methods implemented as functions
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- ✓ Performance and readability comparison table
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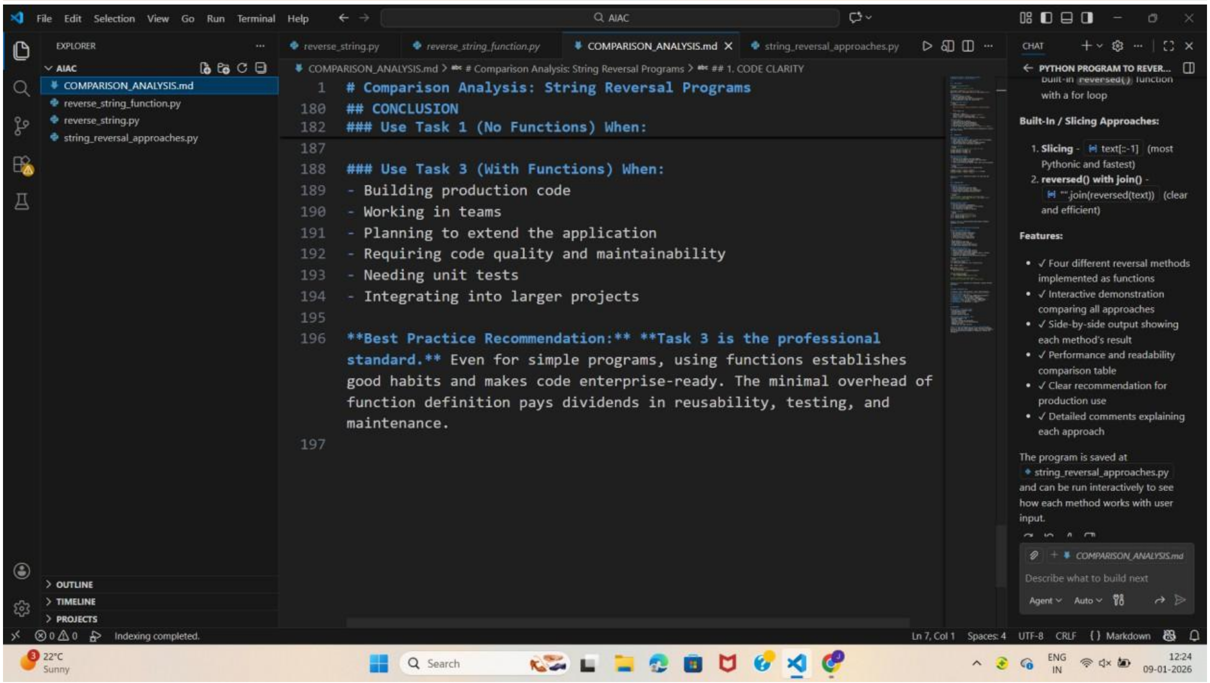

COMPARISON_ANALYSIS.md > # Comparison Analysis: String Reversal Programs > ## 1. CODE CLARITY

```markdown
# Comparison Analysis: String Reversal Programs
## CONCLUSION
### Use Task 1 (No Functions) When:

### Use Task 3 (With Functions) When:
- Building production code
- Working in teams
- Planning to extend the application
- Requiring code quality and maintainability
- Needing unit tests
- Integrating into larger projects

**Best Practice Recommendation:** **Task 3 is the professional standard.** Even for simple programs, using functions establishes good habits and makes code enterprise-ready. The minimal overhead of function definition pays dividends in reusability, testing, and maintenance.
```

PYTHON PROGRAM TO REVER...

built-in `reversed()` function with a for loop

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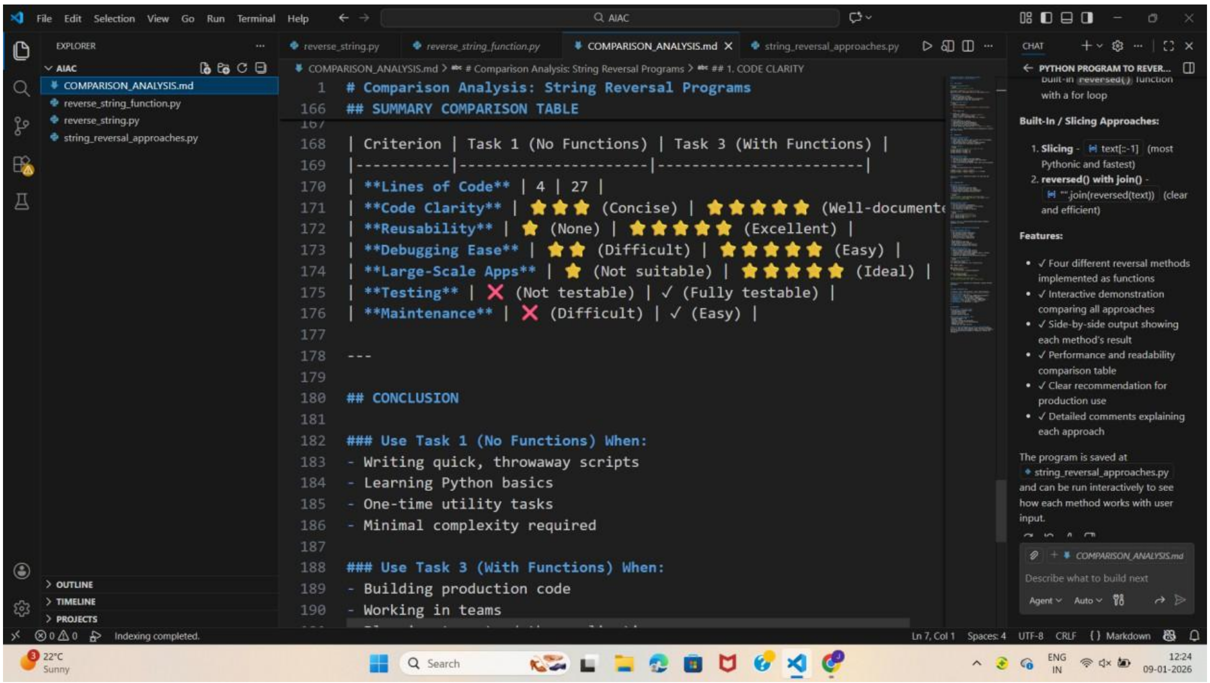
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```
# Comparison Analysis: String Reversal Programs
## SUMMARY COMPARISON TABLE

| Criterion | Task 1 (No Functions) | Task 3 (With Functions) |
|-----------|---------------------|------------------------|
| **Lines of Code** | 4 | 27 |
| **Code Clarity** | ⭐⭐⭐ (Concise) | ⭐⭐⭐⭐⭐ (Well-documente
| **Reusability** | ⭐ (None) | ⭐⭐⭐⭐⭐ (Excellent) |
| **Debugging Ease** | ⭐⭐ (Difficult) | ⭐⭐⭐⭐⭐ (Easy) |
| **Large-Scale Apps** | ⭐ (Not suitable) | ⭐⭐⭐⭐⭐ (Ideal) |
| **Testing** | ❌ (Not testable) | ✓ (Fully testable) |
| **Maintenance** | ❌ (Difficult) | ✓ (Easy) |

---

## CONCLUSION

### Use Task 1 (No Functions) When:
- Writing quick, throwaway scripts
- Learning Python basics
- One-time utility tasks
- Minimal complexity required

### Use Task 3 (With Functions) When:
- Building production code
- Working in teams
```

built-in `reversed()` function with a for loop

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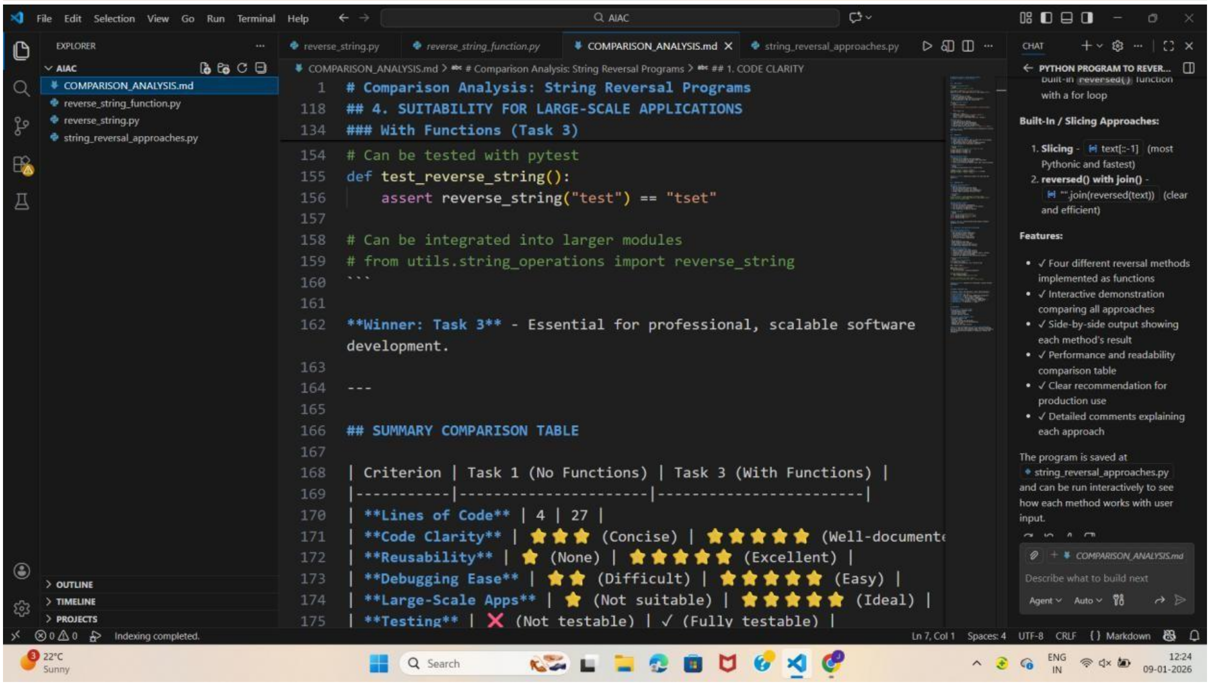
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```
# Comparison Analysis: String Reversal Programs
## 4. SUITABILITY FOR LARGE-SCALE APPLICATIONS
### With Functions (Task 3)
# Can be tested with pytest
def test_reverse_string():
    assert reverse_string("test") == "tset"

# Can be integrated into larger modules
# from utils.string_operations import reverse_string
```

Winner: Task 3 - Essential for professional, scalable software development.

SUMMARY COMPARISON TABLE

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Reusability	⭐ (None)	⭐⭐⭐⭐⭐ (Excellent)
Debugging Ease	⭐⭐ (Difficult)	⭐⭐⭐⭐⭐ (Easy)
Large-Scale Apps	⭐ (Not suitable)	⭐⭐⭐⭐⭐ (Ideal)
Testing	❌ (Not testable)	✓ (Fully testable)
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built-in `reversed()` function with a for loop

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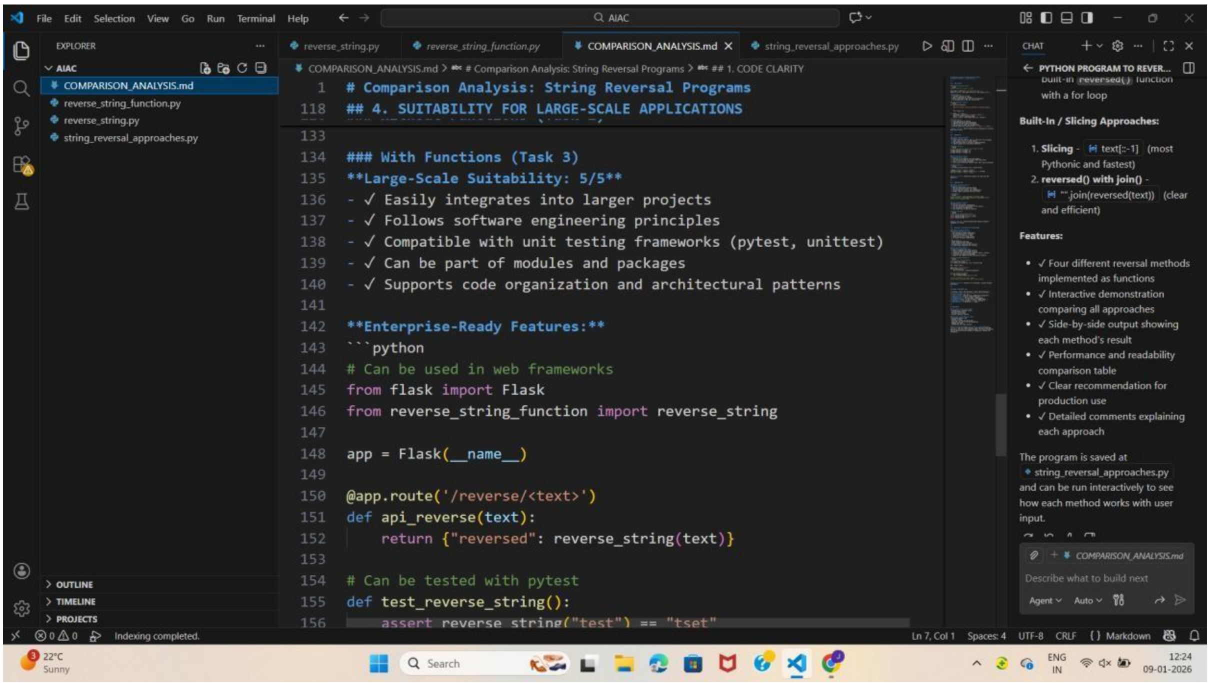
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~~~
# Comparison Analysis: String Reversal Programs
## 4. SUITABILITY FOR LARGE-SCALE APPLICATIONS

### With Functions (Task 3)
**Large-Scale Suitability: 5/5**
- ✓ Easily integrates into larger projects
- ✓ Follows software engineering principles
- ✓ Compatible with unit testing frameworks (pytest, unittest)
- ✓ Can be part of modules and packages
- ✓ Supports code organization and architectural patterns

**Enterprise-Ready Features:**
```python
# Can be used in web frameworks
from flask import Flask
from reverse_string_function import reverse_string

app = Flask(__name__)

@app.route('/reverse/<text>')
def api_reverse(text):
    return {"reversed": reverse_string(text)}

# Can be tested with pytest
def test_reverse_string():
    assert reverse_string("test") == "tset"
~~~

built-in reversed() function with a for loop

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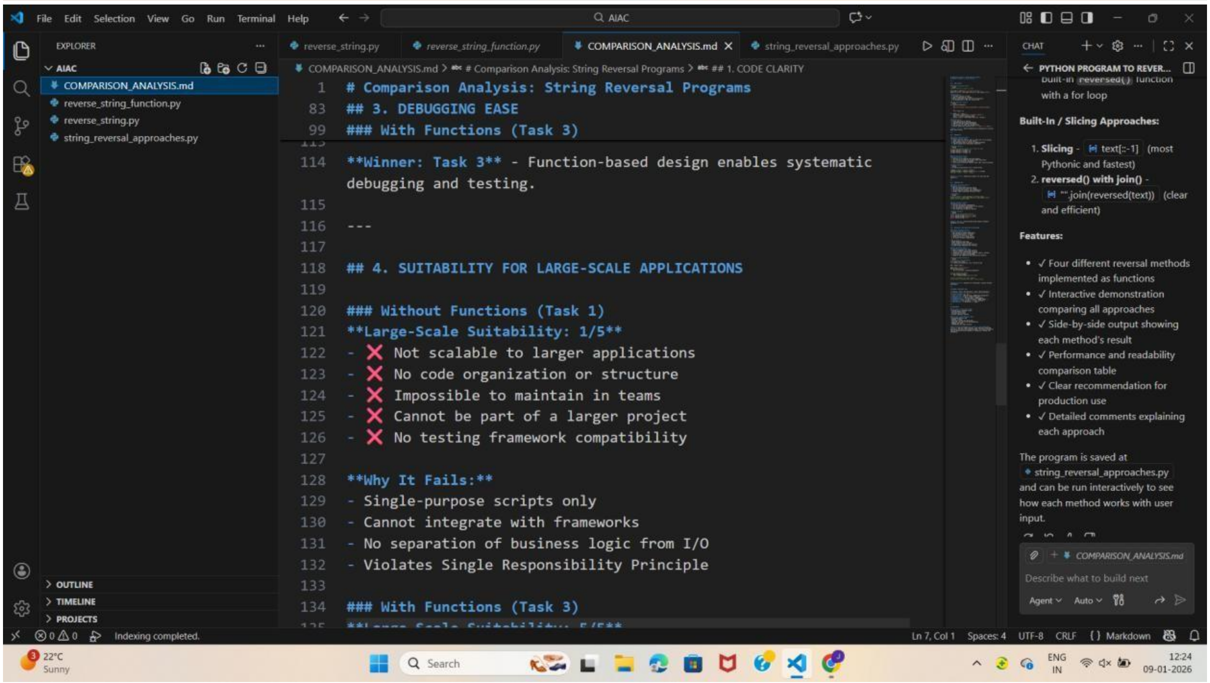
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```
# Comparison Analysis: String Reversal Programs
## 3. DEBUGGING EASE
### With Functions (Task 3)
**Winner: Task 3** - Function-based design enables systematic debugging and testing.

---

## 4. SUITABILITY FOR LARGE-SCALE APPLICATIONS

### Without Functions (Task 1)
**Large-Scale Suitability: 1/5**
- ❌ Not scalable to larger applications
- ❌ No code organization or structure
- ❌ Impossible to maintain in teams
- ❌ Cannot be part of a larger project
- ❌ No testing framework compatibility

**Why It Fails:**
- Single-purpose scripts only
- Cannot integrate with frameworks
- No separation of business logic from I/O
- Violates Single Responsibility Principle

### With Functions (Task 3)
**Large-Scale Suitability: 5/5**
```

built-in reversed() function with a for loop

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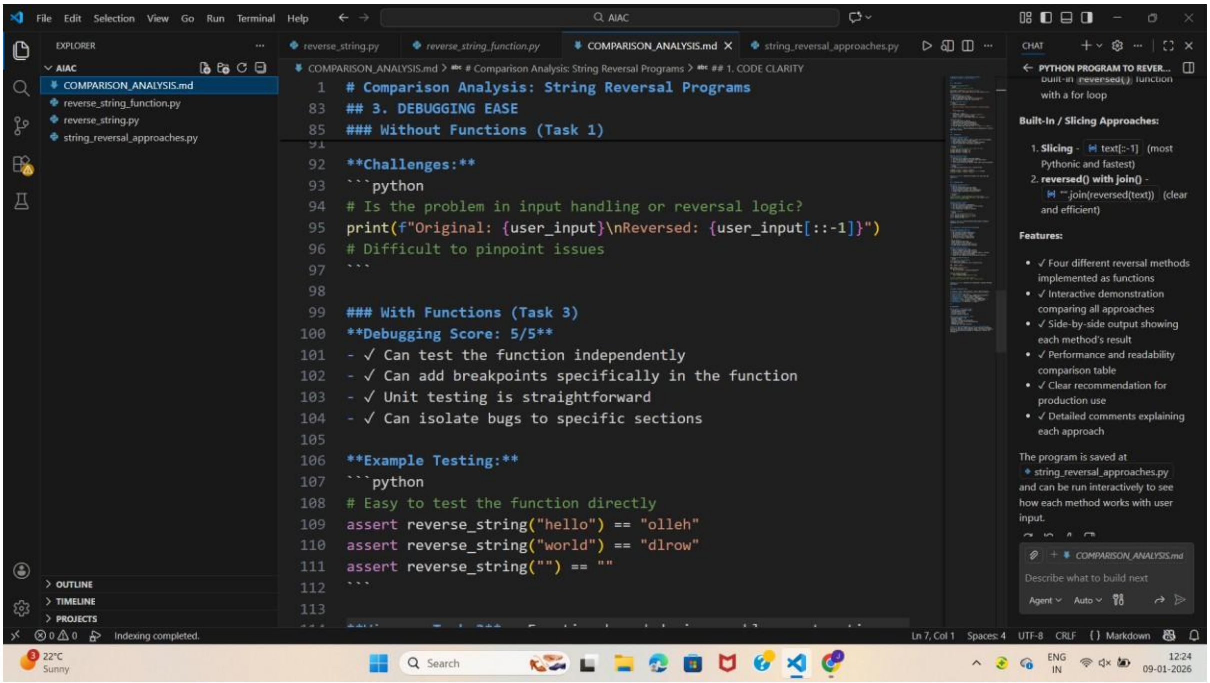

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# Comparison Analysis: String Reversal Programs
## 3. DEBUGGING EASE
### Without Functions (Task 1)

**Challenges:**
```python
# Is the problem in input handling or reversal logic?
print(f"Original: {user_input}\nReversed: {user_input[::-1]}")
# Difficult to pinpoint issues
~~~

With Functions (Task 3)
Debugging Score: 5/5
- ✓ Can test the function independently
- ✓ Can add breakpoints specifically in the function
- ✓ Unit testing is straightforward
- ✓ Can isolate bugs to specific sections

Example Testing:
```python
# Easy to test the function directly
assert reverse_string("hello") == "olleh"
assert reverse_string("world") == "dlrow"
assert reverse_string("") == ""
```

```

built-in `reversed()` function with a for loop

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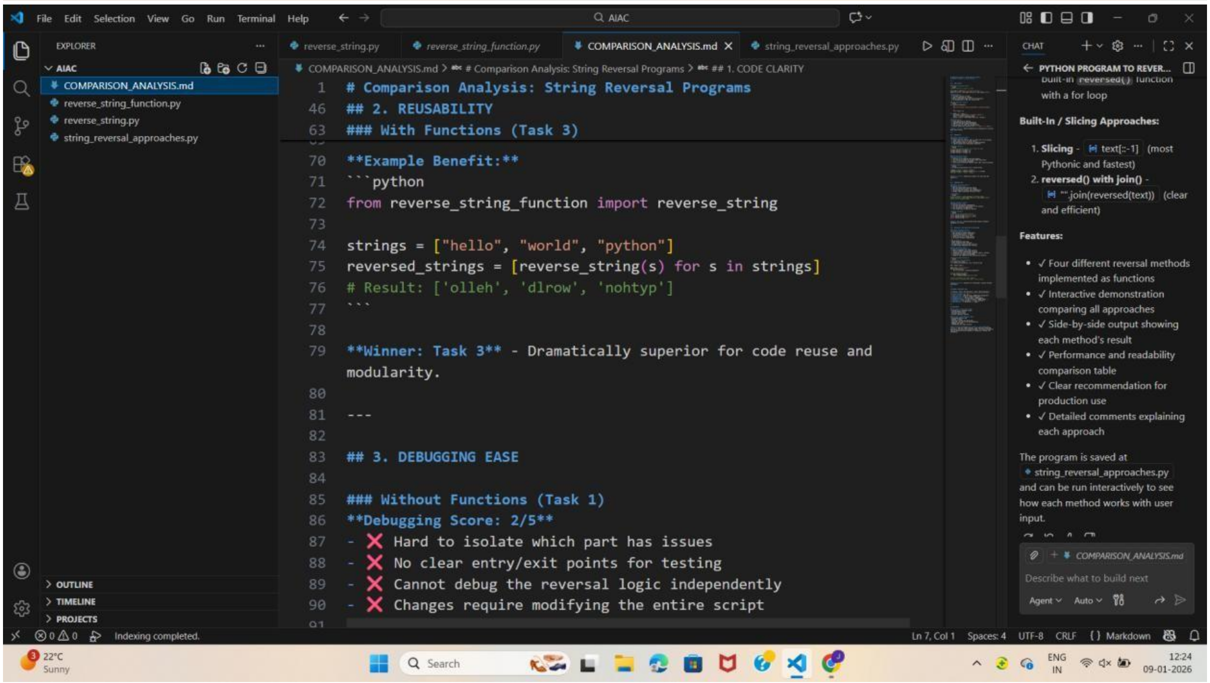
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```
Comparison Analysis: String Reversal Programs
2. REUSABILITY
With Functions (Task 3)
Example Benefit:
```python
from reverse_string_function import reverse_string

strings = ["hello", "world", "python"]
reversed_strings = [reverse_string(s) for s in strings]
# Result: ['olleh', 'dlrow', 'nohtyp']
```

Winner: Task 3 - Dramatically superior for code reuse and modularity.

---

3. DEBUGGING EASE

Without Functions (Task 1)
Debugging Score: 2/5
- ❌ Hard to isolate which part has issues
- ❌ No clear entry/exit points for testing
- ❌ Cannot debug the reversal logic independently
- ❌ Changes require modifying the entire script
```

built-in `reversed()` function with a for loop

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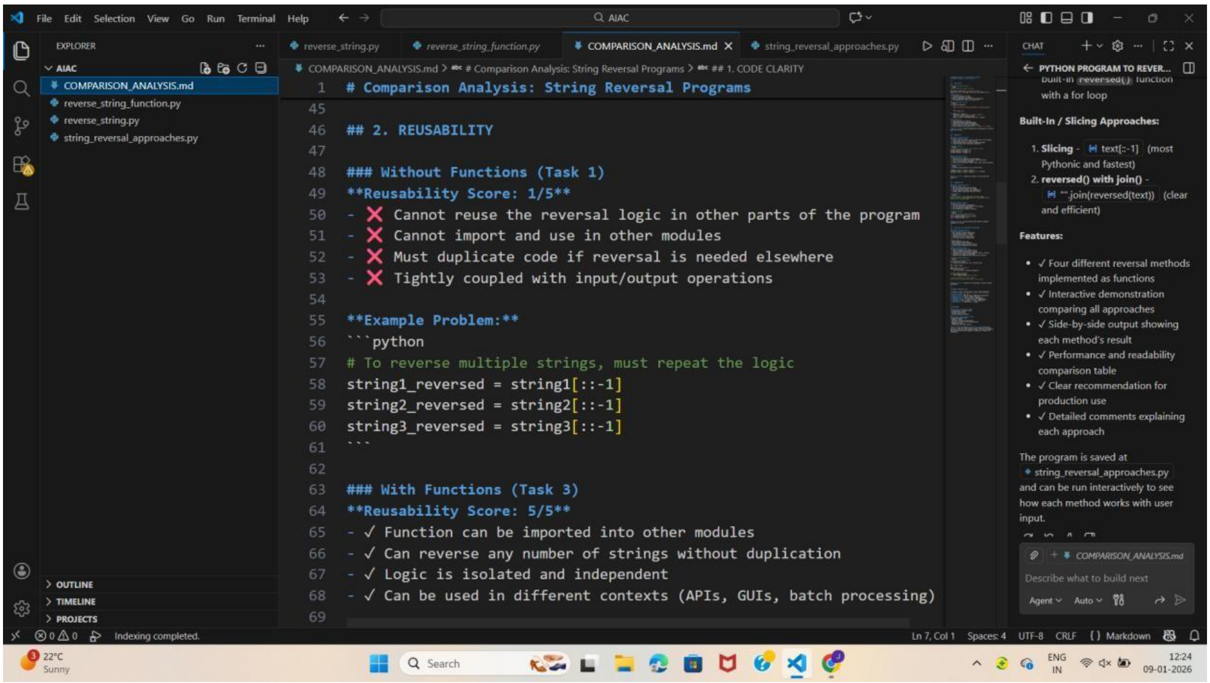
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~~~
# Comparison Analysis: String Reversal Programs

## 2. REUSABILITY

### Without Functions (Task 1)
**Reusability Score: 1/5**
- ❌ Cannot reuse the reversal logic in other parts of the program
- ❌ Cannot import and use in other modules
- ❌ Must duplicate code if reversal is needed elsewhere
- ❌ Tightly coupled with input/output operations

**Example Problem:**
```python
# To reverse multiple strings, must repeat the logic
string1_reversed = string1[::-1]
string2_reversed = string2[::-1]
string3_reversed = string3[::-1]
~~~

With Functions (Task 3)
Reusability Score: 5/5
- ✓ Function can be imported into other modules
- ✓ Can reverse any number of strings without duplication
- ✓ Logic is isolated and independent
- ✓ Can be used in different contexts (APIs, GUIs, batch processing)
```

built-in reversed() function with a for loop

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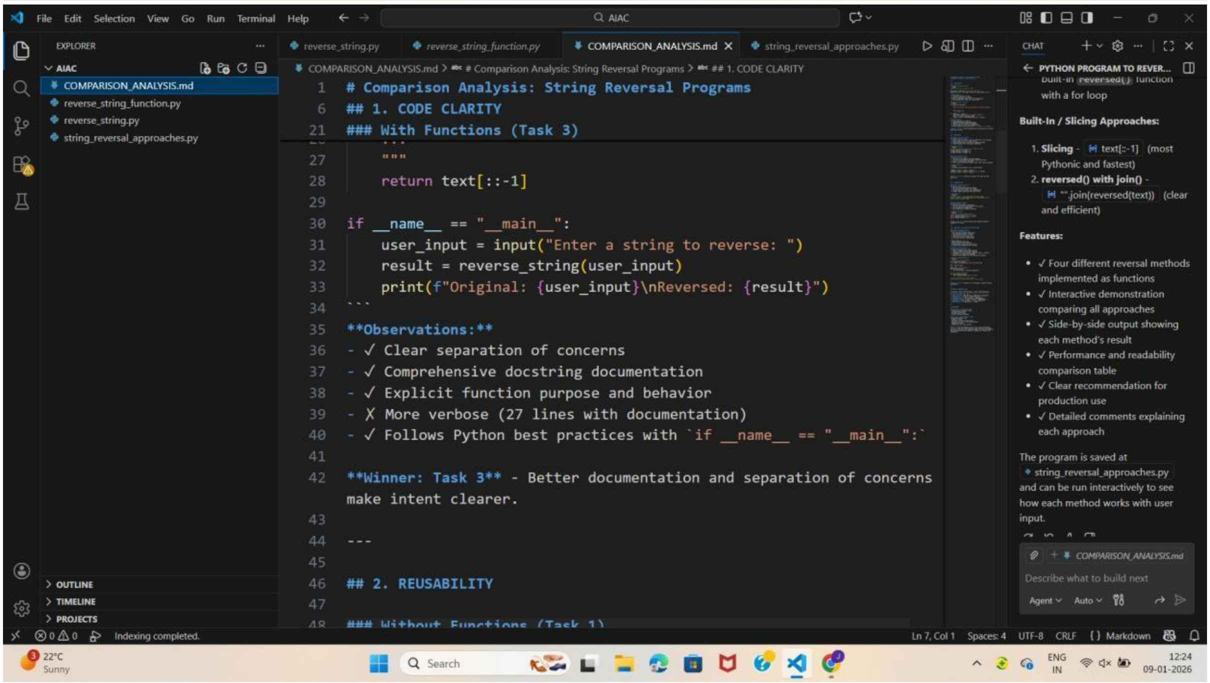
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```
# Comparison Analysis: String Reversal Programs
## 1. CODE CLARITY
### With Functions (Task 3)
    """
    return text[::-1]

if __name__ == "__main__":
    user_input = input("Enter a string to reverse: ")
    result = reverse_string(user_input)
    print(f"Original: {user_input}\nReversed: {result}")
```
Observations:
- ✓ Clear separation of concerns
- ✓ Comprehensive docstring documentation
- ✓ Explicit function purpose and behavior
- X More verbose (27 lines with documentation)
- ✓ Follows Python best practices with `if __name__ == "__main__":`

Winner: Task 3 - Better documentation and separation of concerns make intent clearer.

---

2. REUSABILITY

Without Functions (Task 1)
```

built-in reversed() function with a for loop

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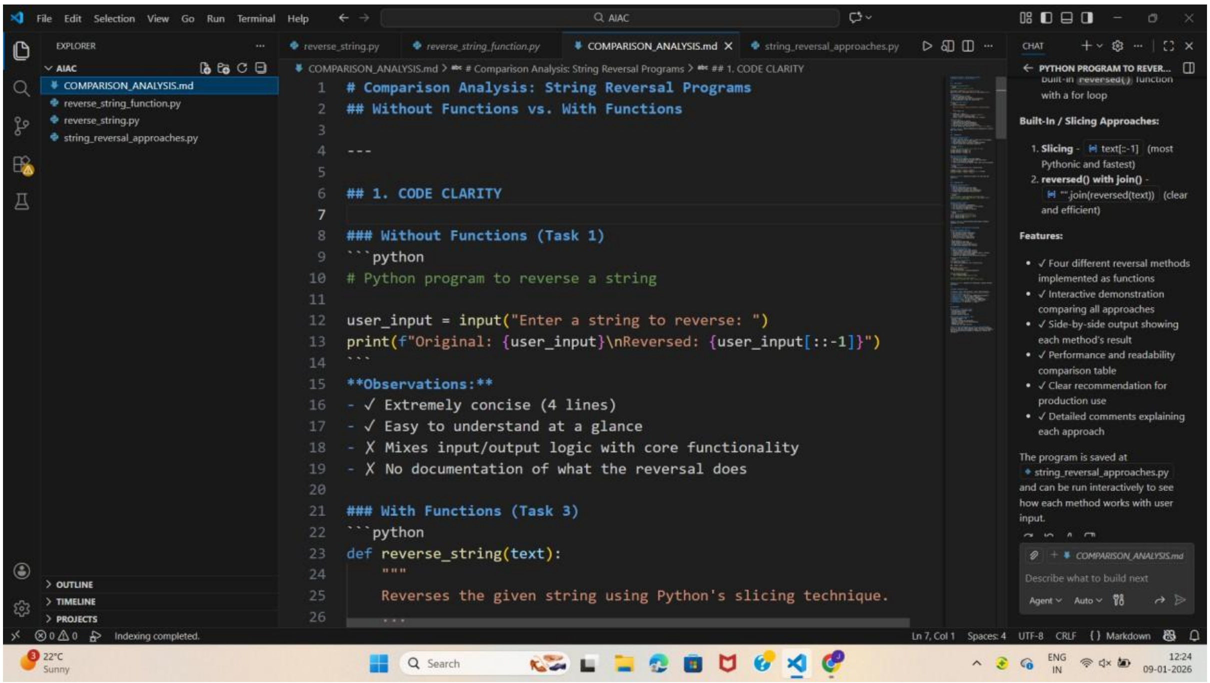

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# Comparison Analysis: String Reversal Programs
## Without Functions vs. With Functions

---

## 1. CODE CLARITY

### Without Functions (Task 1)
```python
# Python program to reverse a string

user_input = input("Enter a string to reverse: ")
print(f"Original: {user_input}\nReversed: {user_input[::-1]}")
~~~
**Observations:**
- ✓ Extremely concise (4 lines)
- ✓ Easy to understand at a glance
- ✗ Mixes input/output logic with core functionality
- ✗ No documentation of what the reversal does

### With Functions (Task 3)
```python
def reverse_string(text):
    """
    Reverses the given string using Python's slicing technique.
```

built-in reversed() function with a for loop

Built-In / Slicing Approaches:

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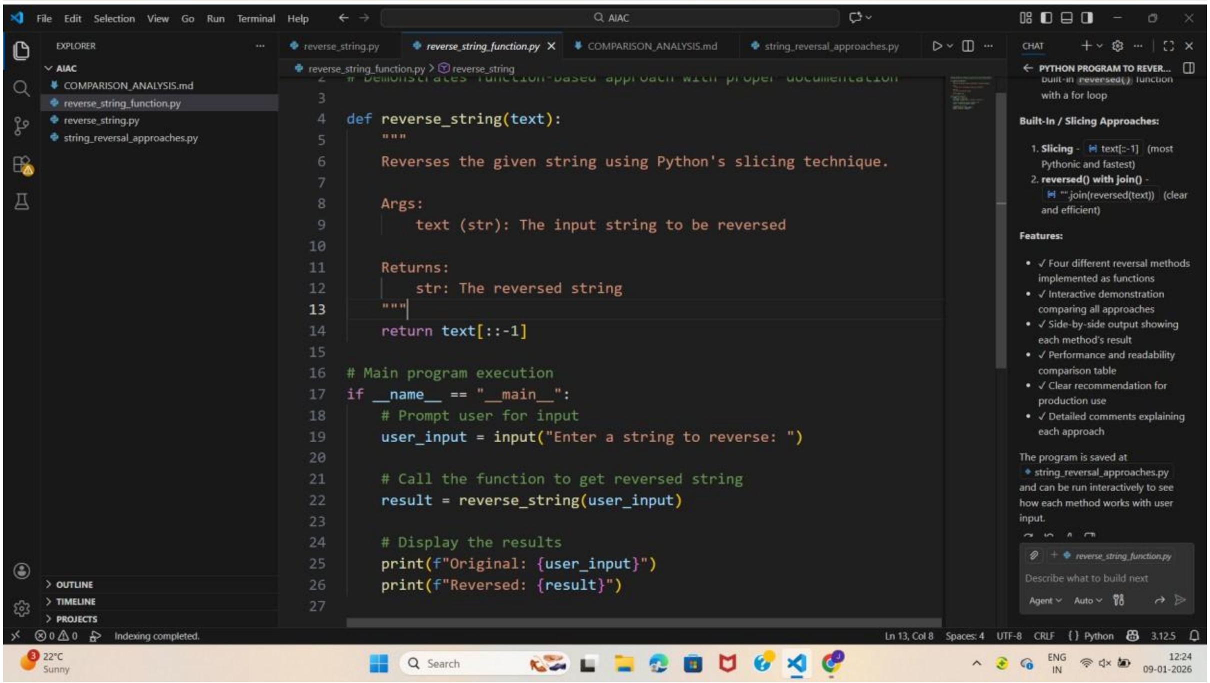

```
# Demonstrates function-based approach with proper documentation

def reverse_string(text):
    """
    Reverses the given string using Python's slicing technique.

    Args:
        text (str): The input string to be reversed

    Returns:
        str: The reversed string
    """
    return text[::-1]

# Main program execution
if __name__ == "__main__":
    # Prompt user for input
    user_input = input("Enter a string to reverse: ")

    # Call the function to get reversed string
    result = reverse_string(user_input)

    # Display the results
    print(f"Original: {user_input}")
    print(f"Reversed: {result}")
```

built-in reversed() function with a for loop

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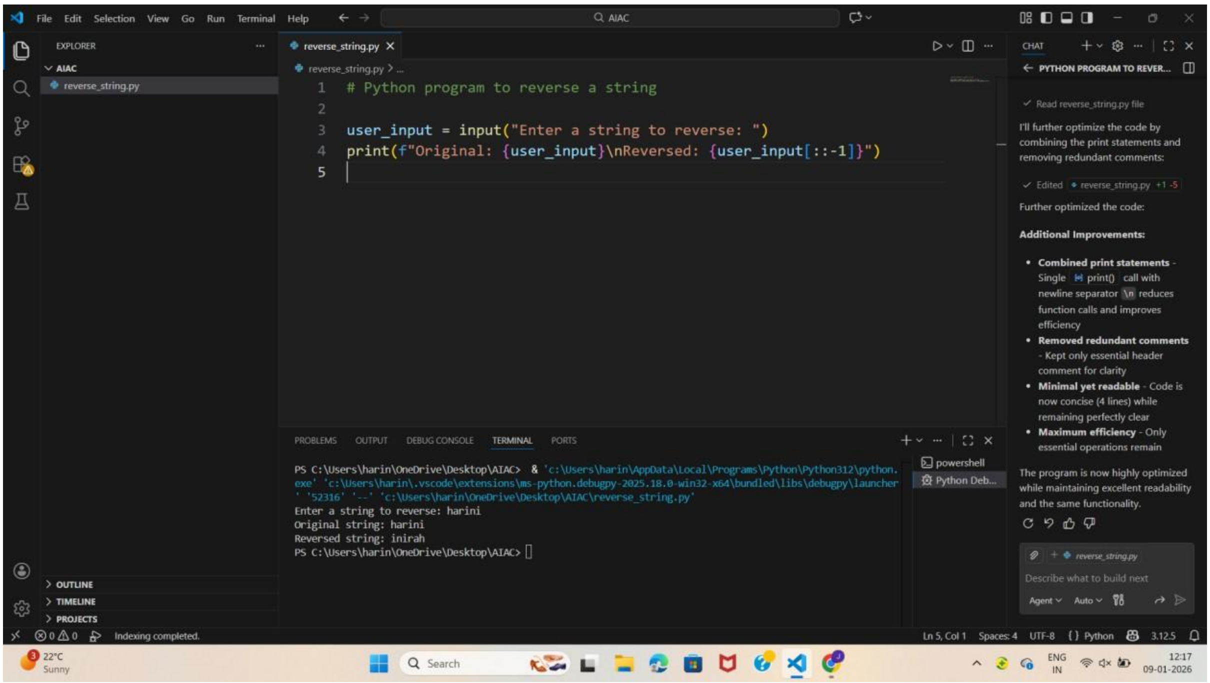

```python
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user_input = input("Enter a string to reverse: ")
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```
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exe' 'c:\Users\harin\.vscode\extensions\ms-python.debugpy-2025.18.0-win32-x64\bundled\libs\debugpy\launcher
' '52316' '--' 'c:\Users\harin\OneDrive\Desktop\AIAC\reverse_string.py'
Enter a string to reverse: harini
Original string: harini
Reversed string: inirah
PS C:\Users\harin\OneDrive\Desktop\AIAC> 
```

✓ Read reverse_string.py file

I'll further optimize the code by combining the print statements and removing redundant comments:

✓ Edited reverse_string.py +1 -5

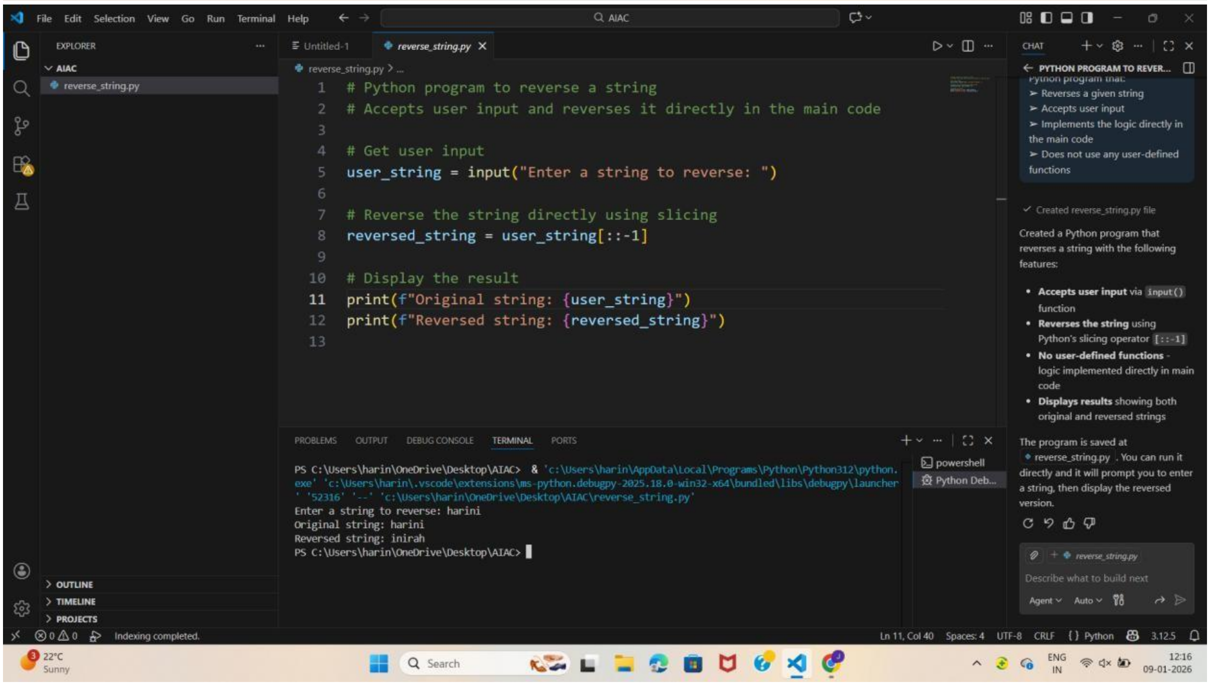
Further optimized the code:

Additional Improvements:

- **Combined print statements** - Single print() call with newline separator `\n` reduces function calls and improves efficiency
- **Removed redundant comments** - Kept only essential header comment for clarity
- **Minimal yet readable** - Code is now concise (4 lines) while remaining perfectly clear
- **Maximum efficiency** - Only essential operations remain

The program is now highly optimized while maintaining excellent readability and the same functionality.

File Edit Selection View Go Run Terminal Help
AIAC
EXPLORER
reverse_string.py
CHAT
PYTHON PROGRAM TO REVER...
Describe what to build next
Agent Auto
Ln 5, Col 1 Spaces: 4 UTF-8 Python 3.12.5
Indexing completed.
22°C Sunny
12:17 09-01-2026



```python
# Python program to reverse a string
# Accepts user input and reverses it directly in the main code

# Get user input
user_string = input("Enter a string to reverse: ")

# Reverse the string directly using slicing
reversed_string = user_string[::-1]

# Display the result
print(f"Original string: {user_string}")
print(f"Reversed string: {reversed_string}")
```

```
PS C:\Users\harin\OneDrive\Desktop\AIAC>  & 'c:\Users\harin\AppData\Local\Programs\Python\Python312\python.
exe' 'c:\Users\harin\.vscode\extensions\ms-python.debugpy-2025.18.0-win32-x64\bundled\libs\debugpy\launcher
' '52316' '--' 'c:\Users\harin\OneDrive\Desktop\AIAC\reverse_string.py'
Enter a string to reverse: harini
Original string: harini
Reversed string: inirah
PS C:\Users\harin\OneDrive\Desktop\AIAC> 
```

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

✓ Created reverse_string.py file

Created a Python program that reverses a string with the following features:

- **Accepts user input** via `input()` function
- **Reverses the string** using Python's slicing operator `[::-1]`
- **No user-defined functions** - logic implemented directly in main code
- **Displays results** showing both original and reversed strings

The program is saved at reverse_string.py. You can run it directly and it will prompt you to enter a string, then display the reversed version.

File Edit Selection View Go Run Terminal Help
AIAC
Untitled-1
reverse_string.py
CHAT
PYTHON PROGRAM TO REVER...
Describe what to build next
Agent Auto
Ln 11, Col 40 Spaces: 4 UTF-8 CRLF Python 3.12.5
Indexing completed.
22°C Sunny
12:16 09-01-2026