NAME : B.SRISHANTH ROLL NO : 2403A510G3

SUBJECT : AI ASSISTED CODING ASSIGNMENT : 12.1

Task Description #1 (Sorting – Merge Sort Implementation)

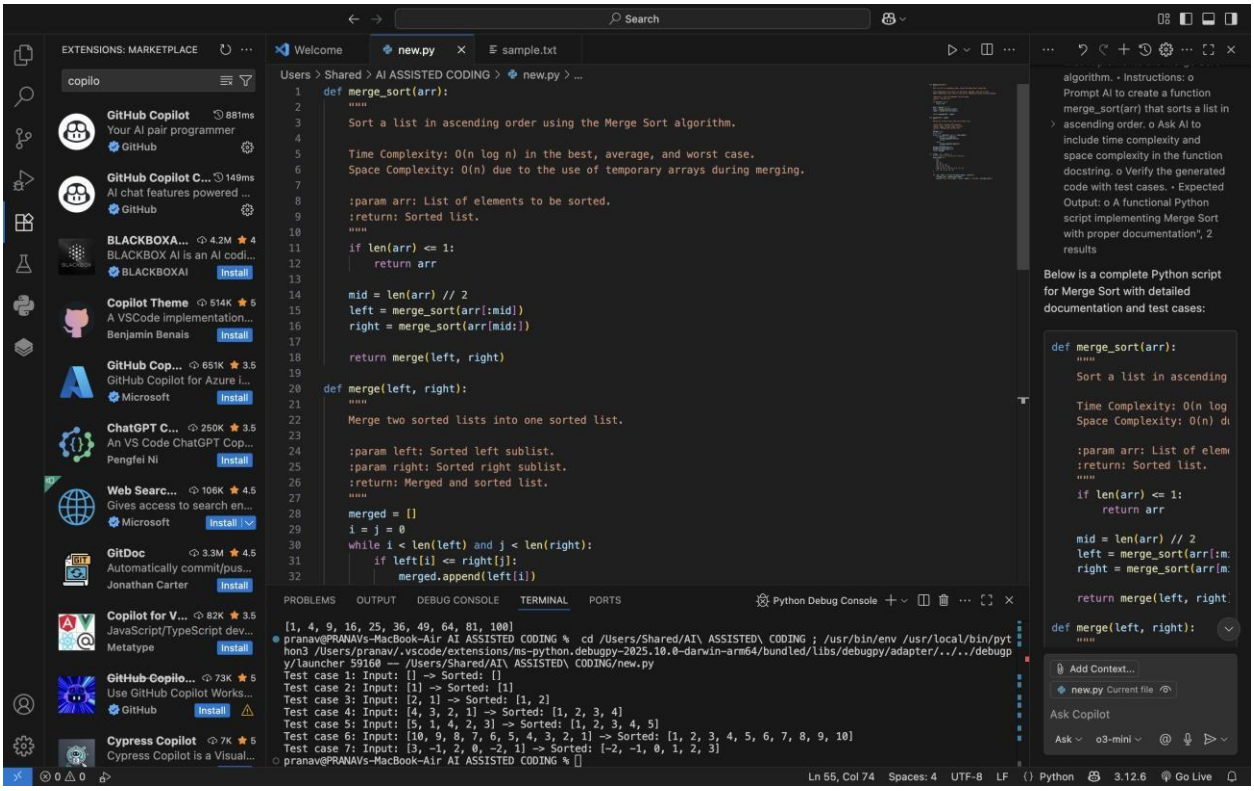
- Task: Use AI to generate a Python program that implements the Merge Sort algorithm.
- Instructions:
  - Prompt AI to create a function merge_sort(arr) that sorts a list in ascending order.
  - Ask AI to include time complexity and space complexity in the function docstring.
  - Verify the generated code with test cases.
- Expected Output:
  - A functional Python script implementing Merge Sort with proper documentation

PROMPT USED :

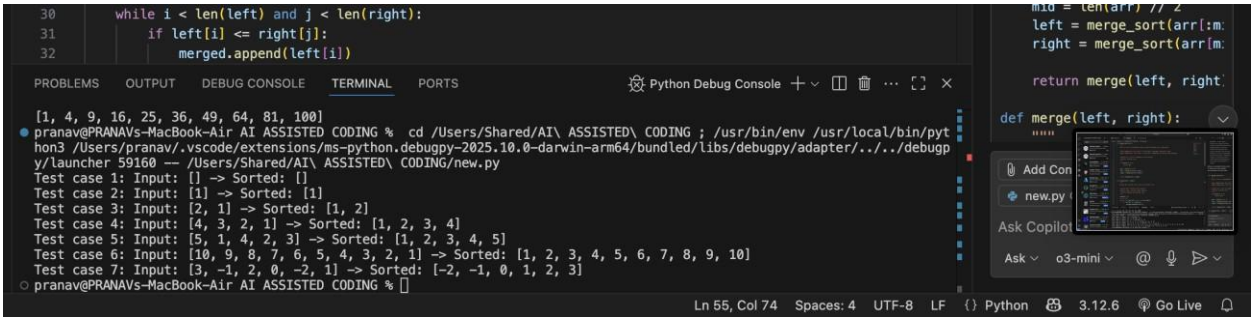
To generate a python program and to implement the merge sort algorithm

To sort in ascending order

CODE GENERATED :



OUTPUT :



Task Description #2 (Searching – Binary Search with AI Optimization)

• Task: Use AI to create a binary search function that finds a target element in a sorted list.

• Instructions:

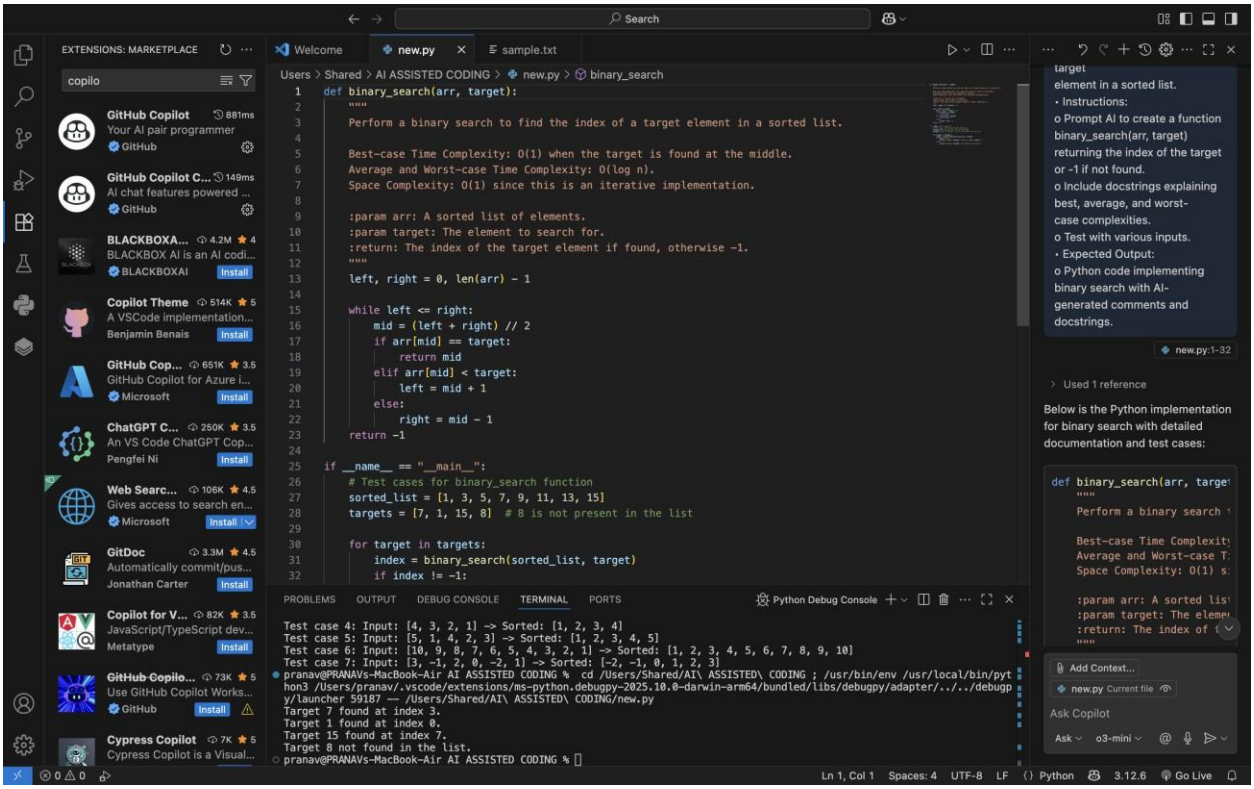
o Prompt AI to create a function binary_search(arr, target) returning the index of the target or -1 if not found.

o Include docstrings explaining best, average, and worst-case complexities.
o Test with various inputs.
• Expected Output:
o Python code implementing binary search with AI-generated comments and docstrings.

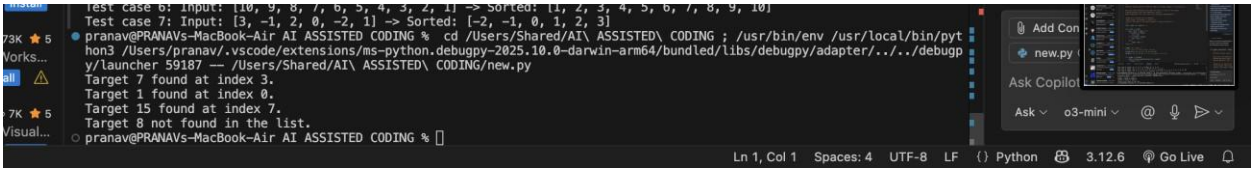
PROMPT USED :

To create a binary search function that finds a target element in a sorted list

CODE GENERATED :



OUTPUT :



Task Description #3 (Real-Time Application – Inventory Management System)

• Scenario: A

retail store's inventory system contains thousands of products, each with attributes like product ID, name, price, and stock quantity. Store staff need to:

1. Quickly search for a product by ID or name.
2. Sort products by price or quantity for stock analysis.

• Task:

o Use AI to suggest the most efficient search and sort

algorithms for this use case.

o Implement the recommended algorithms in Python.

o Justify the choice based on dataset size, update frequency, and performance requirements.

• Expected Output:

o A table mapping operation → recommended algorithm → justification.

o Working Python functions for searching and sorting the inventory.

Deliverables (For All Tasks)

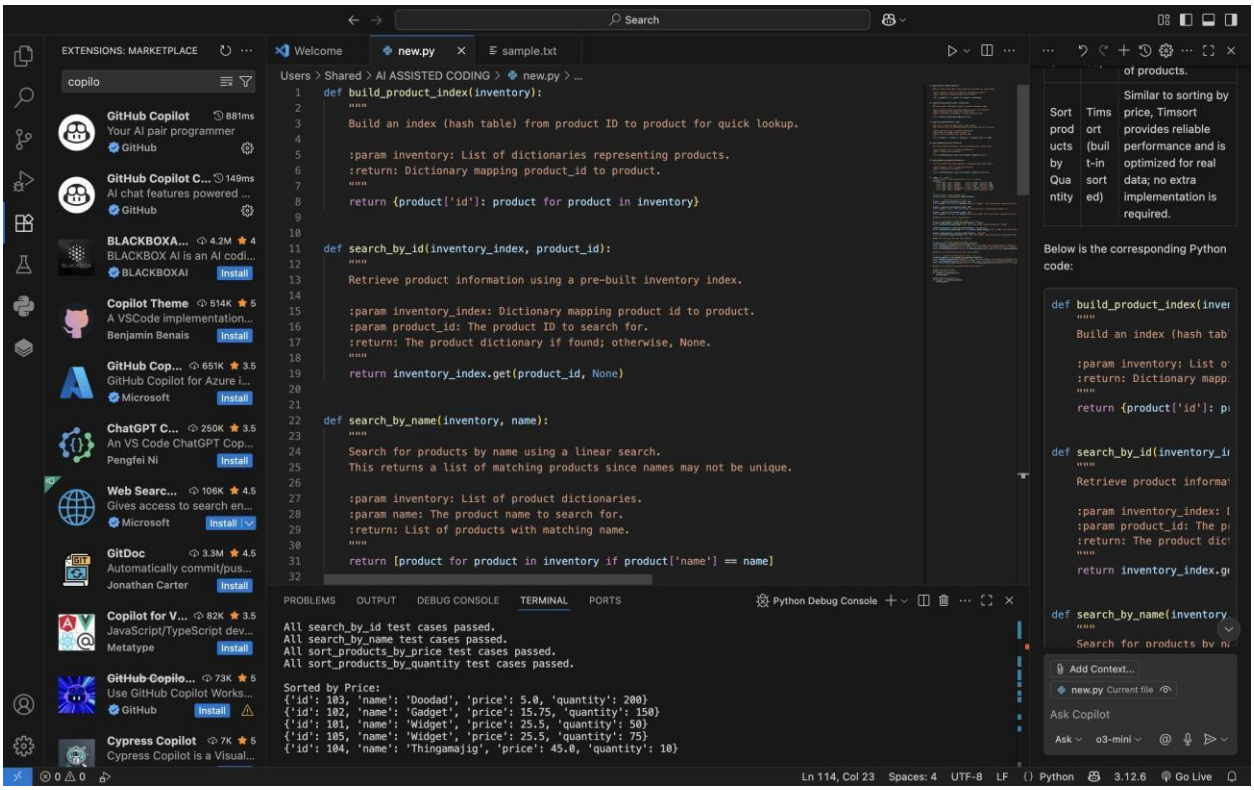
1. AI-generated prompts for code and test case generation.
2. At least 3 assert test cases for each task.
3. AI-generated initial code and execution screenshots.
4. Analysis of whether code passes all tests.
5. Improved final version with inline comments and explanation.
6. Compiled report (Word/PDF) with prompts, test cases, assertions, code, and output.

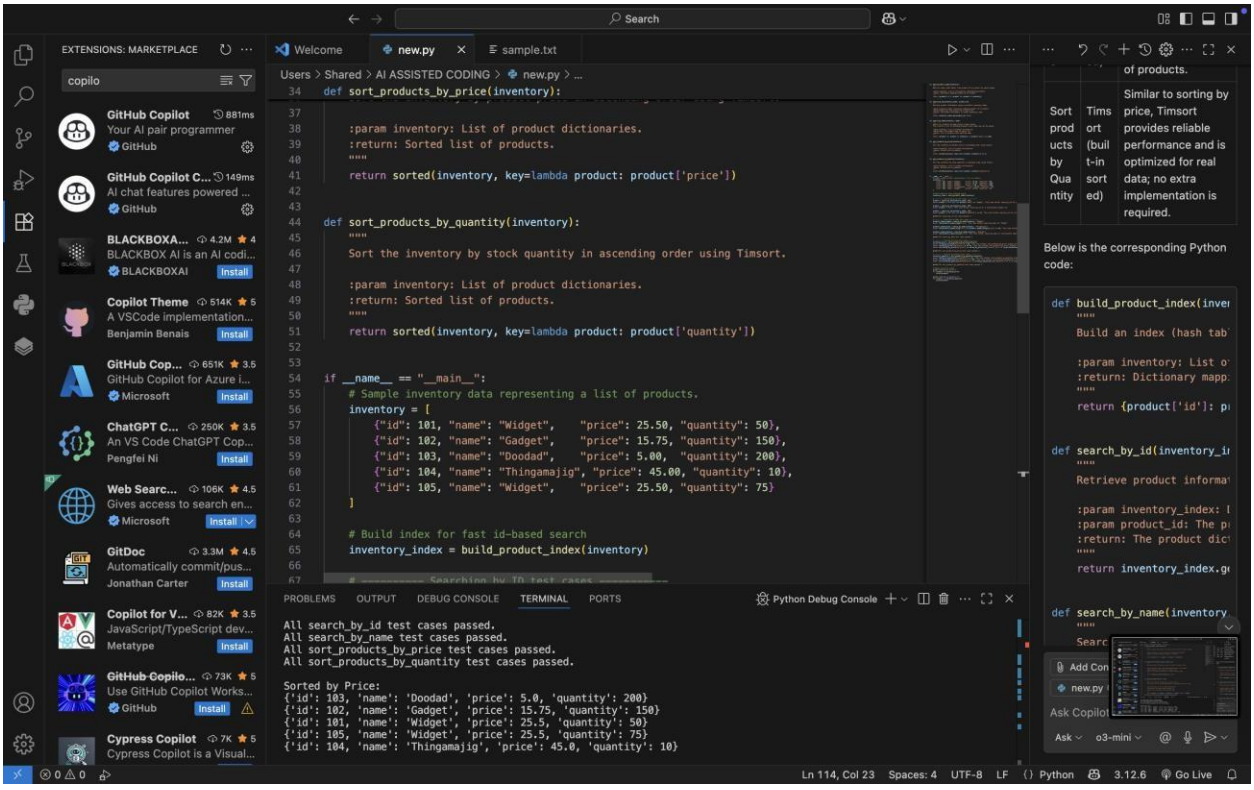
PROMPT USED :

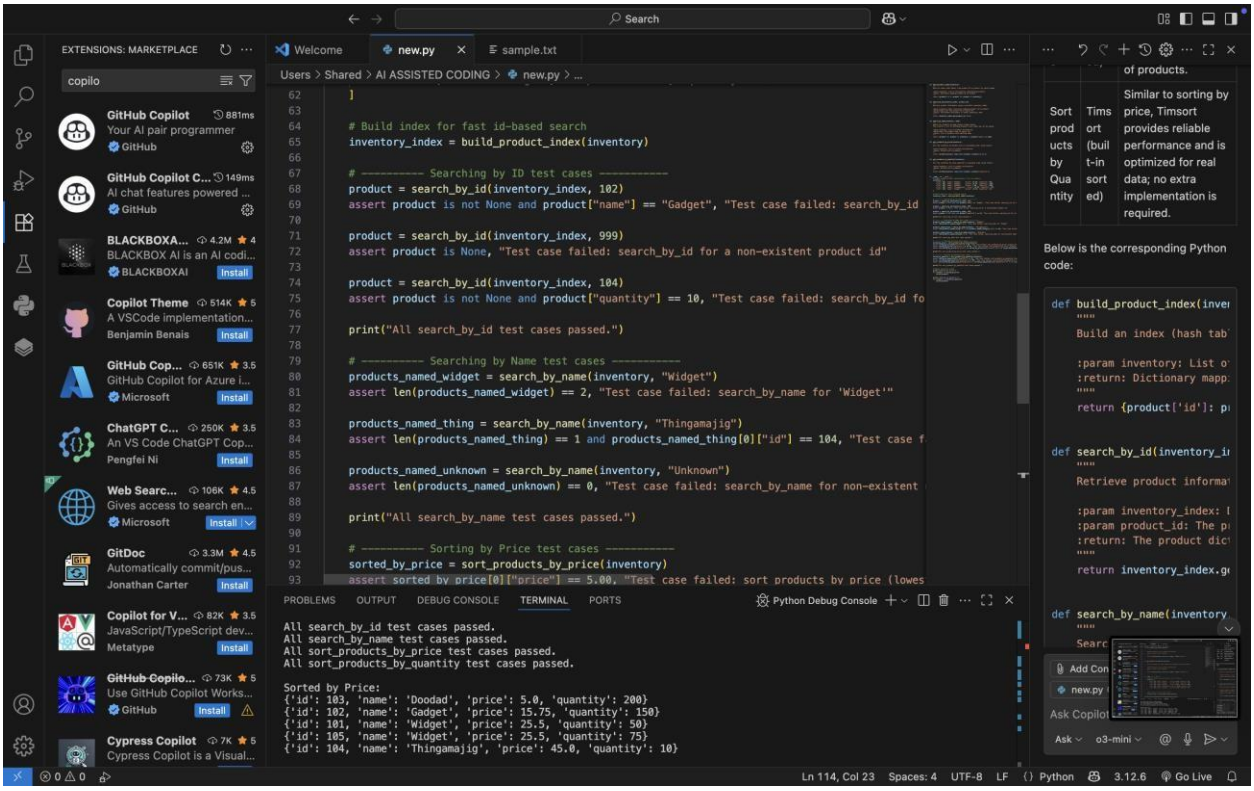
To write the code for a retail store's inventory system contains thousands of products, each with attributes like product ID, name, price, and stock quantity. Store staff need to:

1. Quickly search for a product by ID or name.
2. Sort products by price or quantity for stock analysis.

CODE GENERATED :



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new.py
sample.txt
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# Build index for fast id-based search
inventory_index = build_product_index(inventory)
# ---------- Searching by ID test cases ----------
product = search_by_id(inventory_index, 102)
assert product is not None and product["name"] == "Gadget", "Test case failed: search_by_id
product = search_by_id(inventory_index, 999)
assert product is None, "Test case failed: search_by_id for a non-existent product id"
product = search_by_id(inventory_index, 104)
assert product is not None and product["quantity"] == 10, "Test case failed: search_by_id fo
print("All search_by_id test cases passed.")
# ---------- Searching by Name test cases ----------
products_named_widget = search_by_name(inventory, "Widget")
assert len(products_named_widget) == 2, "Test case failed: search_by_name for 'Widget'"
products_named_thing = search_by_name(inventory, "Thingamajig")
assert len(products_named_thing) == 1 and products_named_thing[0]["id"] == 104, "Test case f
products_named_unknown = search_by_name(inventory, "Unknown")
assert len(products_named_unknown) == 0, "Test case failed: search_by_name for non-existent
print("All search_by_name test cases passed.")
# ---------- Sorting by Price test cases ----------
sorted_by_price = sort_products_by_price(inventory)
assert sorted_by_price[0]["price"] == 5.00, "Test case failed: sort_products_by_price (lowes
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
Python Debug Console
All search_by_id test cases passed.
All search_by_name test cases passed.
All sort_products_by_price test cases passed.
All sort_products_by_quantity test cases passed.
Sorted by Price:
{'id': 103, 'name': 'Doodad', 'price': 5.0, 'quantity': 200}
{'id': 102, 'name': 'Gadget', 'price': 15.75, 'quantity': 150}
{'id': 101, 'name': 'Widget', 'price': 25.5, 'quantity': 50}
{'id': 105, 'name': 'Widget', 'price': 25.5, 'quantity': 75}
{'id': 104, 'name': 'Thingamajig', 'price': 45.0, 'quantity': 10}
of products.
Sort products by Quantity
Timsort (built-in sorted)
Similar to sorting by price, Timsort provides reliable performance and is optimized for real data; no extra implementation is required.
Below is the corresponding Python code:
def build_product_index(inve
"""
Build an index (hash tab
:param inventory: List o
:return: Dictionary mapp
"""
return {product['id']: p
def search_by_id(inventory_i
"""
Retrieve product informa
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return inventory_index.g
def search_by_name(inventory
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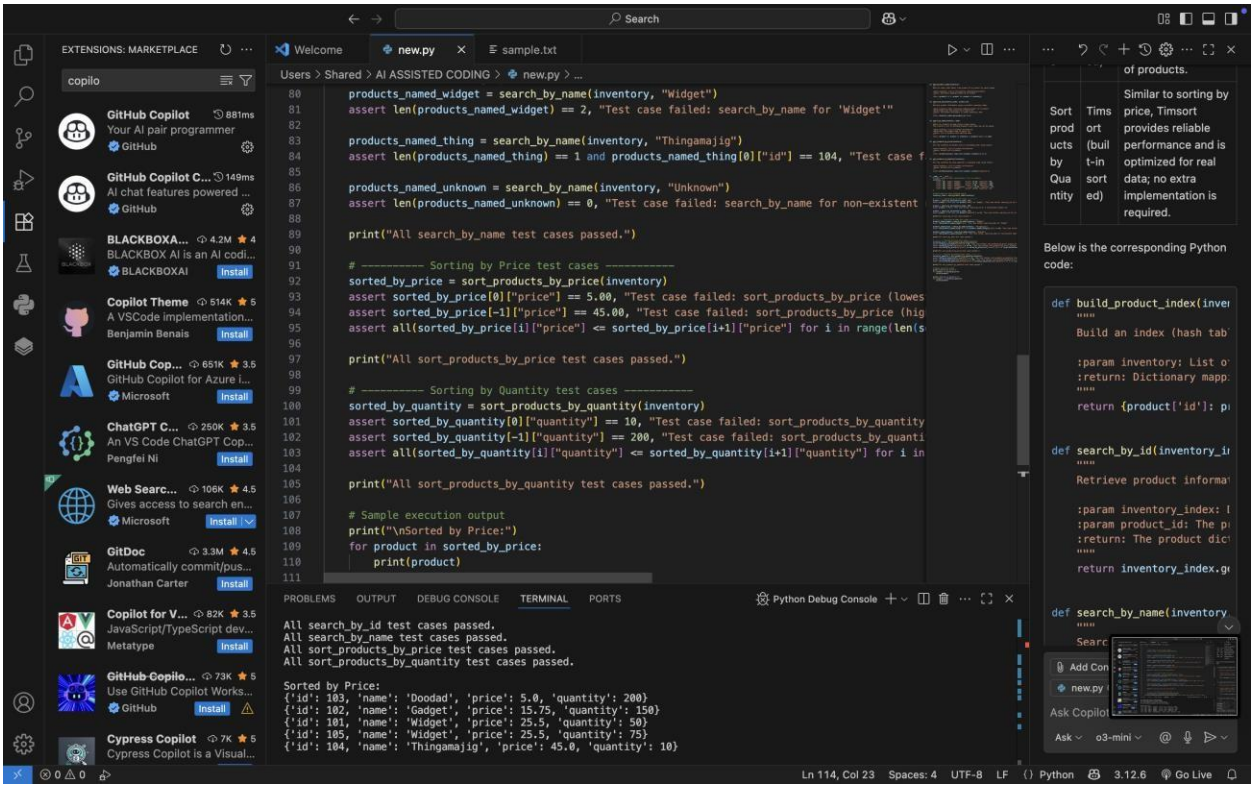
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assert sorted_by_price[-1]["price"] == 45.00, "Test case failed: sort_products_by_price (hig
assert all(sorted_by_price[i]["price"] <= sorted_by_price[i+1]["price"] for i in range(len(s
print("All sort_products_by_price test cases passed.")
# ---------- Sorting by Quantity test cases ----------
sorted_by_quantity = sort_products_by_quantity(inventory)
assert sorted_by_quantity[0]["quantity"] == 10, "Test case failed: sort_products_by_quantity
assert sorted_by_quantity[-1]["quantity"] == 200, "Test case failed: sort_products_by_quanti
assert all(sorted_by_quantity[i]["quantity"] <= sorted_by_quantity[i+1]["quantity"] for i in
print("All sort_products_by_quantity test cases passed.")
# Sample execution output
print("\nSorted by Price:")
for product in sorted_by_price:
print(product)
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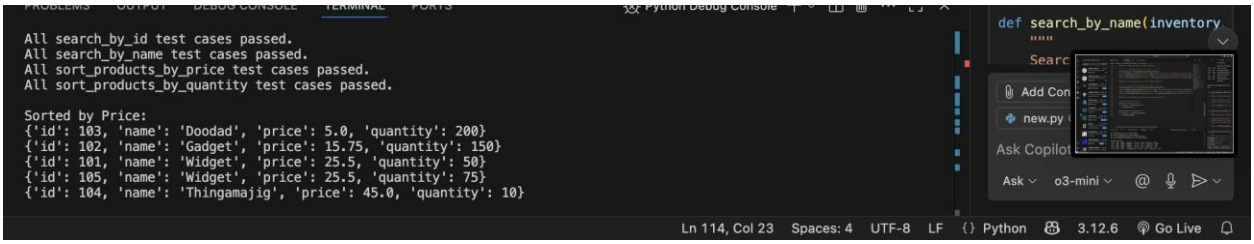
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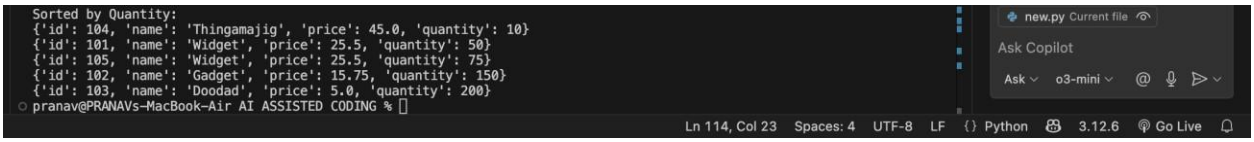
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