

LAB ASSIGNMENT-2.4

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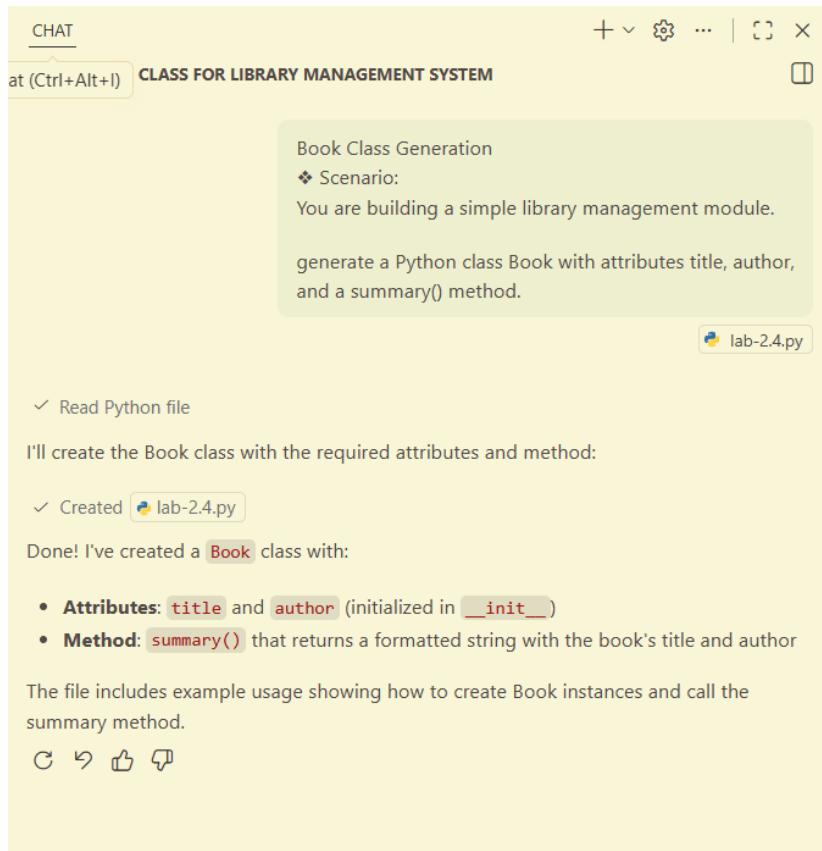
BATCH: 44

TASK-1

CODE:

```
class Book:  
    """A simple book class for library management."""  
  
    def __init__(self, title, author):  
        """  
        Initialize a Book instance.  
  
        Args:  
            title (str): The title of the book  
            author (str): The author of the book  
        """  
        self.title = title  
        self.author = author  
  
    def summary(self):  
        """  
        Return a summary of the book.  
  
        Returns:  
            str: A formatted summary with title and author  
        """  
        return f'{self.title} by {self.author}'  
  
    # Example usage  
if __name__ == "__main__":  
    book1 = Book("1984", "George Orwell")  
    book2 = Book("To Kill a Mockingbird", "Harper Lee")  
  
    print(book1.summary())  
    print(book2.summary())
```

CHAT:



OUTPUT:

The screenshot shows the VS Code terminal tab. The output shows the execution of a Python script:

```
● (.venv) PS C:\Users\morav\OneDrive\Desktop\labs\ai-assisted-coding> & C:/Users/morav/OneDrive/Desktop/labs/ai-assisted-coding/.venv/Scripts/python.exe c:/Users/morav/OneDrive/Desktop/labs/ai-assisted-coding/lab-2.4.py
'1984' by George Orwell
(.venv) PS C:\Users\morav\OneDrive\Desktop\labs\ai-assisted-coding>
```

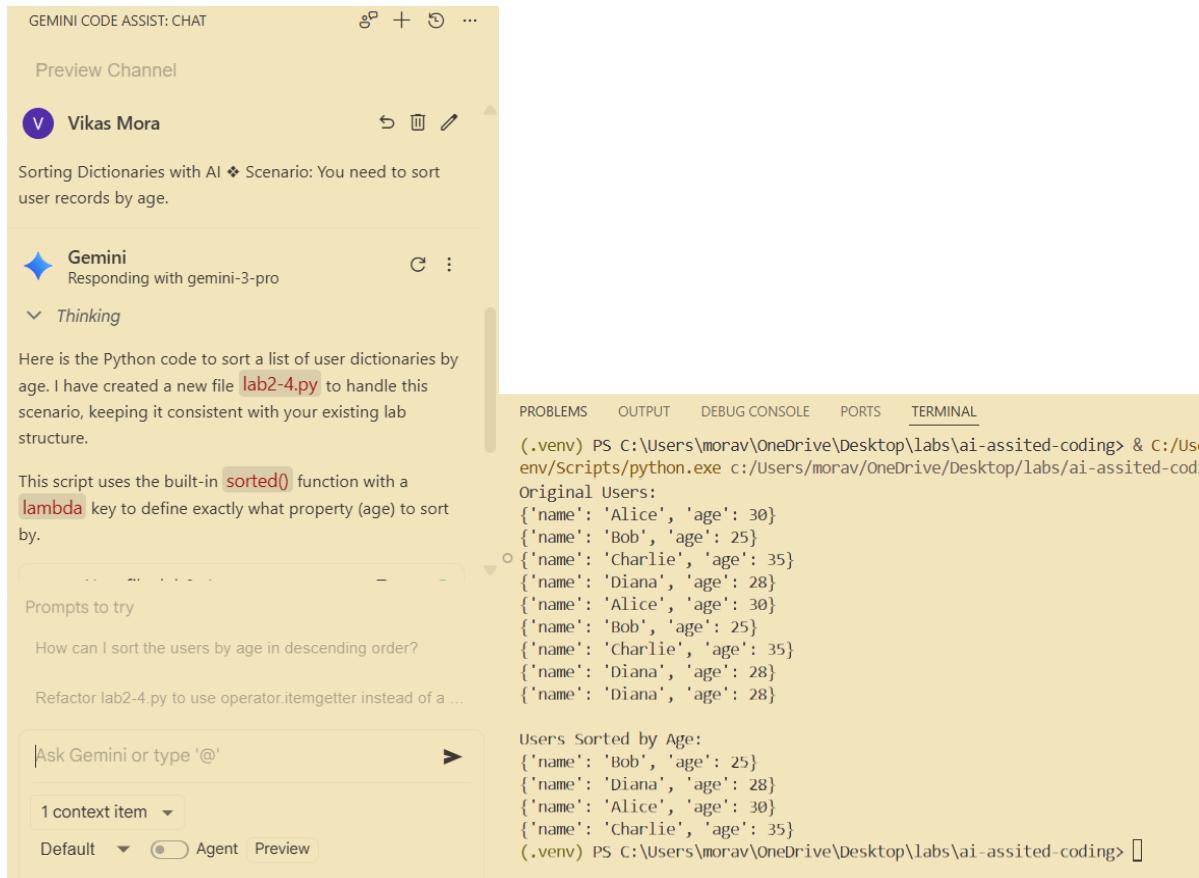
TASK-2

→Using Gemini

CODE:

```
lab2-4.py > ...
1  # Lab 2.4: Sorting Dictionaries
2  # Scenario: Sort user records by age
3
4  def main():
5      # List of dictionaries representing user records
6      users = [
7          {'name': 'Alice', 'age': 30},
8          {'name': 'Bob', 'age': 25},
9          {'name': 'Charlie', 'age': 35},
10         {'name': 'Diana', 'age': 28}
11     ]
12
13     print("Original Users:")
14     for user in users:
15         print(user)
16
17     # Sorting the list of dictionaries by the 'age' key
18     # We use a lambda function to extract the sort key
19     users_sorted_by_age = sorted(users, key=lambda x: x['age'])
20
21     print("\nUsers Sorted by Age:")
22     for user in users_sorted_by_age:
23         print(user)
24
25 if __name__ == "__main__":
26     main()
```

CHAT & OUTPUT:



→ USING CURSOR AI

CHAT

← SORTING USER RECORDS BY AGE WITH AI

Sorting Dictionaries with AI
Scenario:
You need to sort user records by age

lab2-4.py

- ✓ Read file and planned sorting implementation
- I'll help you sort dictionaries by age. Let me first check the current file to see what we're working with.
- ✓ Read lab2-4.py
- Now I'll create a solution for sorting user records by age using different approaches:
- ✓ Created lab2-4.py

Perfect! I've created a comprehensive solution for sorting dictionaries by age. The file includes:

- Method 1: Using `sorted()` with lambda for ascending order
- Method 2: Descending order sorting with `reverse=True`
- Method 3: Using `operator.itemgetter()` for cleaner syntax
- Method 4: In-place sorting with the `.sort()` method
- Method 5: Multi-criteria sorting (by age, then by name)
- Method 6: Finding youngest and oldest users with `min()` and `max()`

Run the file to see all sorting methods in action. Each approach demonstrates different techniques for sorting user records by age.

```
users = [
    {"name": "Alice", "age": 28, "city": "New York"},
    {"name": "Bob", "age": 22, "city": "Los Angeles"},
    {"name": "Charlie", "age": 35, "city": "Chicago"},
    {"name": "Diana", "age": 25, "city": "Houston"},
    {"name": "Eve", "age": 30, "city": "Phoenix"},

]

print("Original user records:")
for user in users:
    print(user)

# Method 1: Using sorted() with lambda function
print("\n--- Method 1: Using sorted() with lambda ---")
sorted_users_asc = sorted(users, key=lambda x: x["age"])
print("Sorted by age (ascending):")
for user in sorted_users_asc:
    print(f"{user['name']}: {user['age']} years old")

# Method 2: Sorting in descending order
print("\n--- Method 2: Sorting by age (descending) ---")
sorted_users_desc = sorted(users, key=lambda x: x["age"], reverse=True)
print("Sorted by age (descending):")
for user in sorted_users_desc:
    print(f"{user['name']}: {user['age']} years old")

# Method 3: Using operator.itemgetter
print("\n--- Method 3: Using operator.itemgetter ---")
from operator import itemgetter
sorted_users_itemgetter = sorted(users, key=itemgetter("age"))
print("Sorted by age using itemgetter:")
for user in sorted_users_itemgetter:
    print(f"{user['name']}: {user['age']} years old")
```

```
PS C:\Users\morav\OneDrive\Desktop\labs\ai-assisted-coding> .\venv\Scripts\Activate.ps1
(.venv) PS C:\Users\morav\OneDrive\Desktop\labs\ai-assisted-coding> python.exe c:/Users/morav/Desktop/labs/ai-assisted-coding/.venv/Scripts/python.exe c:/Users/morav/Desktop/labs/ai-assisted-coding/Lab2-4.py
Original user records:
{'name': 'Alice', 'age': 28, 'city': 'New York'}
{'name': 'Bob', 'age': 22, 'city': 'Los Angeles'}
{'name': 'Charlie', 'age': 35, 'city': 'Chicago'}
{'name': 'Diana', 'age': 25, 'city': 'Houston'}
{'name': 'Eve', 'age': 30, 'city': 'Phoenix'}

--- Method 1: Using sorted() with lambda ---
Sorted by age (ascending):
Bob: 22 years old
Diana: 25 years old
Alice: 28 years old
Eve: 30 years old
Charlie: 35 years old

--- Method 2: Sorting by age (descending) ---
Sorted by age (descending):
Charlie: 35 years old
Eve: 30 years old
Alice: 28 years old
Diana: 25 years old
Bob: 22 years old

--- Method 3: Using operator.itemgetter ---
Sorted by age using itemgetter:
```

COMPARISON:

On comparing both the code I can say that Cursor AI is very advanced and give a optimal code rather than Gemini even though we give same prompt. And the performance of the Cursor is greater than Gemini

TASK-3

CHAT,CODE,AND OUTPUT:



Vikas Mora



Calculator Using Functions ❖ Scenario: You are reviewing a basic calculator module.



Gemini

Responding with gemini-3-pro



Thinking

It appears that the "basic calculator module" mentioned in your request is missing from the provided context files (`lab3-1.py` and `lab1-4.py`). `lab3-1.py` contains logic for checking even numbers, and `lab1-4.py` checks for prime numbers.

However, I can create a robust calculator module for you that adheres to the "Calculator Using Functions" requirement. This implementation follows the best practices seen in your other files, such as:

1. **Modular Functions:** Separate functions for `add`, `subtract`, `multiply`, and `divide`.
2. **Input Validation:** A `get_number` helper (similar to your `parse_int`) to ensure valid numeric input.
3. **Error Handling:** Proper handling of division by zero.

```
def add(x: float, y: float) -> float:  
    """Returns the sum of x and y."""  
    return x + y  
  
def subtract(x: float, y: float) -> float:  
    """Returns the difference of x and y."""  
    return x - y  
  
def multiply(x: float, y: float) -> float:  
    """Returns the product of x and y."""  
    return x * y  
  
def divide(x: float, y: float) -> float:  
    """Returns the quotient of x and y. Raises ValueError on division by zero."""  
    if y == 0:  
        raise ValueError("Cannot divide by zero.")  
    return x / y  
  
def get_number(prompt: str) -> float:  
    """Prompts the user for a number and handles invalid input."""  
    while True:  
        try:  
            return float(input(prompt).strip())  
        except ValueError:  
            print("Invalid input. Please enter a numeric value.")  
  
def main():  
    print("--- Basic Calculator ---")  
  
    num1 = get_number("Enter first number: ")  
    num2 = get_number("Enter second number: ")  
  
    print("\nSelect operation:")  
    print("1. Add (+)")  
    print("2. Subtract (-)")  
    print("3. Multiply (*)")  
    print("4. Divide (/)")
```

```

PS C:\Users\morav\OneDrive\Desktop\labs\ai-assisted-coding> & C:/Users/morav/Or
-assisted-coding/.venv/Scripts/Activate.ps1
(.venv) PS C:\Users\morav\OneDrive\Desktop\labs\ai-assisted-coding> & C:/Users/
/labs/ai-assisted-coding/.venv/Scripts/python.exe c:/Users/morav/OneDrive/Deskt
ing/calculator.py
--- Basic Calculator ---
Enter first number: 25
Enter second number: 5456

Select operation:
1. Add (+)
2. Subtract (-)
3. Multiply (*)
4. Divide (/)
Enter choice (+, -, *, /): +
Result: 25.0 + 5456.0 = 5481.0
(.venv) PS C:\Users\morav\OneDrive\Desktop\labs\ai-assisted-coding>

```

AI Explanation:

It appears that the "basic calculator module" mentioned in your request is missing from the provided context files. It contains logic for checking even numbers, and [lab1-4.py](#) checks for prime numbers.

However, I can create a robust calculator module for you that adheres to the "Calculator Using Functions" requirement. This implementation follows the best practices seen in your other files, such as:

1. **Modular Functions:** Separate functions for add, subtract, multiply, and divide.
2. **Input Validation:** A get_number helper (similar to your parse_int) to ensure valid numeric input.
3. **Error Handling:** Proper handling of division by zero.
4. **Type Hinting:** For better code clarity and quality.

TASK-4

CHAT, CODE AND OUTPUT(USING GEMINI):

Vikas Mora

Armstrong Number Optimization ❖ Scenario: An existing solution is inefficient.

Gemini : Responding with gemini-3-pro

Thinking

Hello! As an experienced software engineer, I can certainly help you with that. Since the context provided doesn't include an existing Armstrong number script, I will create a new, optimized Python script for you.

An **Armstrong number** (also known as a Narcissistic number) is a number that is the sum of its own digits each raised to the power of the number of digits.

Here is an optimized solution. In Python, converting the number to a string is generally more performant for digit extraction than repeated modulo/division operations due to the optimized C implementation of string handling.

I will create a new file `c:\Users\morav\OneDrive\Desktop\labs\ai-assisted-coding\armstrong.py`.

```

C:\Users\morav\OneDrive\Desktop\labs\ai-assisted-coding\armstrong.py

Checks if a number is an Armstrong number.

An Armstrong number is a number that is the sum of its own digits
each raised to the power of the number of digits.
"""

if number < 0:
    return False

# Optimization: In Python, string conversion is often faster than
# repeated math operations (div/mod) for iterating digits.
num_str = str(number)
power = len(num_str)

# Calculate sum using a generator expression for memory efficiency
total = sum(int(digit) ** power for digit in num_str)

return total == number

def main():
    try:
        user_input = input("Enter an integer: ").strip()
        num = int(user_input)

        if is_armstrong(num):
            print(f"{num} is an Armstrong number")
        else:
            print(f"{num} is not an Armstrong number")

    except ValueError:
        print("Invalid input. Please enter a valid integer.")

if __name__ == "__main__":
    main()

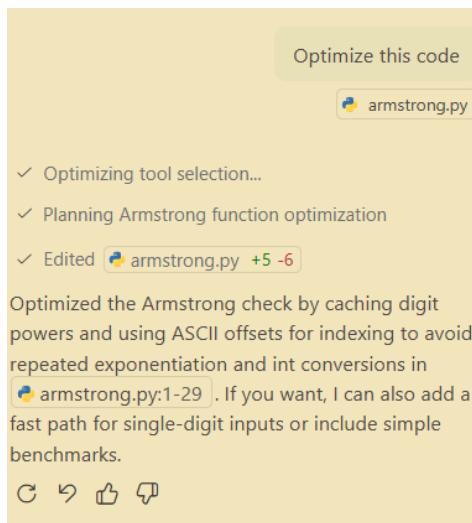
```

```

PS C:\Users\morav\OneDrive\Desktop\labs\ai-assisted-coding> & C:/Users/morav/OneDrive/Desktop/.venv/Scripts/Activate.ps1
(.venv) PS C:\Users\morav\OneDrive\Desktop\labs\ai-assisted-coding> & C:/Users/morav/OneDrive/Desktop/.venv/Scripts/python.exe c:/Users/morav/OneDrive/Desktop/armstrong.py
Enter an integer: 456
456 is not an Armstrong number
(.venv) PS C:\Users\morav\OneDrive\Desktop\labs\ai-assisted-coding>

```

OPTIMIZING THE CODE USING CURSOR:



```

def is_armstrong(number: int) -> bool:
    """
    Checks if a number is an Armstrong number.

    An Armstrong number is a number that is the sum of its own digits
    each raised to the power of the number of digits.
    """
    if number < 0:
        return False

    num_str = str(number)
    power = len(num_str)

    # Cache digit powers once to avoid repeated exponentiation
    pow_cache = [digit ** power for digit in range(10)]
    total = sum(pow_cache[ord(digit) - 48] for digit in num_str)

    return total == number

def main():
    try:
        user_input = input("Enter an integer: ").strip()
        num = int(user_input)

        if is_armstrong(num):
            print(f"{num} is an Armstrong number")
        else:
            print(f"{num} is not an Armstrong number")

    except ValueError:
        print("Invalid input. Please enter a valid integer.")

if __name__ == "__main__":
    main()

```

```

(.venv) PS C:\Users\morav\OneDrive\Desktop\labs\ai-assisted-coding> & C:
rive\Desktop\labs\ai-assisted-coding\.venv\Scripts\python.exe c:/Users/m
ktop/labs/ai-assisted-coding/armstrong.py
Enter an integer: 555
555 is not an Armstrong number
(.venv) PS C:\Users\morav\OneDrive\Desktop\labs\ai-assisted-coding> █

```