Assignment 2.4

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Task 1: Book Class Generation

❖ Scenario:You are building a simple library management module.

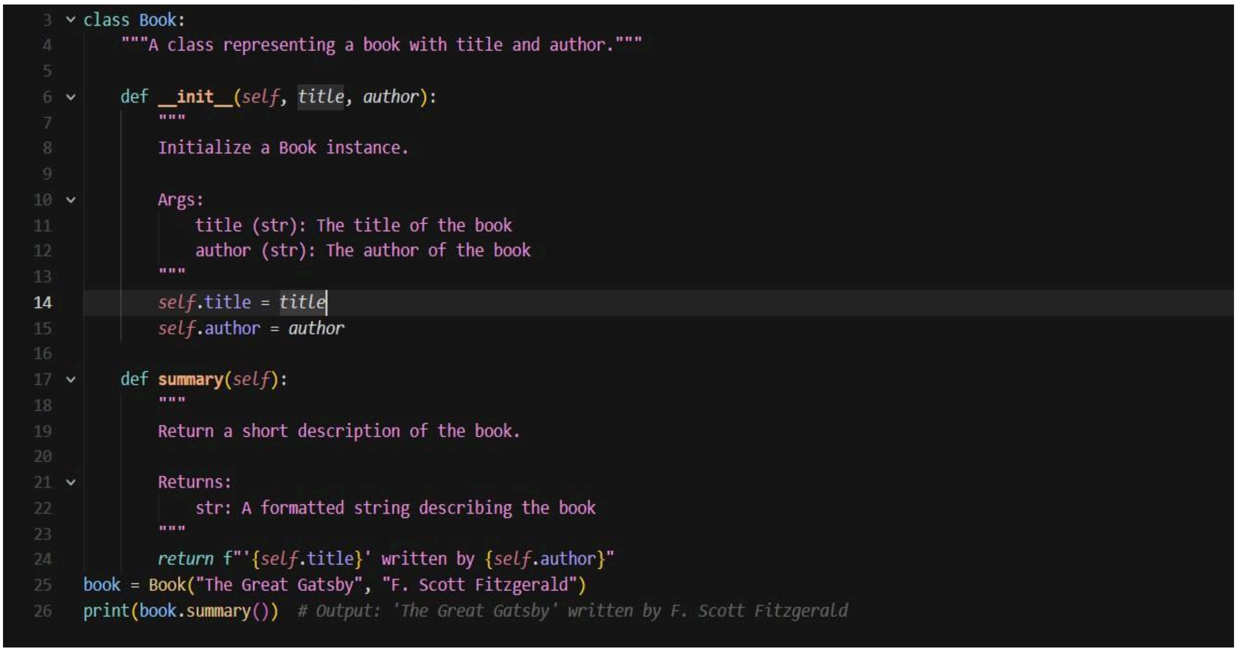
❖ Task: Use Cursor AI to generate a Python class Book with attributes title, author,and a summary() method.

❖ Expected Output:

➢ Generated class

➢ Student commentary on code quality

<u>Code:</u>



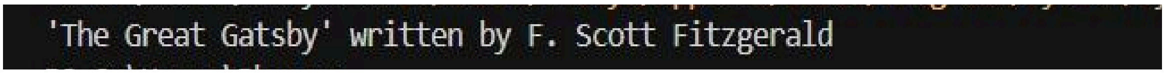
```python
class Book:
    """A class representing a book with title and author."""

    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 short description of the book.

        Returns:
            str: A formatted string describing the book
        """
        return f"'{self.title}' written by {self.author}"
book = Book("The Great Gatsby", "F. Scott Fitzgerald")
print(book.summary())  # Output: 'The Great Gatsby' written by F. Scott Fitzgerald
```



```
'The Great Gatsby' written by F. Scott Fitzgerald
```

Conclusion:

This program is used to store book details like title and author in a single unit. The class helps create multiple book objects without rewriting code.

The summary function prints book information in a clear and fixed format. The main block runs the program and shows the output for different books.

Task 2: Sorting Dictionaries with AI

❖ Scenario:You need to sort user records by age.

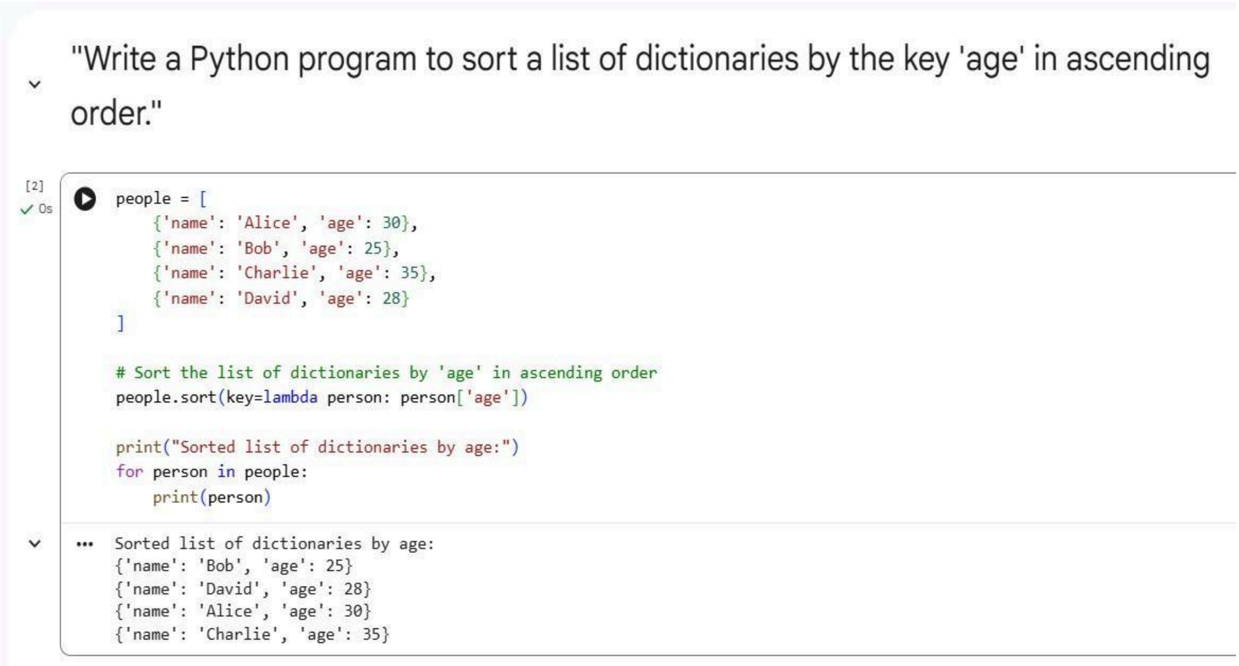
❖ Task:Use Gemini and Cursor AI to generate code that sorts a list of dictionaries by a key.

❖ Expected Output:

➢ Both AI outputs

➢ Comparison of clarity and performance

CODE FROM GEMINI:



"Write a Python program to sort a list of dictionaries by the key 'age' in ascending order."

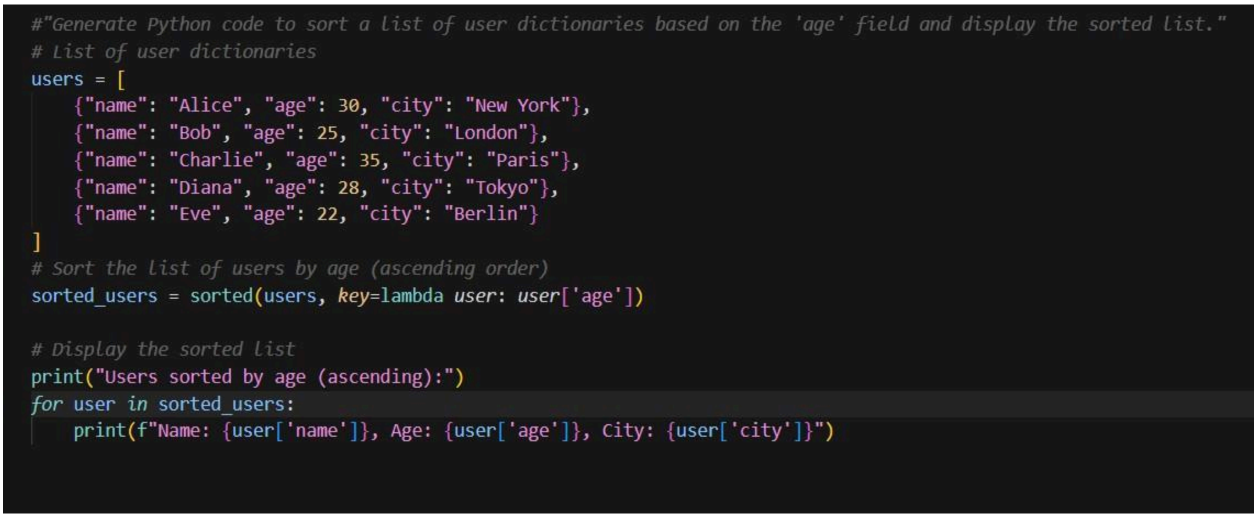
```
people = [
    {'name': 'Alice', 'age': 30},
    {'name': 'Bob', 'age': 25},
    {'name': 'Charlie', 'age': 35},
    {'name': 'David', 'age': 28}
]

# Sort the list of dictionaries by 'age' in ascending order
people.sort(key=lambda person: person['age'])

print("Sorted list of dictionaries by age:")
for person in people:
    print(person)
```

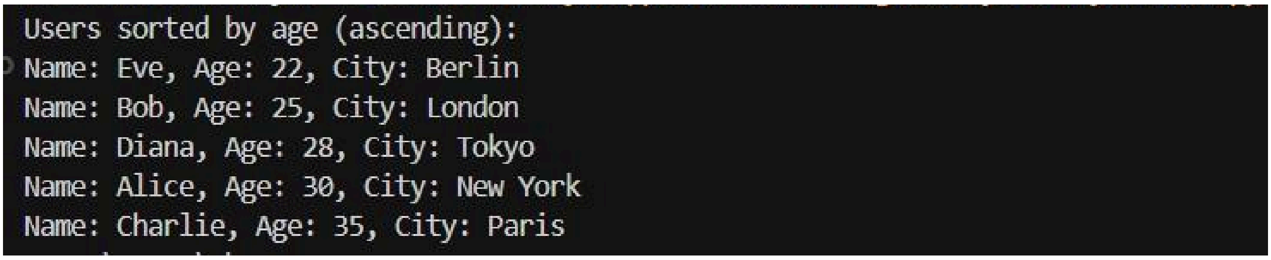
```
Sorted list of dictionaries by age:
{'name': 'Bob', 'age': 25}
{'name': 'David', 'age': 28}
{'name': 'Alice', 'age': 30}
{'name': 'Charlie', 'age': 35}
```

CODE FROM CURSOR AI:



```
#"Generate Python code to sort a list of user dictionaries based on the 'age' field and display the sorted list."
# List of user dictionaries
users = [
    {"name": "Alice", "age": 30, "city": "New York"},
    {"name": "Bob", "age": 25, "city": "London"},
    {"name": "Charlie", "age": 35, "city": "Paris"},
    {"name": "Diana", "age": 28, "city": "Tokyo"},
    {"name": "Eve", "age": 22, "city": "Berlin"}
]
# Sort the list of users by age (ascending order)
sorted_users = sorted(users, key=lambda user: user['age'])

# Display the sorted list
print("Users sorted by age (ascending):")
for user in sorted_users:
    print(f"Name: {user['name']}, Age: {user['age']}, City: {user['city']}")
```



```
Users sorted by age (ascending):
Name: Eve, Age: 22, City: Berlin
Name: Bob, Age: 25, City: London
Name: Diana, Age: 28, City: Tokyo
Name: Alice, Age: 30, City: New York
Name: Charlie, Age: 35, City: Paris
```

Conclusion:

Both tools generated correct and efficient code. Cursor AI used in- place sorting, which is more memory efficient.

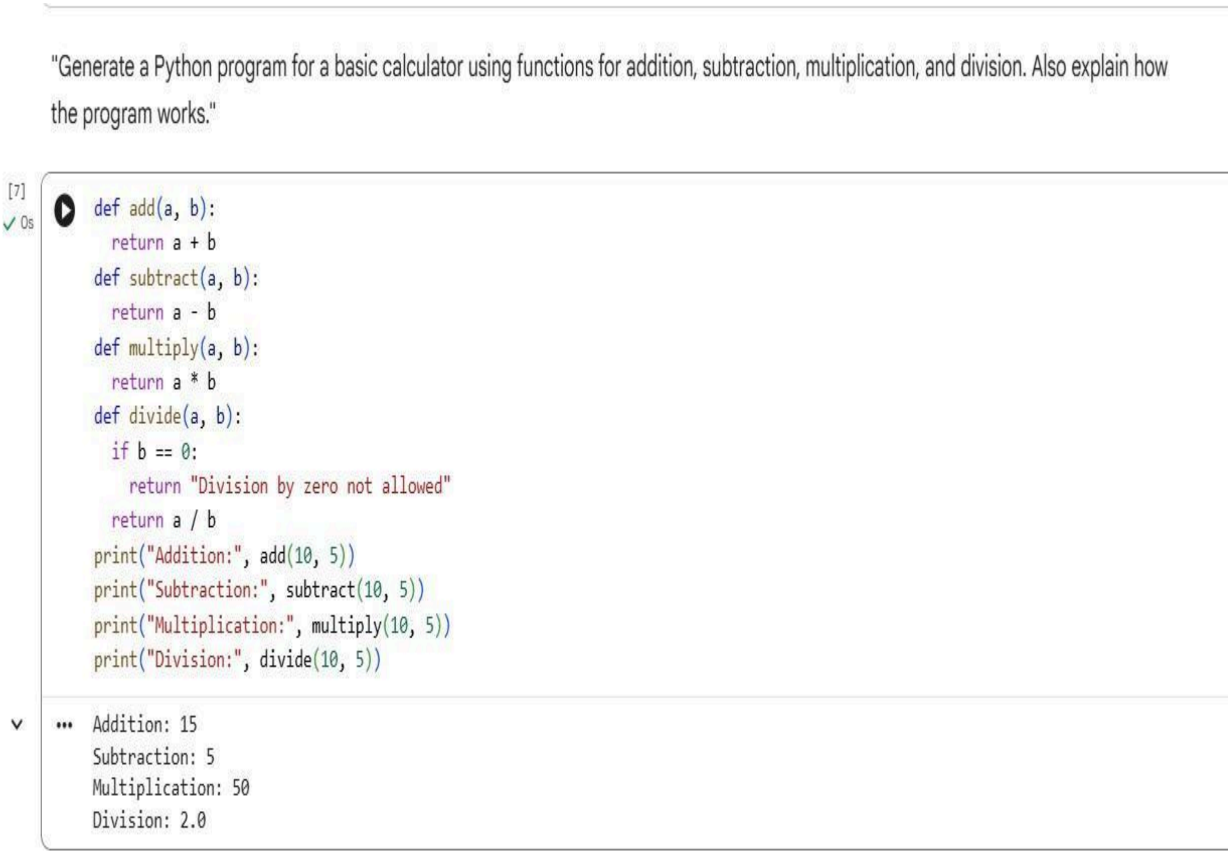
Task 3: Calculator Using Functions

❖ Scenario:You are reviewing a basic calculator module.

❖ Task:Ask Gemini to generate a calculator using functions and explain how it works.
❖ Expected Output:

➢ Calculator code ➢ AI explanation

CODE:



"Generate a Python program for a basic calculator using functions for addition, subtraction, multiplication, and division. Also explain how the program works."

```python
def add(a, b):
  return a + b
def subtract(a, b):
  return a - b
def multiply(a, b):
  return a * b
def divide(a, b):
  if b == 0:
    return "Division by zero not allowed"
  return a / b
print("Addition:", add(10, 5))
print("Subtraction:", subtract(10, 5))
print("Multiplication:", multiply(10, 5))
print("Division:", divide(10, 5))
```

```
Addition: 15
Subtraction: 5
Multiplication: 50
Division: 2.0
```

AI Explanation Summary:

- Separate functions are created for each operation.
- Each function performs a single responsibility.
- Division function checks for division by zero.
- Main program calls each function and prints the result.

Student Analysis:

- Code is modular and easy to understand.
- Proper error handling for division by zero.
- Functions can be reused in larger applications.

Conclusion:

Gemini produced a clear, well-documented functional program with proper explanations.

Task 4: Armstrong Number Optimization:

❖ **Scenario:An existing solution is inefficient.**

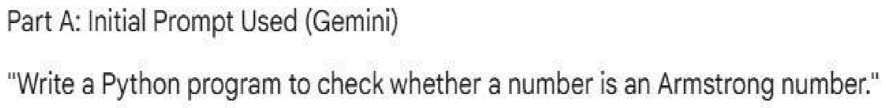
❖ **Task:Generate an Armstrong number program using Gemini, then improve it using Cursor AI.**

❖ **Expected Output:**

➢ **Two versions**

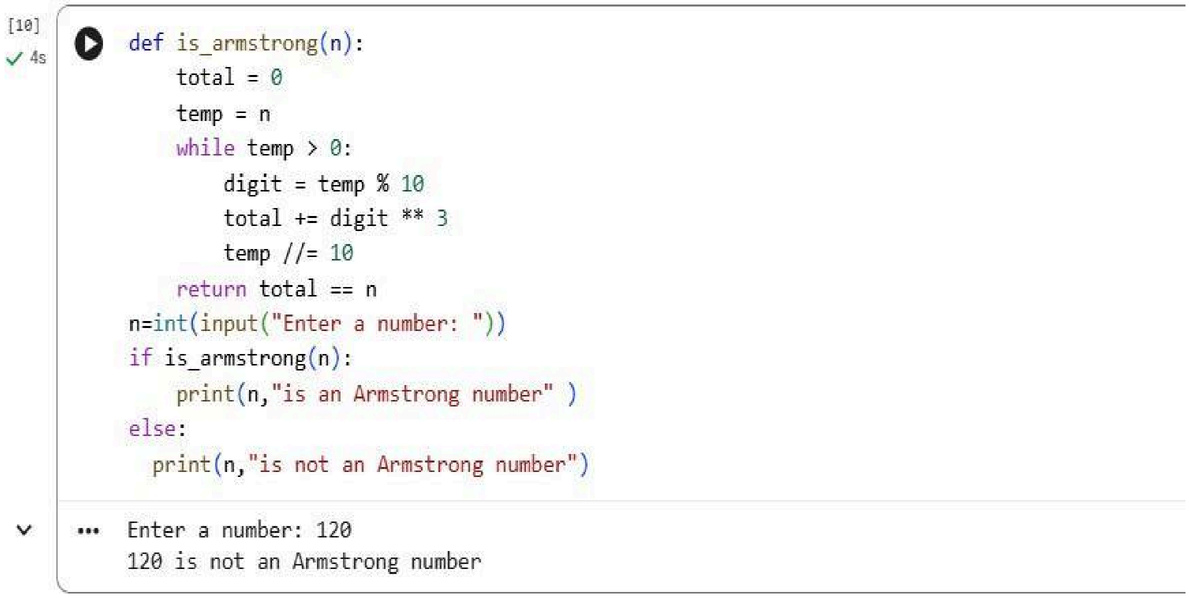
➢ **Summary of improvements**

CODE USING GEMINI:



Part A: Initial Prompt Used (Gemini)

"Write a Python program to check whether a number is an Armstrong number."



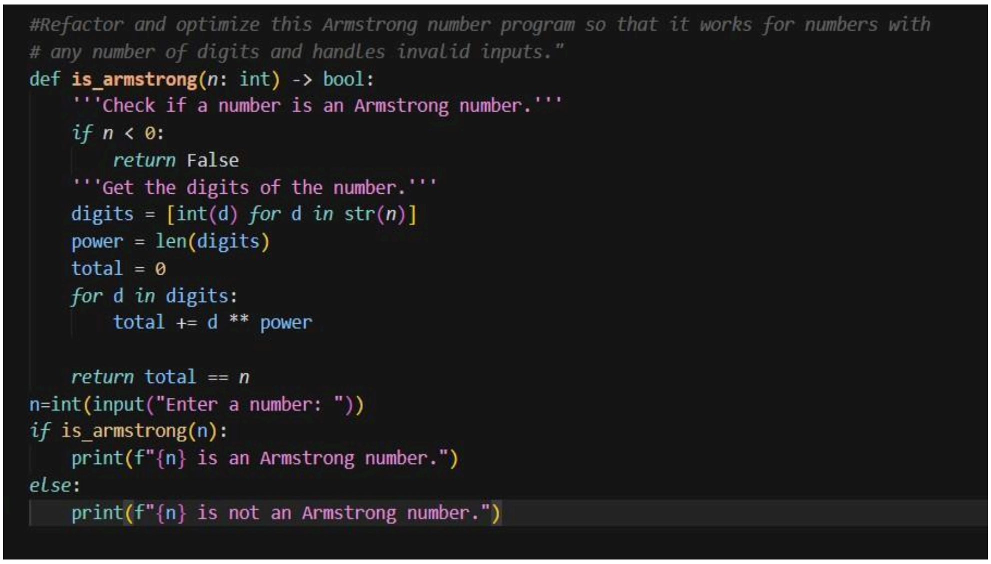
```python
def is_armstrong(n):
    total = 0
    temp = n
    while temp > 0:
        digit = temp % 10
        total += digit ** 3
        temp //= 10
    return total == n
n=int(input("Enter a number: "))
if is_armstrong(n):
    print(n,"is an Armstrong number" )
else:
  print(n,"is not an Armstrong number")
```

```
Enter a number: 120
120 is not an Armstrong number
```

Problems in Initial Version:

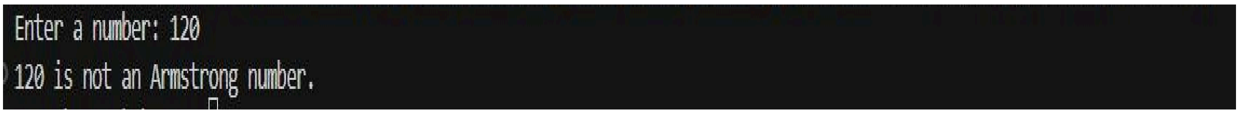
- Power is fixed to 3, works only for 3-digit numbers.
- No handling for negative numbers.
- Not generalized for any digit length.

IMPROVEMENT CODE OF CURSOR AI:



```python
#Refactor and optimize this Armstrong number program so that it works for numbers with
# any number of digits and handles invalid inputs."
def is_armstrong(n: int) -> bool:
    '''Check if a number is an Armstrong number.'''
    if n < 0:
        return False
    '''Get the digits of the number.'''
    digits = [int(d) for d in str(n)]
    power = len(digits)
    total = 0
    for d in digits:
        total += d ** power

    return total == n
n=int(input("Enter a number: "))
if is_armstrong(n):
    print(f"{n} is an Armstrong number.")
else:
    print(f"{n} is not an Armstrong number.")
```



```
Enter a number: 120
120 is not an Armstrong number.
```

Summary of Improvements:

- Works for any number of digits.
- Handles negative numbers.
- Uses digit length dynamically.
- More general and reliable algorithm.

Conclusion:

- Cursor AI significantly improved correctness and generality of the original Gemini solution.