Assignment 7.4
2303A510D2
G.Karthikeya
Batch - 14

Lab 7: Error Debugging with AI – Systematic Approaches to Finding and Fixing Bugs

Task 1: Debugging a Recursive Calculation Module

Wrong Code:

ass - 7.4.py

C: > Users > akshi > OneDrive > Desktop > ass - 7.4.py > ...

```
1  def factorial(n):
2      return n * factorial(n - 1)
3
4  n = int(input("Enter a number: "))
5  print(factorial(n))
```

Output:

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS POSTMAN CONSOLE

```
Enter a number: 5
Traceback (most recent call last):
  File "c:\Users\akshi\OneDrive\Desktop\ass - 7.4.py", line 5, in <module>
    print(factorial(n))
          ~~~~~~~~~^^^
  File "c:\Users\akshi\OneDrive\Desktop\ass - 7.4.py", line 2, in factorial
    return n * factorial(n - 1)
               ~~~~~~~~~^^^^^^^
  File "c:\Users\akshi\OneDrive\Desktop\ass - 7.4.py", line 2, in factorial
  File "c:\Users\akshi\OneDrive\Desktop\ass - 7.4.py", line 2, in factorial
  File "c:\Users\akshi\OneDrive\Desktop\ass - 7.4.py", line 2, in factorial
    return n * factorial(n - 1)
               ~~~~~~~~~^^^^^^^
  File "c:\Users\akshi\OneDrive\Desktop\ass - 7.4.py", line 2, in factorial
    return n * factorial(n - 1)
               ~~~~~~~~~^^^^^^^
  [Previous line repeated 996 more times]
RecursionError: maximum recursion depth exceeded
```

Corrected Code:

ass - 7.4.py

C: > Users > akshi > OneDrive > Desktop > ass - 7.4.py > ...

```python
def factorial(n):
    if n == 0 or n == 1:
        return 1
    return n * factorial(n - 1)

n = int(input("Enter a number: "))
print(factorial(n))
```

Output:

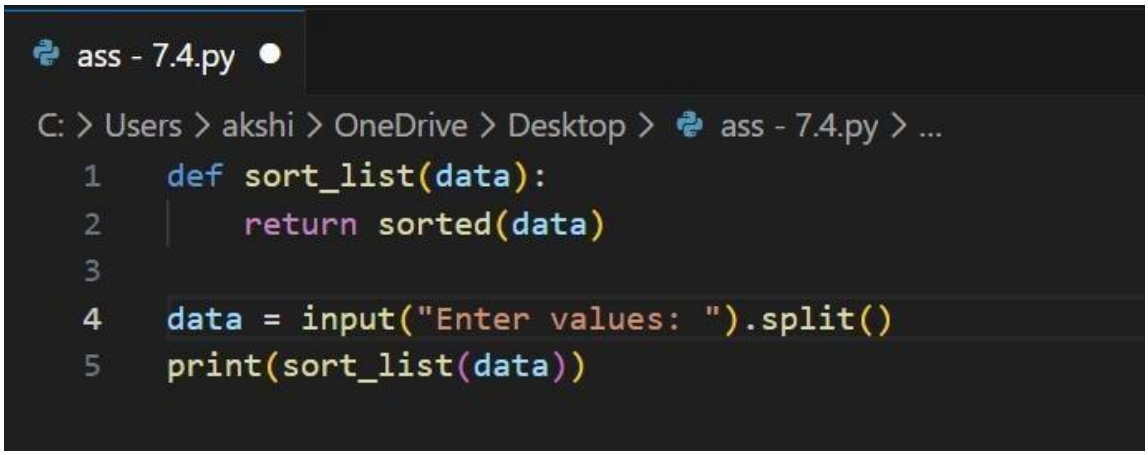
```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS  POSTMAN CONSOLE                Python

PS C:\Users\akshi\OneDrive\Desktop\full stack> & C:/Users/akshi/AppData/Local/Microsoft/WindowsApps/python3.13.exe "c:/Users/akshi/OneDri
Desktop/ass - 7.4.py"
Enter a number: 5
120
PS C:\Users\akshi\OneDrive\Desktop\full stack>
```

Explanation:

- The wrong code does not contain a base condition, so the recursive function keeps calling itself endlessly.
- This results in a RecursionError and program crash.
- The corrected code introduces a proper base case (n == 0 or n == 1).
- This base condition stops recursion at the correct point.
- As a result, the function now produces accurate factorial values.

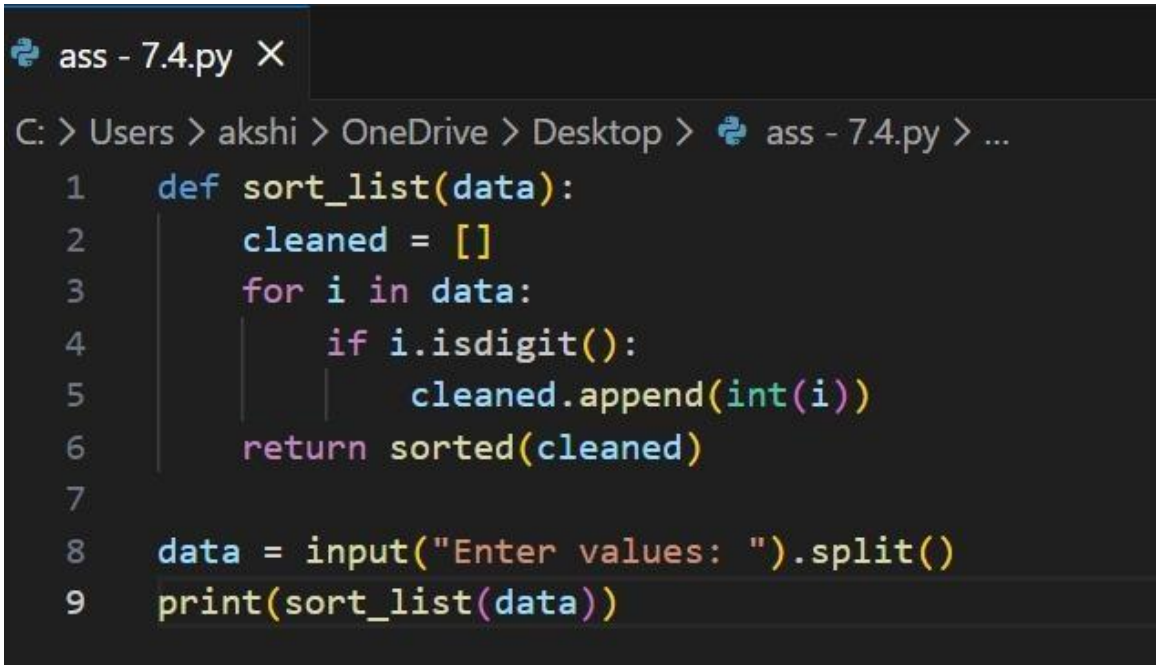
Task 2: Fixing Data Type Errors in a Sorting Utility

Wrong Code:



Output:

Corrected Code:



Output:

```
PS C:\Users\akshi\OneDrive\Desktop\full stack> & C:/Users/akshi/AppData/Local/Microsoft/WindowsApps/python3.13.exe "c:/Users/akshi/OneDrive/
Desktop/ass - 7.4.py"
Enter values: 5 2 8 3 4 7
[2, 3, 4, 5, 7, 8]
PS C:\Users\akshi\OneDrive\Desktop\full stack>
```

Explanation:

- The wrong code directly applies sorted() on mixed data types.
- Python cannot compare integers and strings, causing a TypeError
- The corrected code filters and converts valid numeric strings into integers.
- This ensures all elements are of the same data type before sorting.
- Thus, sorting is performed safely without runtime errors.

Task 3: Improving File Handling Reliability

Wrong Code:

ass - 7.4.py

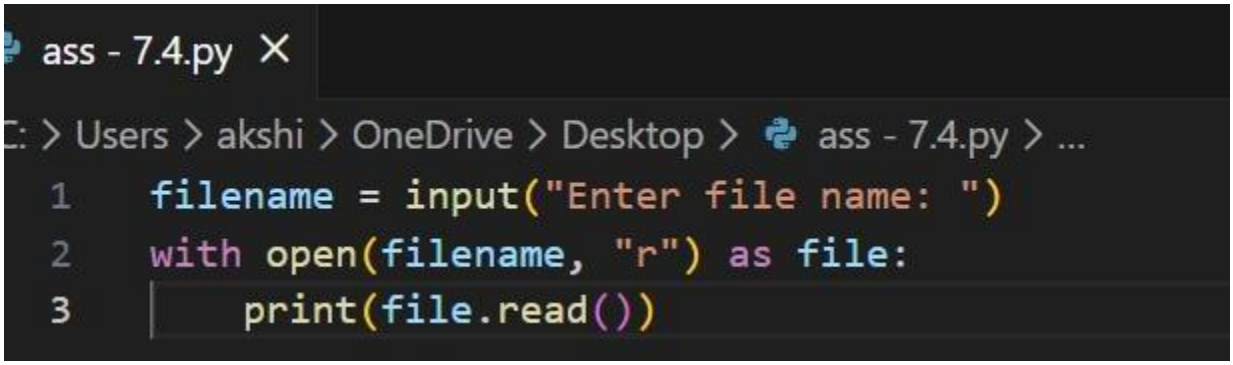
C: > Users > akshi > OneDrive > Desktop > ass - 7.4.py > ...

```
1  filename = input("Enter file name: ")
2  file = open(filename, "r")
3  print(file.read())
```

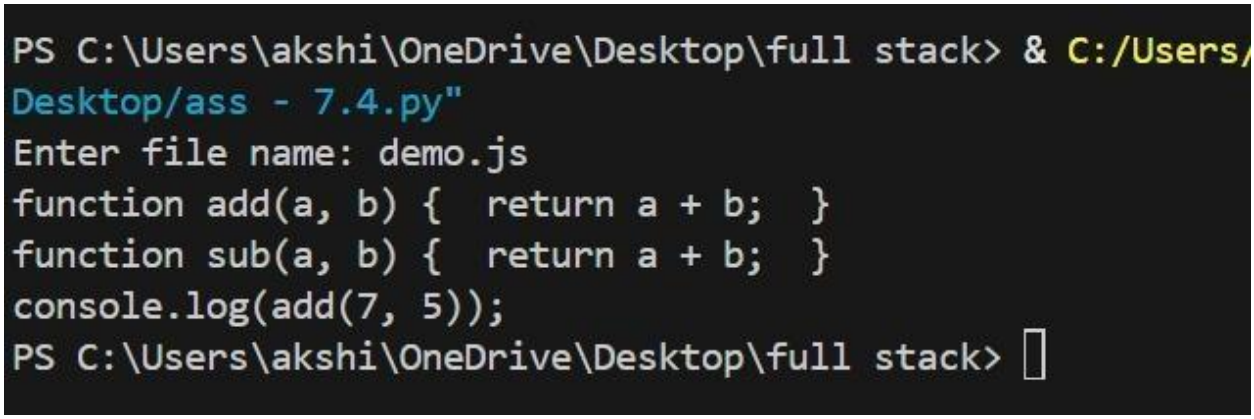
Output:

```
PS C:\Users\akshi\OneDrive\Desktop\full stack> & C:/Users/akshi/AppData/Local/Microsoft/WindowsApps/python3.13.exe "c:/Users/akshi/OneDrive/
Desktop/ass - 7.4.py"
Enter file name: demo.py
Traceback (most recent call last):
  File "c:\Users\akshi\OneDrive\Desktop\ass - 7.4.py", line 2, in <module>
    file = open(filename, "r")
FileNotFoundError: [Errno 2] No such file or directory: 'demo.py'
PS C:\Users\akshi\OneDrive\Desktop\full stack>
```

Corrected Code:



Output:



Explanation:

- The wrong code opens a file but does not explicitly close it.
- If an error occurs, the file remains open, causing resource leakage.
- The corrected code uses the with open() context manager.
- This automatically closes the file after execution.
- Hence, the program becomes safer and more reliable.

Task 4: Handling Runtime Errors Gracefully in Loops

Wrong Code:

ass - 7.4.py

C: > Users > akshi > OneDrive > Desktop > ass - 7.4.py > ...

```
1   values = list(map(int, input("Enter numbers: ").split()))
2   for v in values:
3       print(10 / v)
```

Output:

```
PS C:\Users\akshi\OneDrive\Desktop\full stack> & C:/Users/akshi/AppData/Local
Desktop/ass - 7.4.py"
Enter numbers: 5 0 2 4
2.0
Traceback (most recent call last):
  File "c:\Users\akshi\OneDrive\Desktop\ass - 7.4.py", line 3, in <module>
    print(10 / v)
          ~~~^~~
ZeroDivisionError: division by zero
PS C:\Users\akshi\OneDrive\Desktop\full stack>
```

Corrected Code:

ass - 7.4.py

C: > Users > akshi > OneDrive > Desktop > ass - 7.4.py > values

```
1   values = list(map(int, input("Enter numbers: ").split()))
2   for v in values:
3       try:
4           print(10 / v)
5       except ZeroDivisionError:
6           print("Cannot divide by zero")
```

Output:

```
PS C:\Users\akshi\OneDrive\Desktop\full stack> & C:/Use
Desktop/ass - 7.4.py"
Enter numbers: 5 0 2 4
2.0
Cannot divide by zero
5.0
2.5
PS C:\Users\akshi\OneDrive\Desktop\full stack>
```

Explanation:

- The wrong code performs division without handling exceptions.
- When a zero value is encountered, the program crashes.
- The corrected code wraps the risky operation in a try-except block.
- This catches the ZeroDivisionError and displays a message instead.
- The loop continues execution for remaining values.

Task 5: Debugging Class Initialization Errors

Wrong Code:

ass - 7.4.py

C: > Users > akshi > OneDrive > Desktop > ass - 7.4.py > ...

```python
class Student:
    def __init__(name, age):
        name = name
        age = age

name = input("Enter name: ")
age = int(input("Enter age: "))
s = Student(name, age)
print(s.name, s.age)
```

Output:

```
PS C:\Users\akshi\OneDrive\Desktop\full stack> & C:/Users/akshi/AppData/Local/
Desktop/ass - 7.4.py"
Enter name: Sakshi
Enter age: 20
Traceback (most recent call last):
  File "c:\Users\akshi\OneDrive\Desktop\ass - 7.4.py", line 8, in <module>
    s = Student(name, age)
TypeError: Student.__init__() takes 2 positional arguments but 3 were given
PS C:\Users\akshi\OneDrive\Desktop\full stack>
```

Corrected Code:

ass - 7.4.py

C: > Users > akshi > OneDrive > Desktop > ass - 7.4.py > ...

```python
class Student:
    def __init__(self, name, age):
        self.name = name
        self.age = age

name = input("Enter name: ")
age = int(input("Enter age: "))
s = Student(name, age)
print(s.name, s.age)
```

Output:

```
PS C:\Users\akshi\OneDrive\Desktop\full stack> & C:/U
Desktop/ass - 7.4.py"
Enter name: Sakshi
Enter age: 20
Sakshi 20
PS C:\Users\akshi\OneDrive\Desktop\full stack>
```

Explanation:

- The wrong code does not include the self parameter in the constructor.
- Attributes are not stored in the object, leading to access errors.
- The corrected code correctly uses self to define instance variables.
- This allows proper initialization of object attributes.
- As a result, object creation and attribute access work correctly.