ASSIGNMENT-10.5

Lab 10 – Code Review and Quality: Using AI to Improve Code

Quality and Readability

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Task 1: Improving Variable & Function Names

Original Code

```
def f(a, b):
    return a + b

print(f(10, 20))
```

CODE:

```
def add_numbers(first_number, second_number):
    """
    Returns the sum of two numbers.
    """
    return first_number + second_number


result = add_numbers(10, 20)
print(result)
```

```
Users > nishithamarepally > Desktop > 10.5_1py > ...
1  def add_numbers(first_number, second_number):
2      """
3      Returns the sum of two numbers.
4      """
5      return first_number + second_number
6
7
8  result = add_numbers(10, 20)
9  print(result)
```

OUTPUT

```
nishithamarepally@nishithas-MacBook-Air ~ % /usr/bin/python3 /Users/nishithamarepally/Desktop/10.5_1py
30
```

Task Description #2 – Missing Error Handling

Task: Use AI to add proper error handling.

Sample Input Code:

def divide(a, b):

return a / b

print(divide(10, 0))

Expected Output:

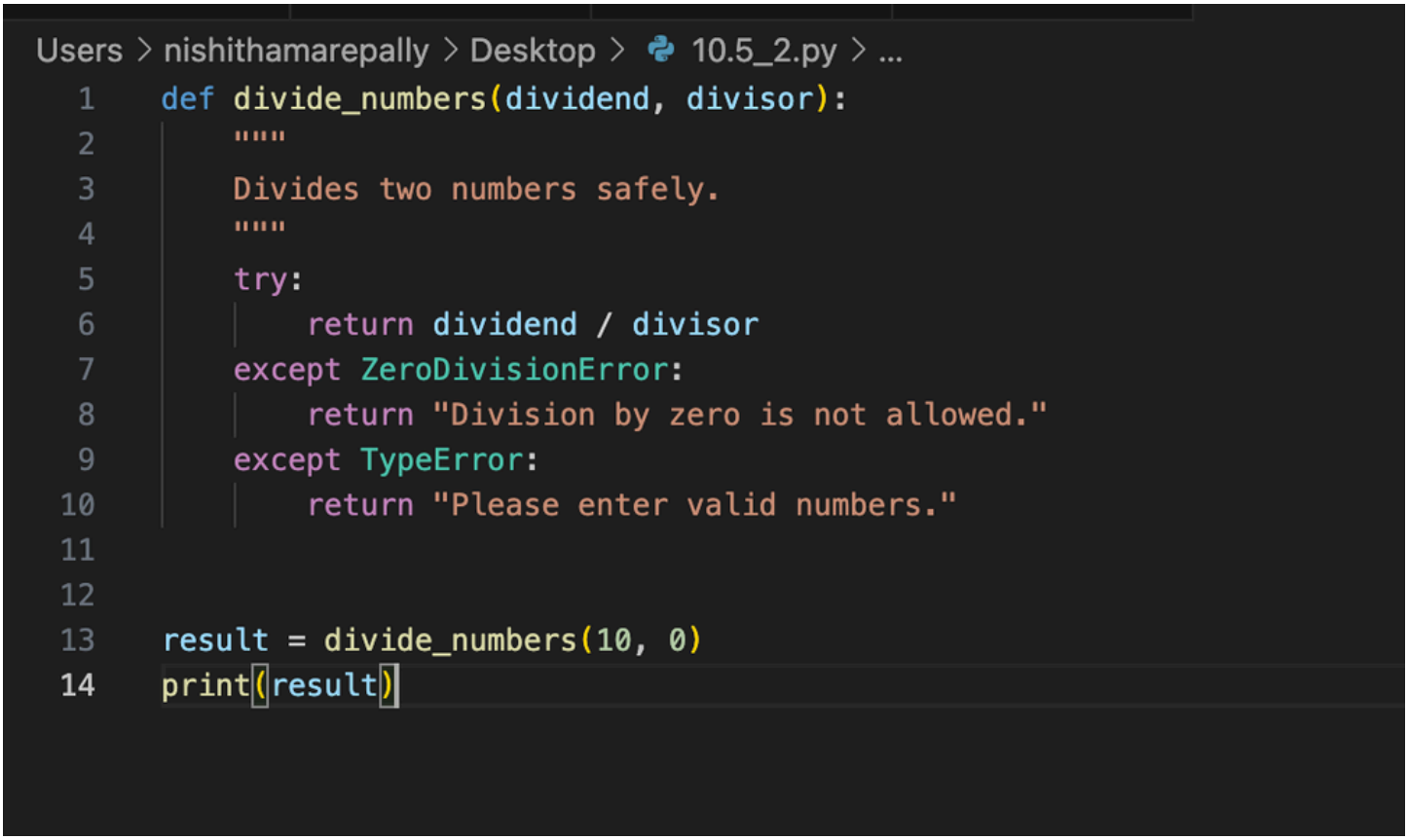
• Code with exception handling and clear error messages

CODE :

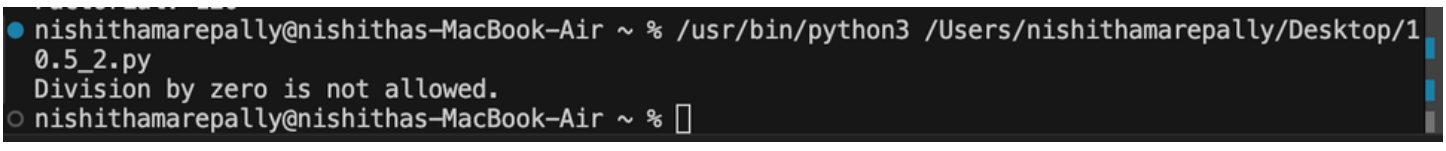
```
def divide_numbers(dividend, divisor):
    """
```

```
    Divides two numbers safely.
    """
    try:
        return dividend / divisor
    except ZeroDivisionError:
        return "Error: Division by zero is not allowed."
    except TypeError:
        return "Error: Please enter valid numbers."


result = divide_numbers(10, 0)
print(result)
```



OUTPUT:



Task Description #3: Student Marks Processing System

The following program calculates total, average, and grade of a student, but it has poor readability, style issues, and no error handling.

```
marks=[78,85,90,66,88]
t=0
for i in marks:
t=t+i
a=t/len(marks)
if a>=90:
print("A")
elif a>=75:
print("B")
elif a>=60:
print("C")
else:
print("F")
```

Task:

• Use AI to refactor the code to follow PEP 8 standards.

• Add meaningful variable names, functions, and comments.

• Add basic input validation and documentation.

CODE :

```
def calculate_average(marks_list):
    """
    Calculates the average of student marks.
```

```
    Args:
        marks_list (list): List of student marks

    Returns:
        float: Average marks
    """
    if not marks_list:
        raise ValueError("Marks list cannot be empty.")

    return sum(marks_list) / len(marks_list)


def determine_grade(average_marks):
    """
    Determines grade based on average marks.
    """
    if average_marks >= 90:
        return "A"
    elif average_marks >= 75:
        return "B"
    elif average_marks >= 60:
        return "C"
    else:
        return "F"


def main():
    """
    Main function to process student marks.
```

```
    """
    marks = [78, 85, 90, 66, 88]

    try:
        average = calculate_average(marks)
        grade = determine_grade(average)

        print(f"Average Marks: {average:.2f}")
        print(f"Grade: {grade}")

    except ValueError as error:
        print(f"Error: {error}")


if __name__ == "__main__":
    main()
```

Users > nishithamarepally > Desktop > 10.5_3.py > main

```python
def calculate_average(marks_list):
    """
    Calculates the average of student marks.

    Args:
        marks_list (list): List of student marks

    Returns:
        float: Average marks
    """
    if not marks_list:
        raise ValueError("Marks list cannot be empty.")

    return sum(marks_list) / len(marks_list)


def determine_grade(average_marks):
    """
    Determines grade based on average marks.
    """
    if average_marks >= 90:
        return "A"
    elif average_marks >= 75:
        return "B"
    elif average_marks >= 60:
        return "C"
    else:
        return "F"


```

```python
def main():
    """
    Main function to process student marks.
    """
    marks = [78, 85, 90, 66, 88]

    try:
        average = calculate_average(marks)
        grade = determine_grade(average)

        print(f"Average Marks: {average:.2f}")
        print(f"Grade: {grade}")

    except ValueError as error:
        print(f"Error: {error}")


if __name__ == "__main__":
    main()
```

OUTPUT:

```
nishithamarepally@nishithas-MacBook-Air ~ % /usr/bin/python3 /Users/nishithamarepally/Desktop/10.5_3.py
Average Marks: 81.40
Grade: B
```

Task Description #4: Use AI to add docstrings and inline comments

to the following function.

def factorial(n):

result = 1

for i in range(1,n+1):

result *= i

return result

CODE :

def factorial(number):

```
    """
    Calculates the factorial of a given number.
    """
    if number < 0:
        raise ValueError("Negative numbers not allowed.")

    result = 1

    for i in range(1, number + 1):
        result *= i

    return result


if __name__ == "__main__":
    number = int(input("Enter a number: "))
    print("Factorial:", factorial(number))
```

Users > nishithamarepally > Desktop > 10.5_4.py > factorial

```python
def factorial(number):
    """
    Calculates the factorial of a given number.
    """
    if number < 0:
        raise ValueError("Negative numbers not allowed.")

    result = 1

    for i in range(1, number + 1):
        result *= i

    return result


if __name__ == "__main__":
    number = int(input("Enter a number: "))
    print("Factorial:", factorial(number))
```

OUTPUT:

```
nishithamarepally@nishithas-MacBook-Air ~ % /usr/bin/python3 /Users/nishithamarepally/Desktop/10.5_4.py
Enter a number: 7
Factorial: 5040
nishithamarepally@nishithas-MacBook-Air ~ % 5
zsh: command not found: 5
nishithamarepally@nishithas-MacBook-Air ~ % /usr/bin/python3 /Users/nishithamarepally/Desktop/10.5_4.py
Enter a number: 5
Factorial: 120
```

Task Description #5: Password Validation System (Enhanced)

The following Python program validates a password using only a minimum length check, which is insufficient for real-world security requirements.

pwd = input("Enter password: ")

if len(pwd) >= 8:

```
print("Strong")
else:
print("Weak")
```

CODE :

```
import re


def is_strong_password(password):
    """
    Checks whether the given password meets security standards.

    Rules:
    - Minimum 8 characters
    - At least one uppercase letter
    - At least one lowercase letter
    - At least one digit
    - At least one special character

    Args:
        password (str): User-entered password

    Returns:
        bool: True if strong, False otherwise
    """

    if len(password) < 8:
        return False
```

```
    if not re.search(r"[A-Z]", password):
        return False

    if not re.search(r"[a-z]", password):
        return False

    if not re.search(r"[0-9]", password):
        return False

    if not re.search(r"[!@#$%^&*()_+{}[\]:;<>,.?~\\-]", password):
        return False

    return True


def main():
    """
    Main function for password validation.
    """
    user_password = input("Enter password: ")

    if is_strong_password(user_password):
        print("Password is Strong ")
    else:
        print("Password is Weak ")
        print("It must contain:")
        print("- At least 8 characters")
        print("- One uppercase letter")
```

```
    print("- One lowercase letter")
    print("- One digit")
    print("- One special character")

if __name__ == "__main__":
    main()
```

Users > nishithamarepally > Desktop > 10.5_5.py > main

```python
import re


def is_strong_password(password):
    """
    Checks whether the given password meets security standards.

    Rules:
    - Minimum 8 characters
    - At least one uppercase letter
    - At least one lowercase letter
    - At least one digit
    - At least one special character

    Args:
        password (str): User-entered password

    Returns:
        bool: True if strong, False otherwise
    """

    if len(password) < 8:
        return False

    if not re.search(r"[A-Z]", password):
        return False

    if not re.search(r"[a-z]", password):
        return False

```

```python
    if not re.search(r"[0-9]", password):
        return False

    if not re.search(r"[!@#$%^&*()_+{}[\]:;<>,.?~\\-]", password):
        return False

    return True


def main():
    """
    Main function for password validation.
    """
    user_password = input("Enter password: ")

    if is_strong_password(user_password):
        print("Password is Strong ✅")
    else:
        print("Password is Weak ❌")
        print("It must contain:")
        print("- At least 8 characters")
        print("- One uppercase letter")
        print("- One lowercase letter")
        print("- One digit")
        print("- One special character")


if __name__ == "__main__":
    main()
```

OUTPUT

```
nishithamarepally@nishithas-MacBook-Air ~ % /usr/bin/python3 /Users/nishithamarepally/Desktop/10.5_5.py
Enter password: Nn@2005
Password is Weak ❌
It must contain:
- At least 8 characters
- One uppercase letter
- One lowercase letter
- One digit
- One special character
nishithamarepally@nishithas-MacBook-Air ~ % Nishi@2005
zsh: command not found: Nishi@2005
nishithamarepally@nishithas-MacBook-Air ~ % /usr/bin/python3 /Users/nishithamarepally/Desktop/10.5_5.py
Enter password: Nishi@2005
Password is Strong ✅
nishithamarepally@nishithas-MacBook-Air ~ % /usr/bin/python3 /Users/nishithamarepally/Desktop/1
```