

ASSIGNMENT 9.5

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Problem 1: String Utilities Function

Consider the following Python function:

```
def reverse_string(text):  
    return text[::-1]
```

Tasks

1. Write documentation in:
 - (a) Docstring
 - (b) Inline comments
 - (c) Google-style documentation
2. Compare the three documentation styles.
3. Recommend the most suitable style for a utility-based string library.

Code

(a) Docstring

```
1 # 1. Docstring Type Documentation
2 def reverse_string(text):
3     """
4         Reverses the given string.
5         Parameters:
6             text: The string to be reversed.
7         Returns:
8             The reversed string.
9         """
10    return text[::-1]
11 print(reverse_string.__doc__)
```

```
Reverses the given string.
Parameters:
text (str): The string to be reversed.
Returns:
str: The reversed string.
Example:
>>> reverse_string("hello")
'olleh'
```

(b) Inline comments

```
1 # Inline Type Documentation
2 def reverse_string(text):
3     return text[::-1] # Reverses the given string
4 -----
5 # Reverse the string "Hello, World!" and print the result
6 -----
```

(c) Google-style documentation

```

1 # Google Style Documentation
2 def reverse_string(text: str) -> str:
3     """Reverses the given string.
4
5     Args:
6         text (str): The string to be reversed.
7
8     Returns:
9         str: The reversed string.
10
11    """
12
13    return text[::-1]
14 input_text = input("Enter a string to reverse: ")
15 if not isinstance(input_text, str):
16     raise ValueError("Input must be a string.")
17 print(reverse_string(input_text))
18 print(reverse_string.__doc__)

```

```

Enter a string to reverse: hello
olleh
Reverses the given string.

```

Args:

text (str): The string to be reversed.

Returns:

str: The reversed string.

1. Compare the three documentation styles.

Aspect	Docstring	Inline Comments	Google-Style
Scope	Function	Line	Function
Structure	Basic	None	Structured
Readability	Good	Simple	Clear

Aspect	Docstring	Inline Comments	Google-Style
Detail Level	Medium	Low	High
Tool Support	Yes	No	Yes
Professional Use	Moderate	Low	High
Best For	Scripts	Logic	Libraries

1. Recommend the most suitable style for a utility-based string library.

Google-style documentation is most suitable for a utility-based string library because it reflects professional coding standards and industry practices.

Problem 2: Password Strength Checker

Consider the function:

```
def check_strength(password):
    return len(password) >= 8
```

Task:

1. Document the function using docstring, inline comments, and Google style.
1. Compare documentation styles for security-related code.
2. Recommend the most appropriate style.

```

1  # Inline Comment
2  # This function checks if the password is strong enough by ensuring it has at least 8 characters.
3  def check_strength(password: str) -> bool:
4      # Doctype Comment
5      """
6          Parameters:
7              password (str): The password to be checked for strength.
8          Returns:
9              bool: True if the password is strong (at least 8 characters), False otherwise.
10         """
11        # Google Docstring Comment
12        """
13            A strong password is defined as one that has at least 8 characters.
14            This function checks the length of the password and returns True
15            if it meets the requirement, otherwise it returns False.
16        Args:
17            password (str): The password to be evaluated for strength.
18        Returns:
19            bool: True if the password is strong, False if it is weak.
20        Example:
21        >>> check_strength("password123")
22        True
23        """
24        return len(password) >= 8 # This is the minimum length requirement for a strong password.
25    print(check_strength.__doc__)
26    print(check_strength("password123")) # This should return True since the password is strong.

```

```

Parameters:
    password (str): The password to be checked for strength.
Returns:
    bool: True if the password is strong (at least 8 characters), False otherwise.

True

```

1. Compare documentation styles for security-related code.

Aspect	Docstring	Inline Comments	Google-Style
Clarity	Good	Basic	Very Clear
Structure	Simple	None	Structured
Security Explanation	Limited	Minimal	Detailed
Professional Use	Moderate	Low	High
Maintainability	Medium	Low	High
Industry Preference	Acceptable	Rare	Strong

1. Recommend the most appropriate style.

For security-related code like password validation, Google-style documentation is most appropriate because it ensures clarity, professionalism, and maintainability.

Problem 3: Math Utilities Module

Task:

1. Create a module `math_utils.py` with functions:

- o `square(n)`

- o `cube(n)`

- o `factorial(n)`

1. Generate docstrings automatically using AI tools.
2. Export documentation as an HTML file.

```
math_utils.py X
Assignment 9.5 > math_utils.py > cube
1  # To define 3 functions: square, cube, and factorial with clear docstrings.
2  def square(x):
3      """
4          Calculate the square of a number.
5
6          Parameters:
7              x (int or float): The number to be squared.
8
9          Returns:
10             int or float: The square of the input number.
11             """
12         return x * x
13 print(square.__doc__)
```

```

14  def cube(x):
15      """
16          Calculate the cube of a number.
17
18          Parameters:
19          x (int or float): The number to be cubed.
20
21          Returns:
22          int or float: The cube of the input number.
23          """
24      return x * x * x
25  print(cube.__doc__)

```

```

26  def factorial(n):
27      """
28          Calculate the factorial of a non-negative integer.
29          Parameters:
30          n (int): The non-negative integer for which to calculate the factorial.
31          Returns:
32          int: The factorial of the input number.
33          Raises:
34          ValueError: If n is negative.
35          """
36          if n < 0:
37              raise ValueError("Factorial is not defined for negative numbers.")
38          elif n == 0 or n == 1:
39              return 1
40          else:
41              result = 1
42              for i in range(2, n + 1):
43                  result *= i
44          return result
45  print(factorial.__doc__)

```

1. Export documentation as an HTML file.

```
● PS Z:\AIAC\Assignment 9.5> python -m pydoc -w .\math_utils.py
```

```
Calculate the square of a number.
```

```
Parameters:
```

```
x (int or float): The number to be squared.
```

```
Returns:
```

```
int or float: The square of the input number.
```

```
Calculate the cube of a number.
```

```
Parameters:
```

```
x (int or float): The number to be cubed.
```

```
Returns:
```

```
int or float: The cube of the input number.
```

```
Calculate the factorial of a non-negative integer.
```

```
Parameters:
```

```
n (int): The non-negative integer for which to calculate the factorial.
```

```
Returns:
```

```
int: The factorial of the input number.
```

```
Raises:
```

```
ValueError: If n is negative.
```

```
wrote math_utils.html
```

The screenshot shows a web browser window displaying the Pydoc documentation for a Python module named 'math_utils'. The title bar says 'Pydoc: module math_utils'. The address bar shows 'localhost:8080/math_utils.html'. The page content includes a header 'math_utils' and a sub-header 'Functions'. It lists three functions: 'cube(x)', 'factorial(n)', and 'square(x)'. Each function has a detailed docstring describing its purpose, parameters, returns, and any exceptions it might raise.

```
# To define 3 functions: square, cube, and factorial with clear docstrings.

Functions

cube(x)
    Calculate the cube of a number.

    Parameters:
    x (int or float): The number to be cubed.

    Returns:
    int or float: The cube of the input number.

factorial(n)
    Calculate the factorial of a non-negative integer.

    Parameters:
    n (int): The non-negative integer for which to calculate the factorial.

    Returns:
    int: The factorial of the input number.

    Raises:
    ValueError: If n is negative.

square(x)
    Calculate the square of a number.

    Parameters:
    x (int or float): The number to be squared.

    Returns:
    int or float: The square of the input number.
```

Problem 4: Attendance Management Module

Task:

1. Create a module attendance.py with functions:

- o mark_present(student)
- o mark_absent(student)
- o get_attendance(student)

1. Add proper docstrings.

2. Generate and view documentation in terminal and browse

```
attendance.py ●
Assignment 9.5 > attendance.py > ...
1  # To Create 3 Functions mark_present(student), mark_absent(student) and get_attendance() with
2  # Proper Docstrings
3  def mark_present(student: str) -> None:
4      """
5          Marks a student as present.
6
7      Args:
8          student (str): The name of the student to mark as present.
9      """
10     print(f"{student} is marked as present.")
11
12 def mark_absent(student: str) -> None:
13     """
14         Marks a student as absent.
15
16     Args:
17         student (str): The name of the student to mark as absent.
18     """
19     print(f"{student} is marked as absent.")
20
21 def get_attendance(student: str) -> None:
22     """
23         Gets the attendance status of a student.
24
25     Args:
26         student (str): The name of the student whose attendance is to be retrieved.
27     """
28     print(f"Attendance status for {student} is being retrieved.")
29 print(mark_present.__doc__, mark_absent.__doc__, get_attendance.__doc__)
```

```
○ PS Z:\AIAC\Assignment 9.5> python -m pydoc -p 8080
Server ready at http://localhost:8080/
Server commands: [b]rowser, [q]uit
server> b
server>
Marks a student as present.

Args:
    student (str): The name of the student to mark as present.

Marks a student as absent.

Args:
    student (str): The name of the student to mark as absent.

Gets the attendance status of a student.

Args:
    student (str): The name of the student whose attendance is to be retrieved.
```

```

Marks a student as present.

Args:
    student (str): The name of the student to mark as present.

Marks a student as absent.

Args:
    student (str): The name of the student to mark as absent.

Gets the attendance status of a student.

Args:
    student (str): The name of the student whose attendance is to be retrieved.

```

The screenshot shows a web browser window with the title "Pydoc module attendance". The address bar indicates the URL is "localhost:8080/attendance.html". The page content is the Python documentation for the "attendance" module. At the top, there's a header with links to "Module Index", "Topics", and "Keywords". Below the header, the module name "attendance" is shown in a blue bar along with a link to "index" and the file path "z:\aiac\assignment 9.5\attendance.py". The main content area contains three function definitions: `get_attendance`, `mark_absent`, and `mark_present`. The `get_attendance` function is highlighted with an orange background. The `get_attendance` function is described as returning None and getting the attendance status of a student. Its args are a student name. The `mark_absent` function marks a student as absent. Its args are a student name. The `mark_present` function marks a student as present. Its args are a student name.

```

# To Create 3 Functions mark_present(student), mark_absent(student) and get_attendance() with
# Proper Docstrings

Functions

get_attendance(student: str) -> None
    Gets the attendance status of a student.

    Args:
        student (str): The name of the student whose attendance is to be retrieved.

mark_absent(student: str) -> None
    Marks a student as absent.

    Args:
        student (str): The name of the student to mark as absent.

mark_present(student: str) -> None
    Marks a student as present.

    Args:
        student (str): The name of the student to mark as present.

```

Problem 5: File Handling Function

Consider the function:

```

def read_file(filename):
    with open(filename, 'r') as f:
        return f.read()

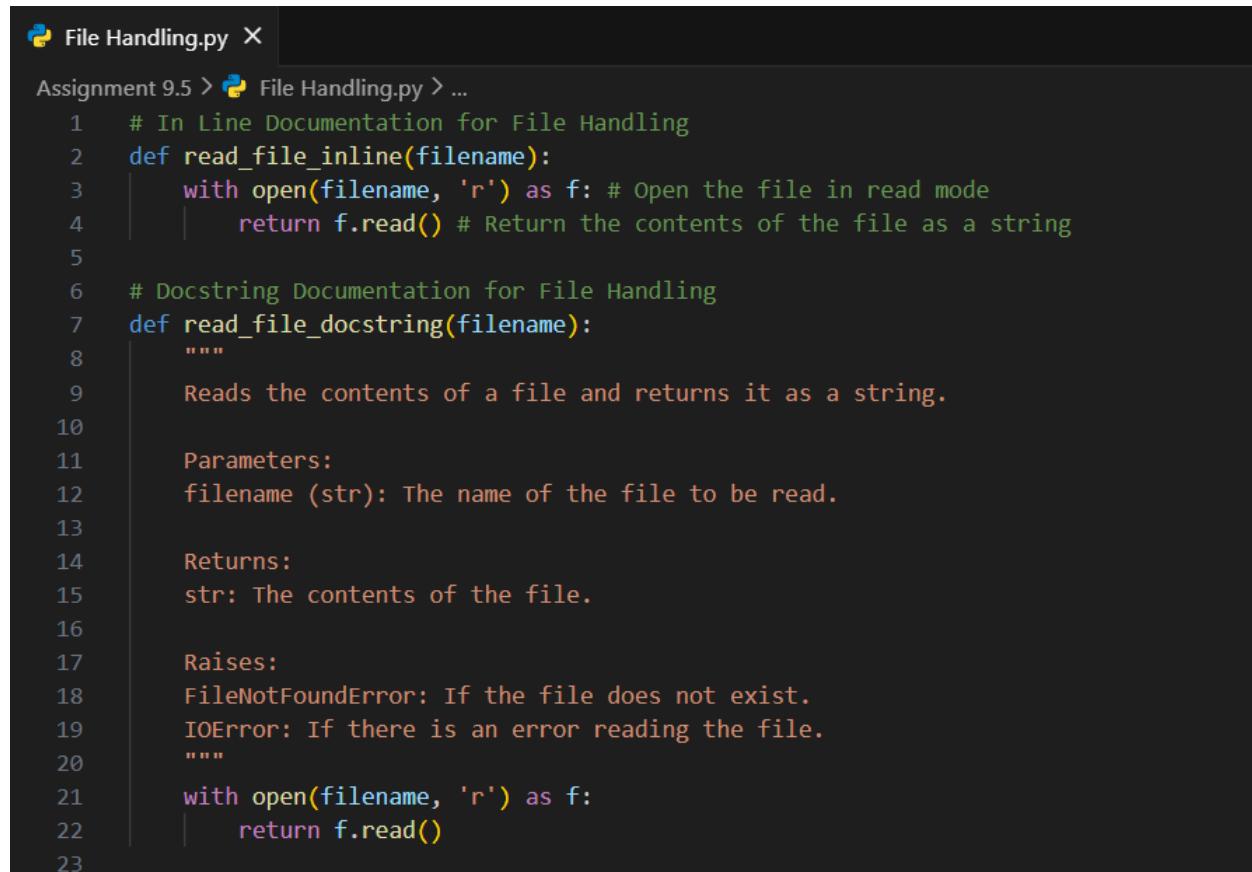
```

Task:

1. Write documentation using all three formats.

2. Identify which style best explains exception handling.

3. Justify your recommendation.



The screenshot shows a code editor window titled "File Handling.py". The code is a Python script with two functions: `read_file_inline` and `read_file_docstring`. The `read_file_inline` function uses inline documentation. The `read_file_docstring` function uses a multi-line docstring with parameters, returns, and raises sections. Both functions use a `with` statement to open files in read mode and return their contents as strings. Error handling is indicated by the `FileNotFoundException` and `IOError` exceptions mentioned in the docstring.

```
Assignment 9.5 > File Handling.py > ...
1 # In Line Documentation for File Handling
2 def read_file_inline(filename):
3     with open(filename, 'r') as f: # Open the file in read mode
4         return f.read() # Return the contents of the file as a string
5
6 # Docstring Documentation for File Handling
7 def read_file_docstring(filename):
8     """
9     Reads the contents of a file and returns it as a string.
10
11    Parameters:
12        filename (str): The name of the file to be read.
13
14    Returns:
15        str: The contents of the file.
16
17    Raises:
18        FileNotFoundError: If the file does not exist.
19        IOError: If there is an error reading the file.
20    """
21    with open(filename, 'r') as f:
22        return f.read()
23
```

```
24 # Google Style Docstring Documentation for File Handling
25 def read_file_google_style(filename: str) -> str:
26     """
27     Reads the contents of a file and returns it as a string.
28
29     Args:
30         filename (str): The name of the file to be read.
31     Returns:
32         str: The contents of the file.
33     Raises:
34         FileNotFoundError: If the file does not exist.
35         IOError: If there is an error reading the file.
36     """
37     with open(filename, 'r') as f:
38         return f.read()
39
40
41 print(read_file_inline.__doc__)
42 print(read_file_docstring.__doc__)
43 print(read_file_google_style.__doc__)
```

None

Reads the contents of a file and returns it as a string.

Parameters:

filename (str): The name of the file to be read.

Returns:

str: The contents of the file.

Raises:

FileNotFoundError: If the file does not exist.

IOError: If there is an error reading the file.

Reads the contents of a file and returns it as a string.

Args:

filename (str): The name of the file to be read.

Returns:

str: The contents of the file.

Raises:

FileNotFoundError: If the file does not exist.

IOError: If there is an error reading the file.

Identify which style best explains exception handling, Justify your recommendation.

Google Style Docstring

It clearly separates exceptions under a dedicated "Raises" section, making error handling easy to understand and professionally structured.