

Assignment – 9.1

Documentation Generation – Automatic Documentation and Code Comments

Week: 5 (Monday)

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Problem 1

Given Python Function

```
def find_max(numbers):
    return max(numbers) (a)
```

Docstring Documentation

```
def find_max(numbers):
    """
    Returns the maximum value from a list of numbers.
    Parameters:
        numbers (list): A list of numeric values.
    Returns:
        int or float: The maximum value in the list.
    """
    return max(numbers) (b) Inline
```

Comments

```
def find_max(numbers):
    # Find and return the maximum value from the list
    return max(numbers) (c) Google-Style Documentation

def find_max(numbers):
    """
    Finds the maximum value in a list of numbers.
    Args:
        numbers (list): A list containing numeric values.
    Returns:
```

```
    int or float: The largest number in the list.  
    """      return max(numbers)
```

Critical Comparison

- **Docstrings** provide structured internal documentation and are accessible using help() and pydoc.
- **Inline comments** are simple but limited and unsuitable for detailed explanations.
- **Google-style documentation** is highly readable, standardized, and ideal for large projects.

Recommendation

For a mathematical utilities library, **Google-style documentation** is most effective due to its clarity, consistency, and compatibility with documentation tools.

Problem 2

Given Python Function

```
def login(user, password, credentials):      return  
credentials.get(user) == password
```

(a) Docstring Documentation

```
def login(user, password, credentials):  
    """  
        Verifies user login credentials.  
        Parameters:  
        user (str): Username  
        password (str): User password  
        credentials (dict): Dictionary of stored credentials  
        Returns:      bool: True if login is successful,  
        False otherwise  
    """  
        return credentials.get(user) == password
```

(b) Inline Comments

```
def login(user, password, credentials):  
    # Check if the entered password matches stored credentials      return  
    credentials.get(user) == password
```

(c) Google-Style Documentation

```
def login(user, password, credentials):  
    """  
        Authenticates a user using provided credentials.  
        Args:
```

```

        user (str): Username of the user.          password (str):
Password entered by the user.          credentials (dict):
Dictionary mapping users to passwords.

    Returns:
        bool: True if authentication succeeds, otherwise False.
    """
        return credentials.get(user) == password

```

Comparison and Recommendation

Google-style documentation is most helpful for **new developers onboarding a project** because it clearly explains parameters, return values, and intent in a standardized format.

Problem 3 – Calculator Module

calculator.py

```

def add(a, b):
    """Returns the sum of two numbers."""
    return a + b
def subtract(a, b):
    """Returns the difference of two numbers."""
    return a - b
def multiply(a, b):
    """Returns the product of two numbers."""
    return a * b
def divide(a, b):
    """Returns the quotient of two numbers."""
    return a / b

```

Documentation Generation

Terminal documentation: `help(calculator)`

HTML documentation generation: `pydoc -w calculator`

The generated `calculator.html` file is opened in a web browser to verify documentation.

Problem 4 – Conversion Utilities Module

conversion.py

```
def decimal_to_binary(n):
    """Converts a decimal number to binary."""
    return bin(n)[2:]
def binary_to_decimal(b):
    """Converts a binary number to decimal."""
    return int(b, 2)
def decimal_to_hexadecimal(n):
    """Converts a decimal number to hexadecimal."""
    return hex(n)[2:]
```

Documentation Generation

Terminal: help(conversion) HTML export using: pydoc -w conversion

Problem 5 – Course Management Module

course.py

```
courses = {}      def
add_course(course_id, name,
credits):
    """Adds a new course to the course list."""
    courses[course_id] = {'name': name, 'credits': credits}      def
remove_course(course_id):
    """Removes a course using course ID."""
    courses.pop(course_id,
None)      def
get_course(course_id):
    """Retrieves course details by course ID."""
    return courses.get(course_id)
```

Documentation Generation

Terminal documentation using help(course)
HTML documentation exported using:

pydoc -w course

The generated HTML file is opened in a browser to verify correctness.

Conclusion

This lab demonstrates the importance of proper documentation in software development. Automatic documentation generation improves maintainability, onboarding efficiency, and overall code quality. Google-style docstrings are recommended for professional and collaborative projects.

