

AI Assisted Coding (III Year)

Assignment

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Lab 9: Documentation Generation -Automatic documentation and code comments

Lab Objectives

- 1. To understand automatic documentation generation.**
- 2. To generate code comments and docstrings using AI tools.**
- 3. To learn the importance of documentation in software development.**

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.