Embedded Software Engineer - Flash Memory Logger and Mock Framework task

Task Description:

Your task is to develop a basic flash memory logger module for an embedded system, along with a mock framework to facilitate testing. The memory logger should be designed to track memory usage in flash memory, providing information about the current memory utilization, and allowing data retrieval from the flash memory.

You are also required to create a mock framework that simulates the behaviour of the underlying flash memory system and enables comprehensive testing of the memory logger module. The mock framework should mimic the flash memory management functions and provide a mechanism to verify the correctness of the memory logger's functionality.

Please provide your solution as a compressed file or a link to a version control repository (e.g., GitHub) containing the code, documentation, and any necessary instructions to compile, run, and test the solution.

Task Requirements:

1. Flash Memory Logger Module:
    - Implement a flash memory logger module that tracks memory usage in the flash memory, allows writing new logs and reading old ones.
    - A single log should contain a 2-byte incremental log id and 6 bytes of data. 8 bytes total.
    - Logs should be written continuously. Once memory starts to run out, the oldest log page should be erased to make room.
    - The memory manager should be able to return a log with a specific ID.
    - The module should keep a record of the current memory utilization, including the total flash memory and the number of currently allocated blocks.
    - Consider the constraints of flash memory, such as block-based operations. For the purpose of this task, flash memory is divided into pages, each containing 256 bytes. The total flash memory size is 256 pages.
2. Mock Framework:
    - Develop a mock framework that simulates the behaviour of the underlying flash memory system.
    - The mock framework should provide functions that mimic writing a block of data to a memory address, reading a block of data from a memory address and erasing pages.

- The mock framework should use a simple binary file to represent flash memory.
- Using the mock framework, create unit tests for memory logger module.

Deliverables:

1. Implement the flash memory logger module in C or C++ language (recommended C++), considering the constraints of flash memory and the embedded system environment.
2. Develop the mock framework to facilitate comprehensive testing of the flash memory logger module.
3. Write clear and concise documentation, including instructions on how to use the flash memory logger module and the mock framework.
4. Include a sample test case using the mock framework to verify the functionality of the flash memory logger module.

Evaluation Criteria:

1. Correctness of the flash memory logger module implementation.
2. Effectiveness of the mock framework in simulating the flash memory management functions.
3. Clarity and organization of the code, adhering to best practices.
4. Quality and completeness of the documentation.