Programming Test

Directions: Nevelex uses this to understand your proficiency and ability to learn in various areas. For the coding sample, you can certainly use the Internet to look up APIs and research, but do not copy and paste solutions. Please cite any partial code that you use. Do not to use an existing base class that does the whole solution.

Please provide a sample for the following problem in your most knowledgeable programming language JAVA or C++(C++ 11 would be a plus). Make any decisions on how complex you want to make it.

We ask that you do NOT upload your answers into a publicly accessible location.

Expectations: Nevelex uses this test to see how you code, how you solve problems, and get a glimpse of your ability to relate your answers to a technical audience.

1. Design and develop a thread-safe container class called ThreadSafeContainer.
    a. The class shall conform to the following restrictions:
        i. The data will be removed in a first in first out order.
        ii. The class with be a template/generic container class
        iii. The class will be initialized with a capacity at construction time.
        iv. The **add** method will add one element to the FIFO and, if needed, block the caller until space is available.
        v. The **remove** method will block the caller until an element is available for retrieval.
        vi. The **clear** method will remove any objects which were added, but not yet removed.
        vii. The **shutdown** method will cause any blocked or future calls to **add** or **remove** to throw a **ShutdownException**.
        viii. Please do not use any existing BlockingQueue classes. We prefer that you generate your own versions to see how you handle blocking and synchronization.

b. Explain how your design is thread-safe? Is it safe for *n* reader threads and *m* writer threads?
c. [Optional] Test your code using a unit testing framework. You could using something like JUnit for Java or Google Test for C++.
d. [Optional] Using some UML diagrams of your choosing, please illustrate your design.

2. Without changing the method signature, please describe what, if anything, is wrong with this code. If so, how would you fix it? What happens when multiple threads interact with the two public methods?

```
class VolatileTest
{
private:
   volatile int value;
   …

public:
   …

   /// @brief Increments value by 1.
   void increment(void)
   {
         value++;
   }

   /// @brief Return value squared.
   int square(void)
   {
      return value * value;
   }
}
```

3. You should have received additional code sample files called EmployeeWeightDatabase. There are separate versions for c++ and java. Please pick one of the files to evaluate. Look it over and fix any issues in the file. Fixes could include runtime problems, readability, and general bugs.