Concurrent Object-Oriented Programming

Exercise session 4:
Debugging and Improvement of the DSM Application

1. Debugging:
Edit the source code in order to display the number of threads created by the application. What do you observe? Find the cause of this problem and correct it.

Hint: all method calls using RMI are synchronous.

2. Termination algorithm:
Currently, you have to stop the servers manually, by interrupting them. It would be better if the application would stop by itself whenever the user program on each node has finished. To do so, implement the following algorithm:

- With the transmission of the token, each node may specify one node that has finished its work and wishes to terminate.
- Each node must transmit to its successor (according to the “server_id” order) each termination request that it receives.
- A node effectively terminates whenever it knows that all the other nodes are ready to terminate and it has received its own termination signal.

This description is voluntarily short, you should be able to fill-in the blanks without problem. After that, implement this algorithm.

3. Adding concurrency on each node:
In the present version of the application, there can be only one user program (instances of the “application” class) per physical node. Modify the program so that for each server there can be many threads with each a user program running.