Faculty of Engineering & Technology Electrical & Computer Engineering Department

ENCS3390 Operating Systems

Project: Virtual Memory Management Simulation

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Abstract:

In this project, we implemented a virtual memory management simulator with page replacement algorithms, which were, FIFO and LRU, the odd ones in the algorithms list in project description (1,3) based on the max value of the least significant digit of the team ID numbers.

Theory:

The First In First Out (FIFO) page replacement algorithm operates by replacing the frame which was loaded to memory at the earliest time. Thus, when the allocated pages for a process are full, the algorithm replaces the earliest loaded frame with the frame requested from the hard disk. The second page replacement algorithm, Least Recently Used (LRU) operates by replacing the frame which was least recently accessed with the one requested from the hard disk.
The programmed simulation is multithreaded, where each process is simulated on a separate thread.

How to run this code:

First, you can generate a new file and enter the number of processes, the size of physical memory in frames, and the minimum number of frames per process as in figure 1, or you can browse and specify an existing file.

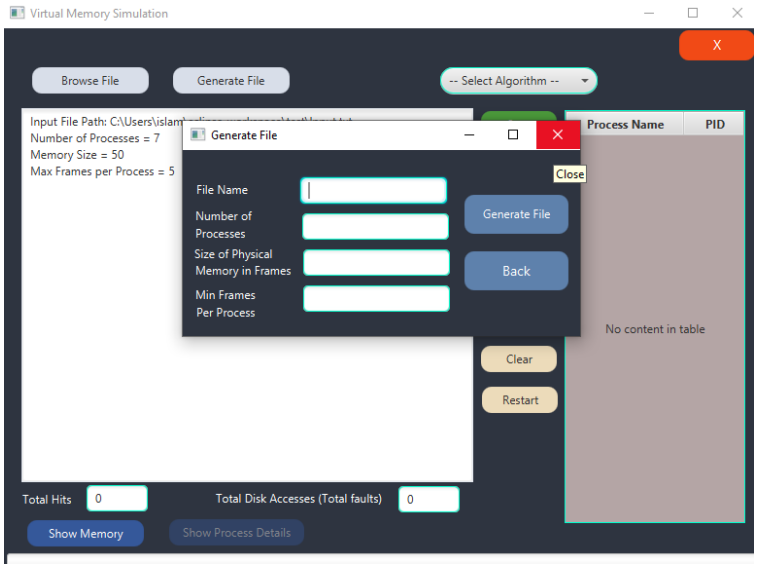
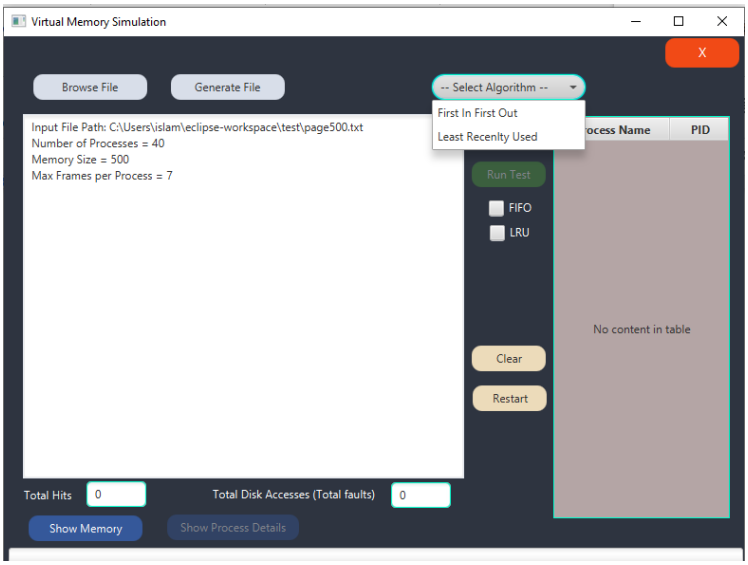


Figure 1



Second, choose the page replacement algorithm you need as in Figure 2, and start the simulator.

Figure 2

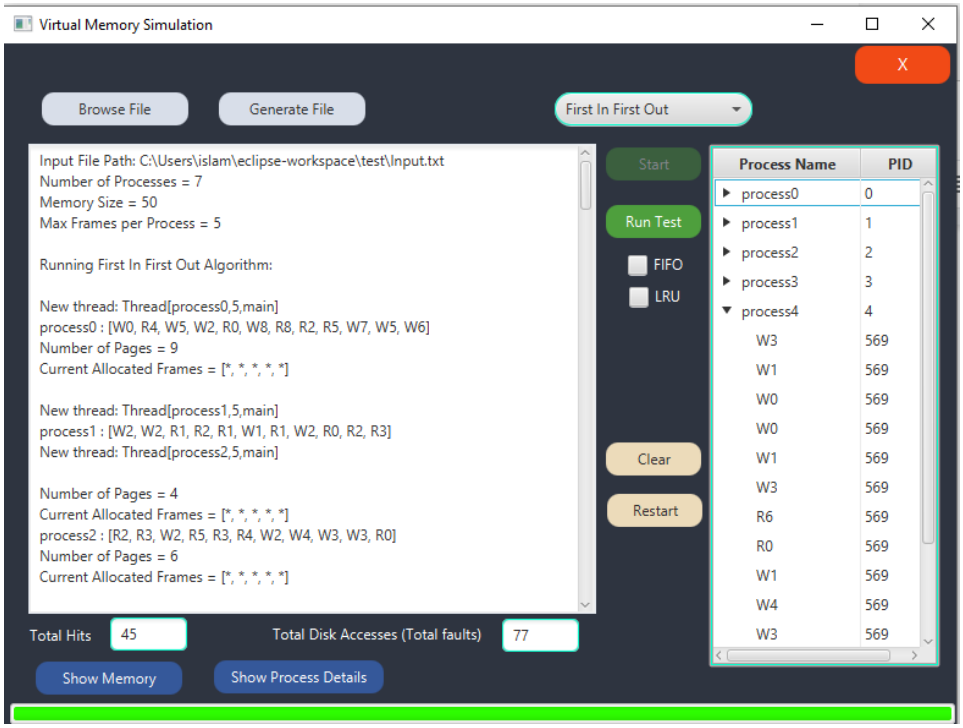


Figure 3 : creation of a new thread.

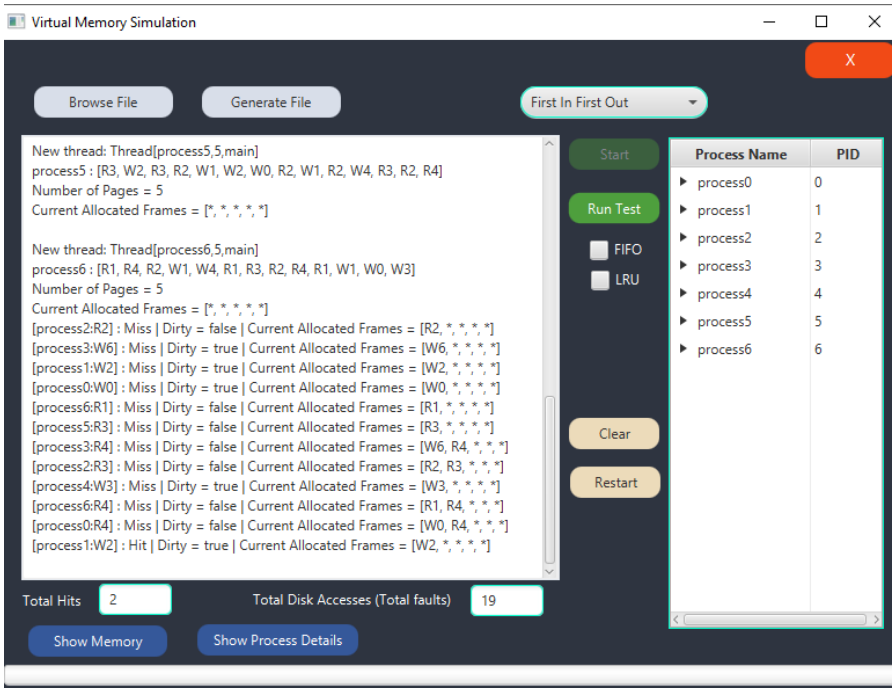


Figure 4: how the simulation goes.

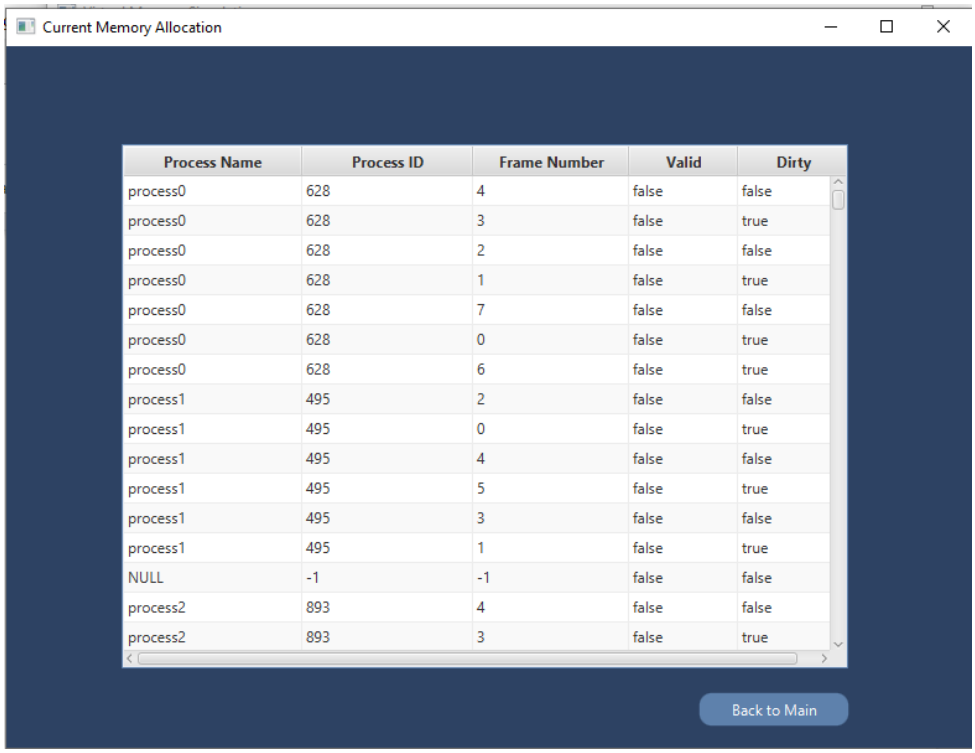


Figure 5: memory table.

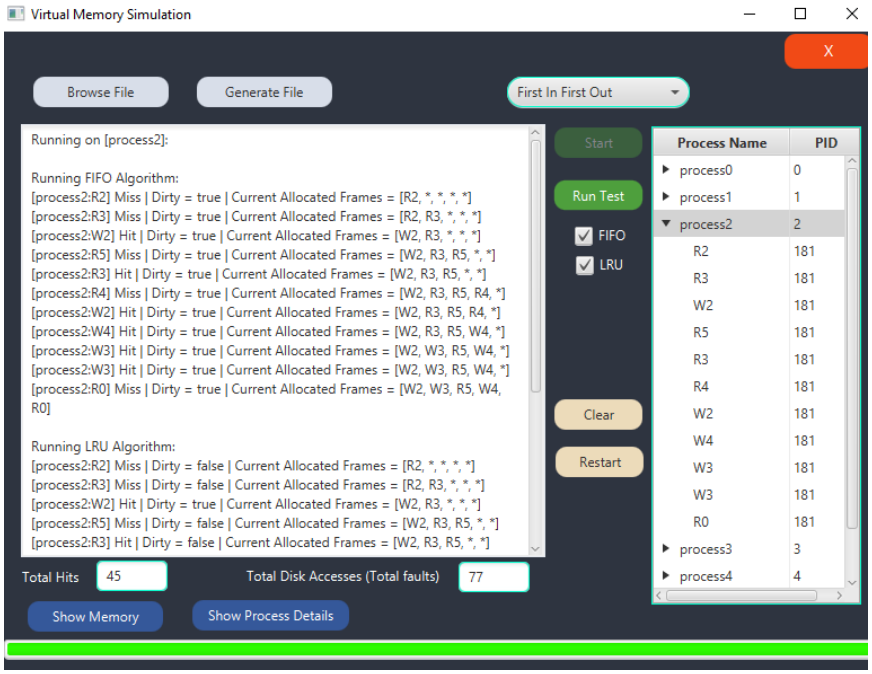


Figure 6: shows run test for process 2 using FIFO algorithm.

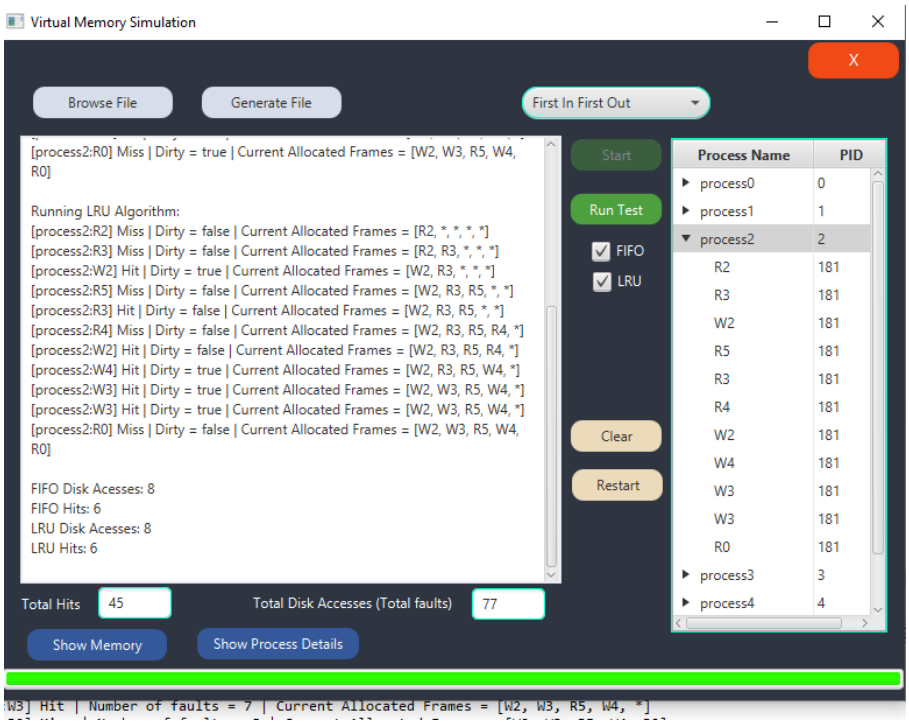


Figure 7: shows run test for process 2 using LRU algorithm.

Conclusion:

This project simulated some of the most important parts of an operating system and its key concepts. It demonstrated multithreading, CPU scheduling, memory page replacement algorithms, and hard disk access. In addition to the simulation, the project included the programming and design of a graphical user interface. Thus this project demonstrated the development of a useful, complex, application, from the theoretical phase, to the implementation, to the final stages of development.