BIRZEIT UNIVERSITY

Faculty of Engineering and Technology

Electrical and Computer Engineering Department

Operating Systems

ENCS3390

Course Project

Virtual Memory Management Simulation

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Abstract

This project is about a page replacement simulator that schedules the processes according to the Round Robin algorithm and after that, these processes go throw two-page replacement algorithms (FIFO and LRU) algorithms to calculate the page fault for each process, the total page fault, and the total cycles without using threads. Also, an interface was designed to show the output in a nice way.

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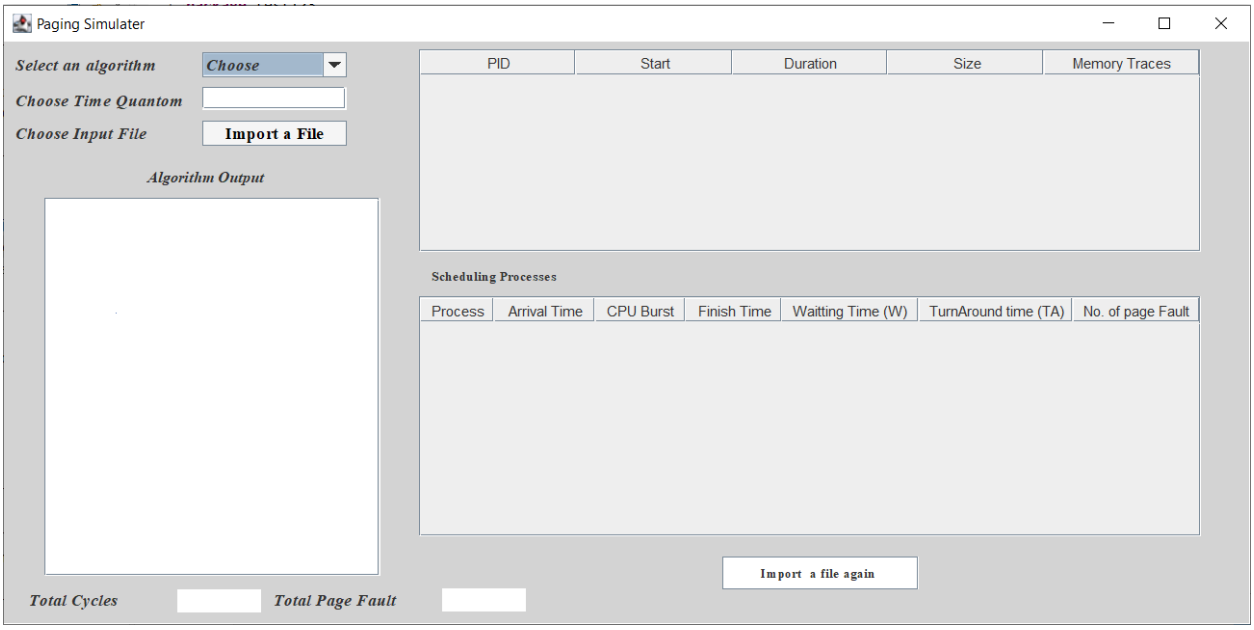
1. Virtual Memory Simulation Interface

Firstly, we designed the interface for our virtual memory simulation program as shown in the following figure (Figure(1.1)). The user must select the page replacement algorithm, either FIFO algorithm or LRU algorithm, then he enter the quantum time, and finally import the input file from the directory in order to calculate and print the results of the page faults and total number of cycles in a nice way.



Figure(1.1):Virtual Memory Simulation Interface.

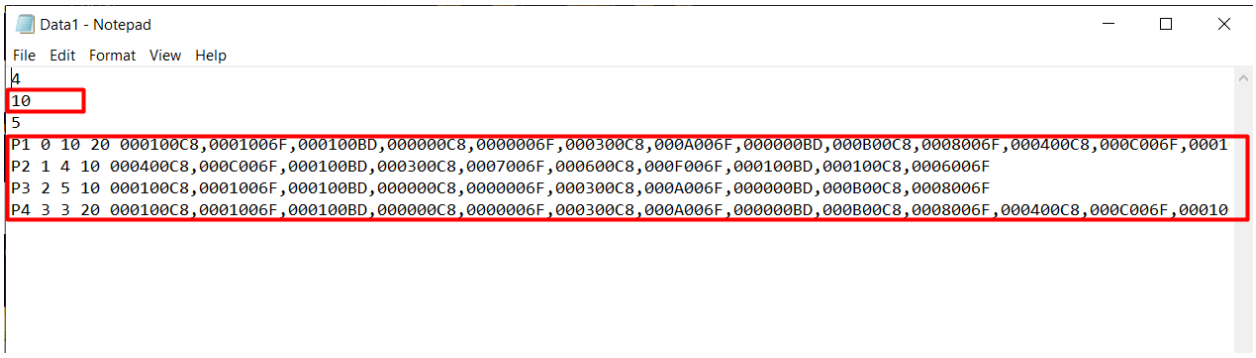
2. Test Cases

2.1Testing FIFO page replacement algorithm:

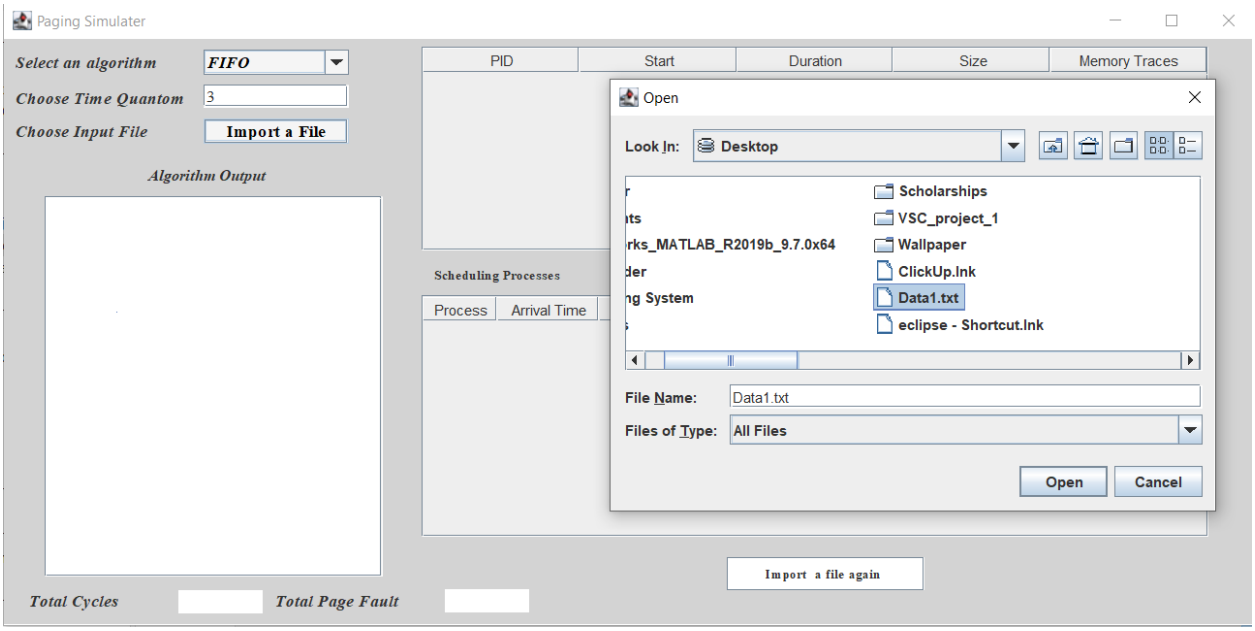
The following two test cases show that the FIFO page replacement Algorithm is working with different time quantum.

❖ 2.1.1 Case 1:

Supposing that the time quantum equals to 3 and number of frames equals to 10, we applied the FIFO page replacement algorithm to the data in the following txt file as shown in the following figures:

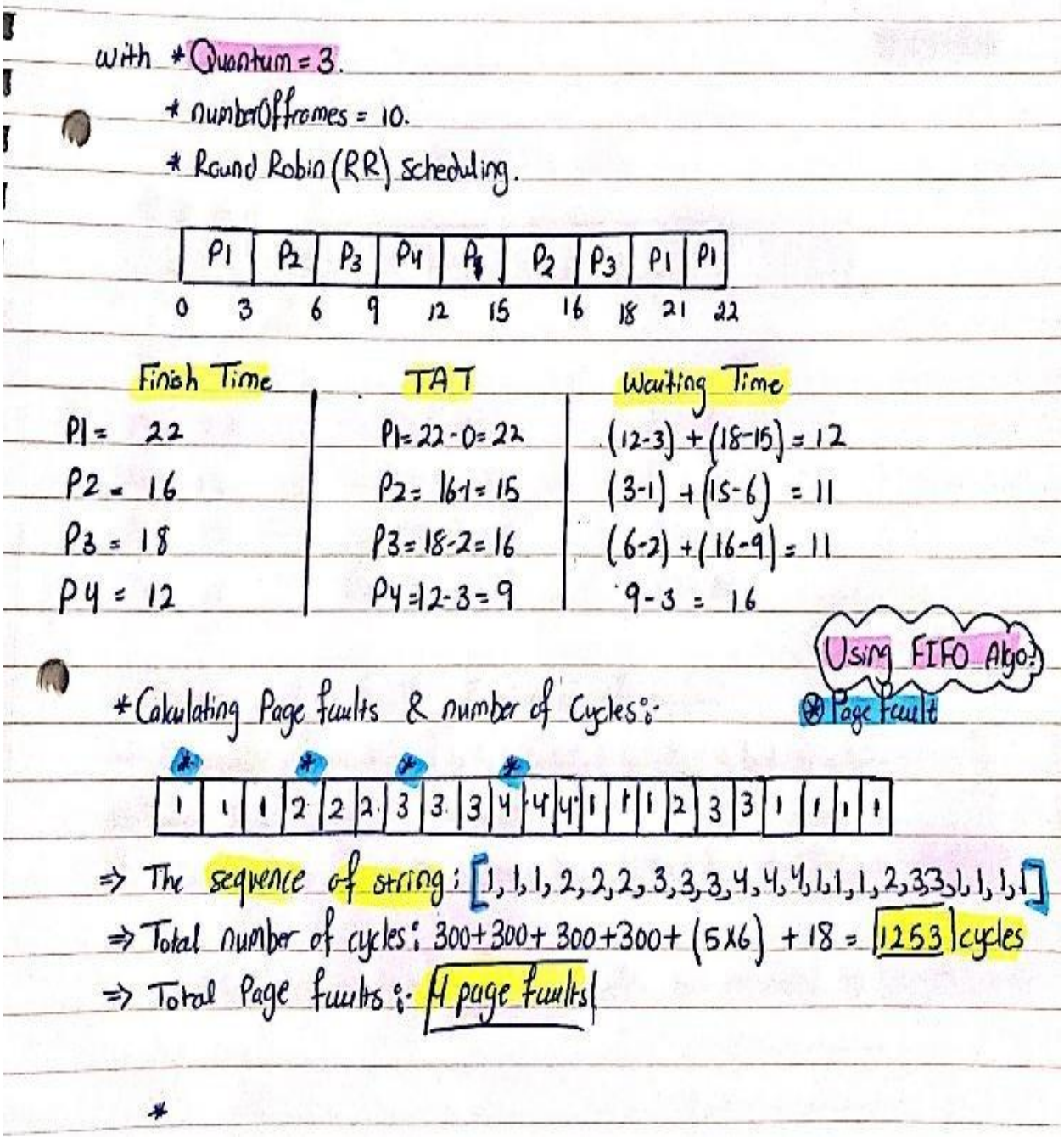


Figure(2.1): txt data file.



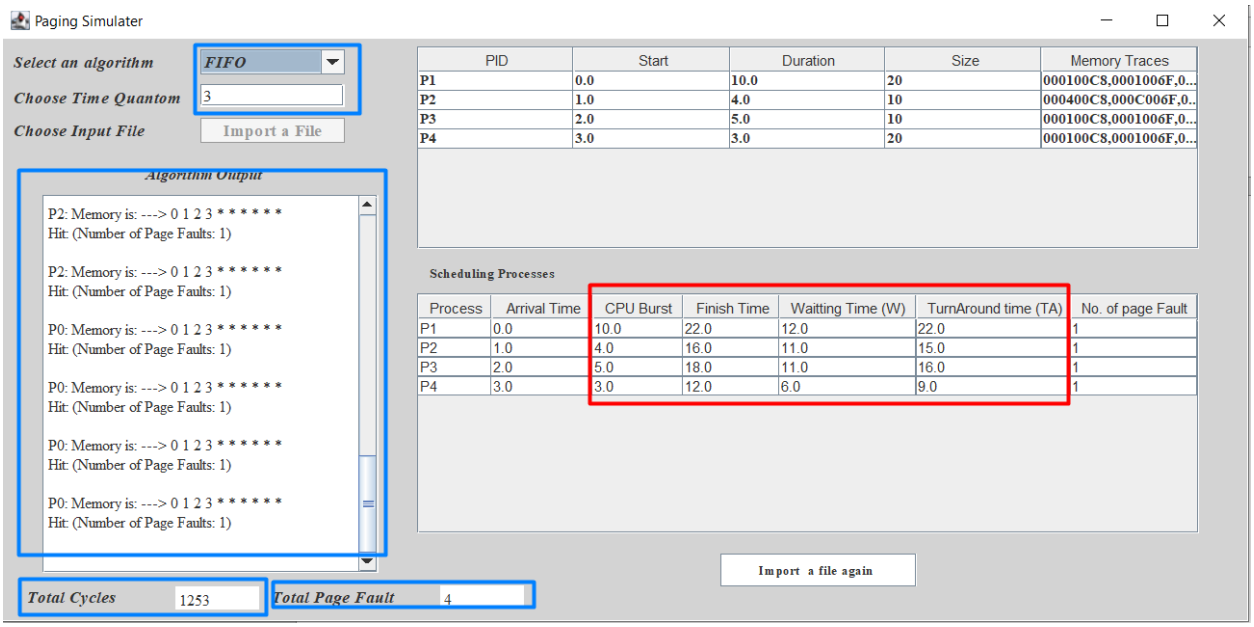
Figure(2.2): uploading the data in txt data file with time quantum equals to 3.

The following figure shows the results theoretically:



Figure(2.3): The Round Robin and FIFO Algorithm outputs.

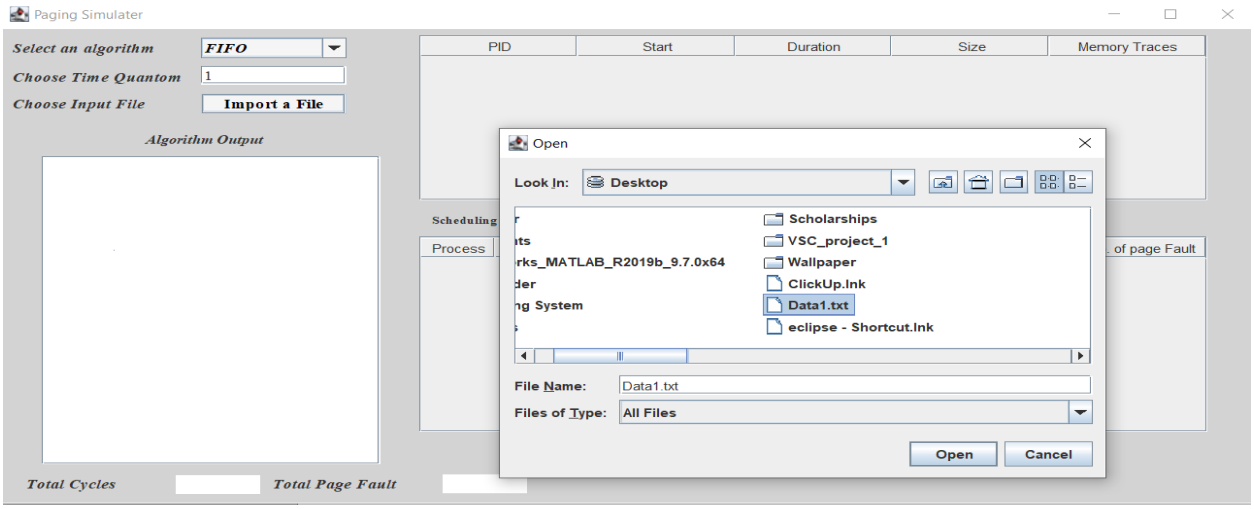
Figure(2,4) shows the output after using the same data in the implemented project, the results are exactly the same as expected.



Figure(2.4): The Round Robin and FIFO Algorithm outputs in the interface.

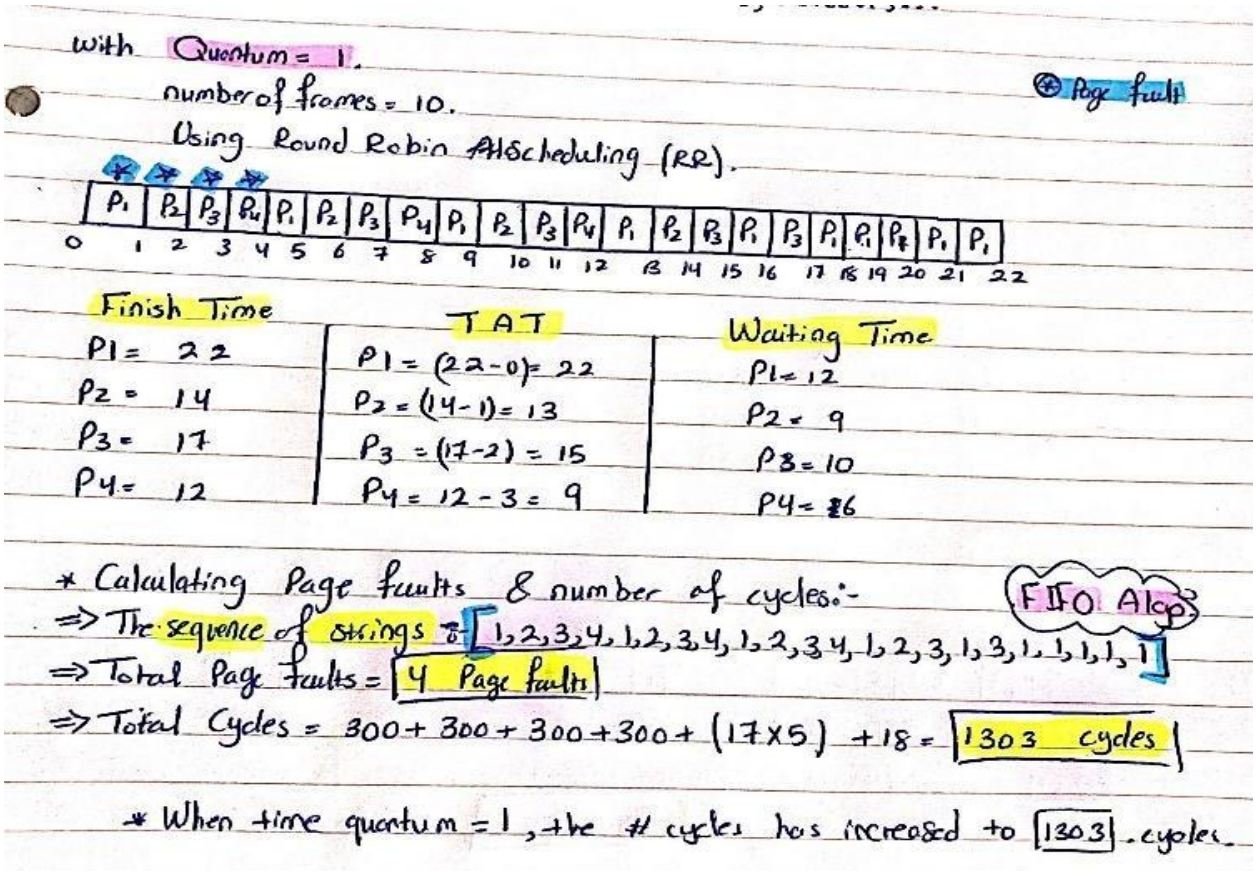
❖ 2.1.2 Case 2:

Supposing that the time quantum equals to 1 and number of frames equals to 10, we applied the FIFO page replacement algorithm to the data in the same txt file:



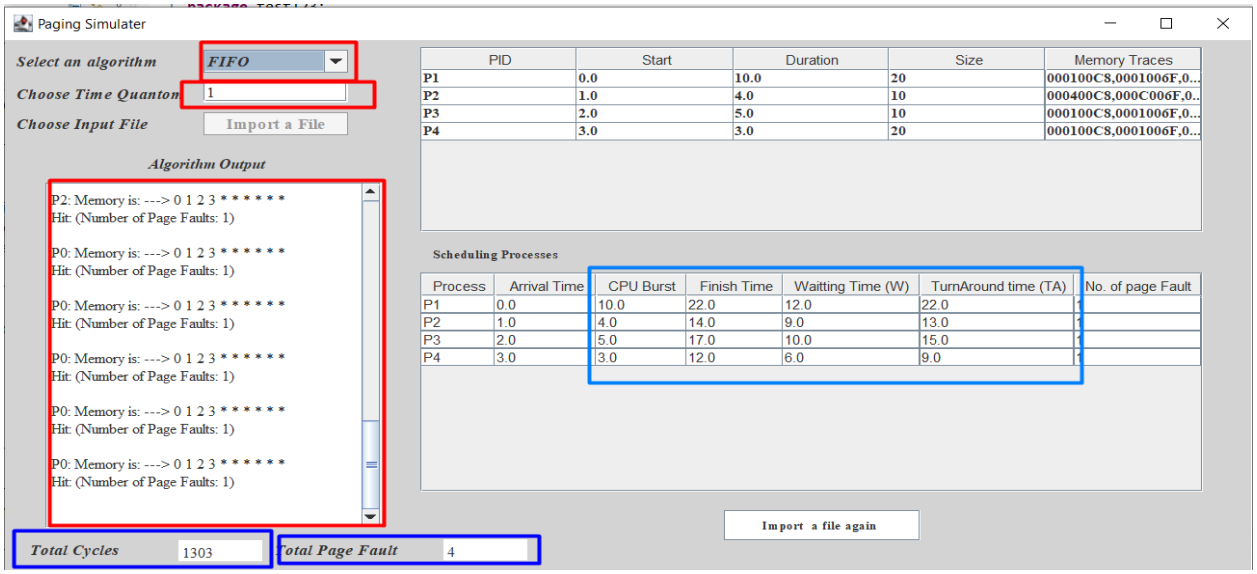
Figure(2.5): uploading the data in txt data file with time quantum equals to 1.

The following figure shows the results theoretically:



Figure(2.6): The Round Robin and FIFO Algorithm outputs.

Figure(2,4) shows the output the results are exactly the same as expected.

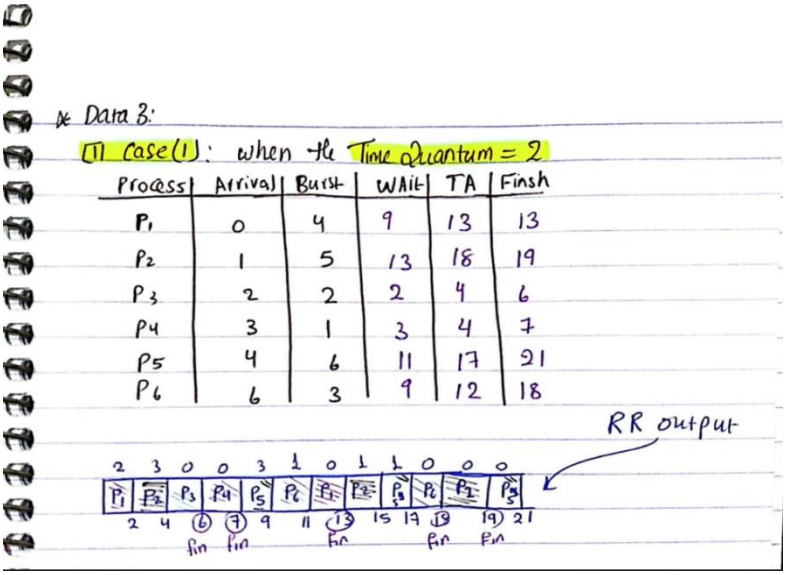


Figure(2.7): The Round Robin and FIFO Algorithm outputs in the interface.

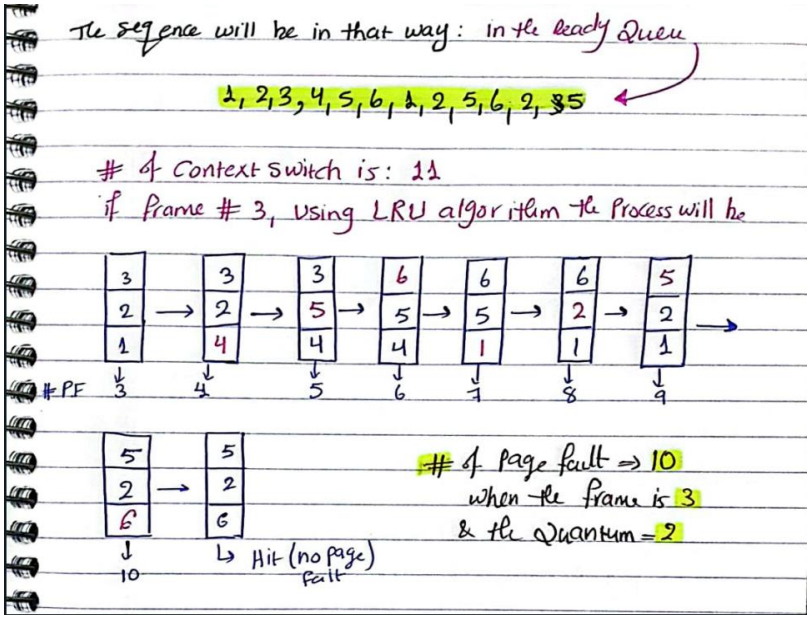
2.2 Testing URL page replacement algorithm:

These tests show that the LRU page replacement algorithm is working with different time quantum.

- **2.2.1 Case 1:** Suppose that the frames number is 3, and the Quantum is 2,
  The below figure shows the results theoretically.



Figure(2.8): the Round Robin Algorithm output.



Figure(2.9): the LRU Algorithm output.

Figure(2.10) shows the output after using the same data in the implemented project, the results are the same as expected.

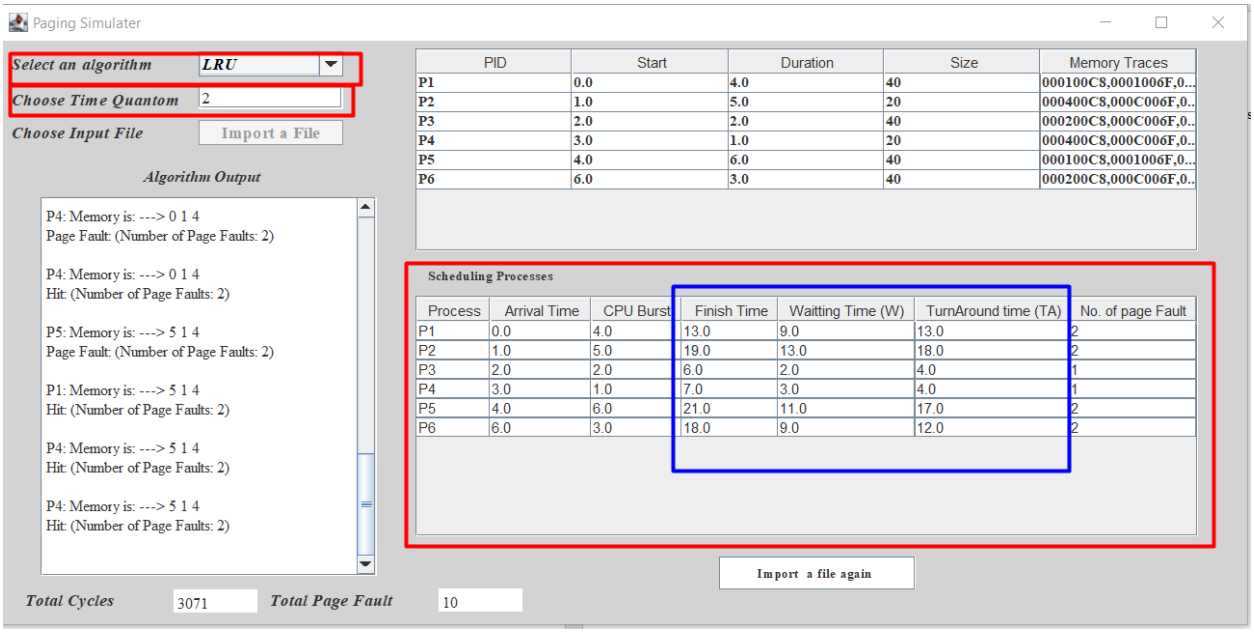


figure (2.10): shows the output of the RR when the Quantum is 2.

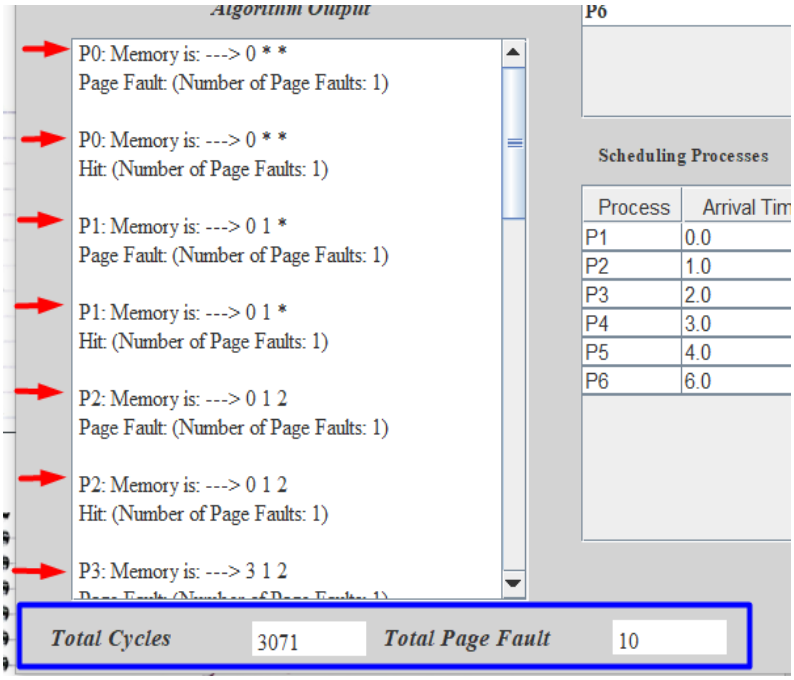
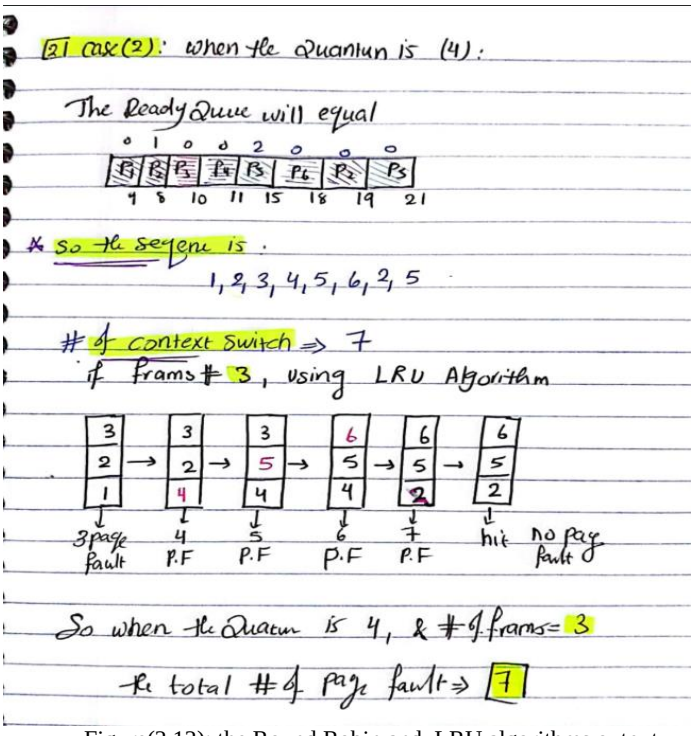


figure (2.11): shows the output of LRU algorithm

note that (the processes in the algorithm are represented by P(n-1) (P0 → P1, P1 → P2, etc.)

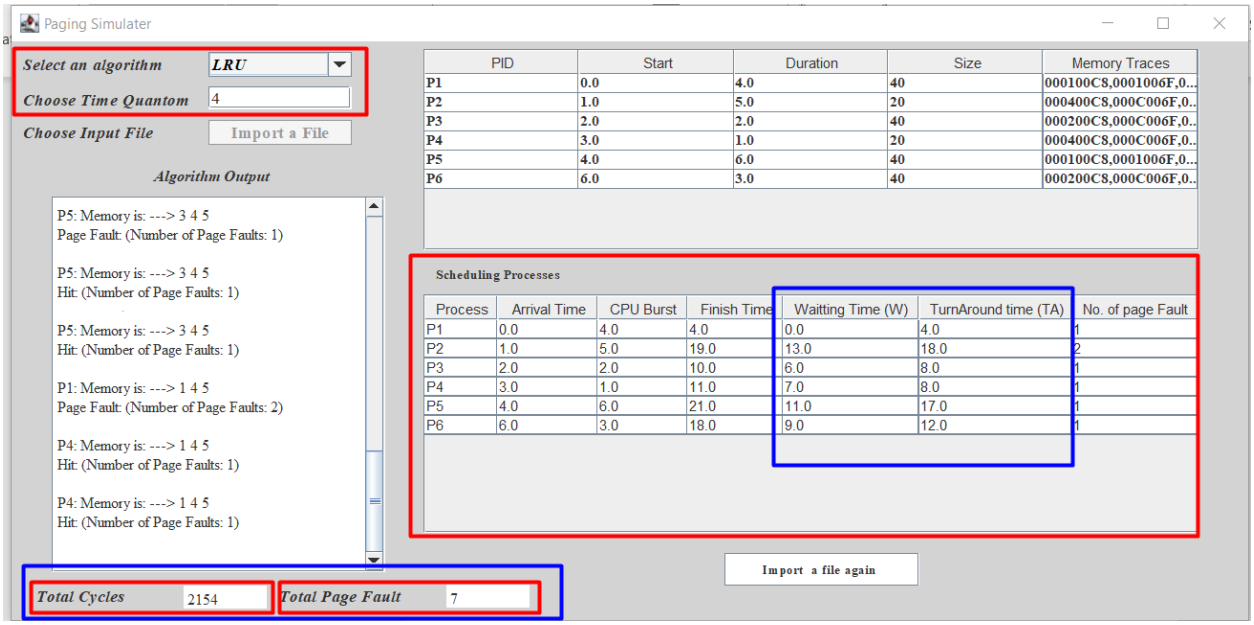
❖ 2.2.2 Case 2:

Suppose that the frames number is 3, and the Quantum is 4,
The below figure shows the results theoretically.



Figure(2.12): the Round Robin and LRU algorithms output

Figure(2.13) shows the output after using the same data in the implemented project, the results are the same as expected



Figure(2.13): shows the output of the RR when the Quantum is 4.

3. Conclusion

This project was a great experiment, many ideas and challenges were introduced and most of them were solved. In the end, the main idea of this project was implemented and it’s working clearly.