First In First Out (FIFO) Page replacement algorithm

Pages and frames

- Physical memory - fixed sized blocks - frames

- Logical memory - same sized blocks - pages

- Page fault - A page fault happens when a running program accesses a memory page that is mapped into the virtual address space but not loaded in physical memory.

First In First Out (FIFO) :

- simplest page replacement algorithm
- the operating system keeps track of all pages in the memory in a queue, the oldest page is in the front of the queue
- When a page needs to be replaced page in the front of the queue is selected for removal

Example :

- Reference string - An algorithm is evaluated by running it on a particular string of memory references

- Consider the following reference string

    1, 2, 3, 4, 1, 2, 5, 1, 2, 3, 4, 5
with 3 page frames. Find the number of page faults.

Solution

- The given reference string is :   1, 2, 3, 4, 1, 2, 5, 1, 2, 3, 4, 5

- Considering the system has 3 frames, then given reference string using the FIFO page replacement algorithm yields a total of 9 page faults.

1	1	1	2	3	4	1	1	1	2	5	5
	2	2	3	4	1	2	2	2	5	3	3
		3	4	1	2	5	5	5	3	4	4
PF	PF	PF	PF	PF	PF	PF	X	X	PF	PF	X

Advantages

- It is simple and easy to understand & implement.
- It is efficiently used for small systems
- It does not cause more overheads

Disadvantages

- slow process execution

- When we increase the number of frames while using FIFO, we are giving more memory to processes. So, page fault should decrease, but here the page faults are increasing. This problem is called as Belady's Anomaly.

- It uses an additional data structure

Conclusion

- FIFO page replacement algorithm is definitely not the best page replacement algorithm to use practically.

- When the number of incoming pages is less, and a user is looking for a simple approach, FIFO might be a reasonable choice.