

Title: Write a program to simulate page replacement algorithm.

1. FIFO
2. LRU
3. Optimal

Objectives:

- To understand concept of paging.
- To learn page replacement algorithms.

Problem Statement:

Write a program to simulate page replacement algorithms.

Software Requirements:

- Ubuntu OS

Hardware Requirement:

- 4GB RAM, 800 GB HDD

Theory:

Paging:

Paging is a memory management scheme that permits the physical address space of a process.

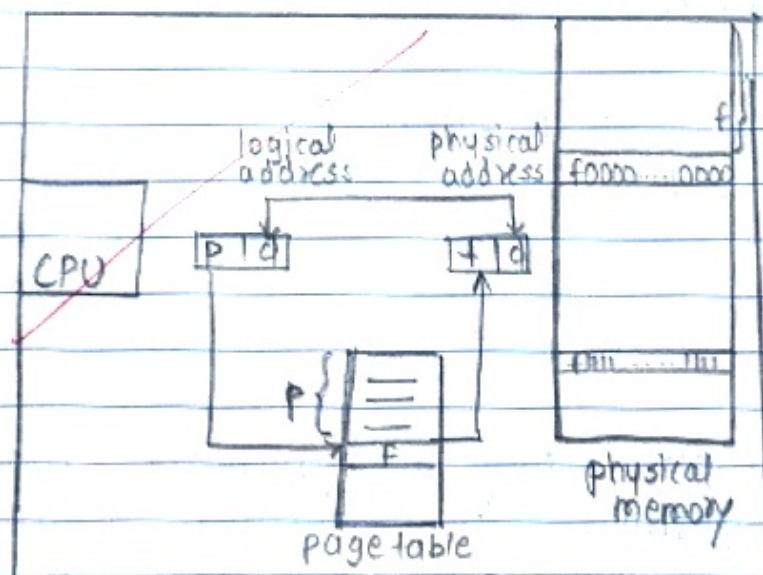
Physical memory is divided into fixed-sized blocks called page frames. Logical memory is divided into fixed size blocks called pages.

When a process is to be executed, its pages can be loaded into any frames.

Consider size of logical address space is  $2^m$ . Now, a page of size  $2^n$ ,  $n$  will specify page offset &  $m-n$  bits will specify page number.

How a logical address is translated into a physical address:

In paging, address translation is performed using a mapping table, called Page Table. The OS maintains a page table for each process to keep track of which page frame is allocated to which page. It stores frame number allocated to each page & page number is used as index to page table.



FIFO

First In First Out: simplest, the OS system keeps track of all pages in memory in a queue, oldest page is in front of queue. When a page needs to be replaced page in



front of queue is selected for removal.

Eg: Consider string 1, 3, 0, 3, 5, 6, 3 with 3 frames.  
Find no. of faults

Page 1, 3, 0, 9, 5, 6, 3  
Reference

1	3	0	3	5	6	3
		0	0	0	0	3
	3	3	3	3	6	6
1	1	1	1	5	5	5
Miss	Miss	Miss	Hit	Miss	Miss	Miss

Page faults = 6

LRU:

- Replaces page that has not been referenced for the longest time in past.
- Performs nearly and optimal policy.

Reference string 7 0 1 2 0 3 0 4 2 9 0 3 2 1 2 0 1 7 0 1

7	0	1	2	0	5	0	4	2	9	0	3	2	1	2	0	1	7	0	1
7	7	7	2	2		4	4	4	0		1		1	1					
	0	0	0	0		0	0	3	3		3		0	0					
		1	1	3		3	2	2	2		2		2	7					

Optimal:

Replace page which is not in use in longest period of time in future.

Reference string

7 0 1 2 0 3 0 4 2 3 0 3 2 1 2 0 1 7 0 1

7	7	7	2	2	2	2	2	2	7
	0	0	0	0	4	0	0	0	0
		1	1	3	3	3	1	1	1

page frames

Conclusion: The various memory management page replacement algorithms were studied & successfully implemented.

Done  
07/09/22

1	1								
0	0								
1	1								