A NOVEL PAGE REPLACEMENT TECHNIQUE TO IMPROVE UTILIZATION OF CPU

Dr.G.Vijaya Lakshmi
Assistant Professor, Department of Computer Sceince, Vikrama Simhapuri University, Nellore, A.P, India

Abstract **:** In Operating system there are various memory management strategies which keep many processes in memory simultaneously to allow multiprogramming. The concept of virtual memory is to execute the processes that are actually greater than that of physical memory using demand paging which in turn govern by different page replacement algorithms. In this paper to improve the processor performance we propose a Novel Page Replacement technique and compared the results with existing algorithms i.e ., FIFO, LRU, OPTIMAL page replacement algorithms

Keywords*:* Page Replacement algorithms, FIFO, LRU, OPTIMAL, , Hit ratio, Fault rate.

I. INTRODUCTION

In Operating system to improve both Utilization of CPU and speed of its response to users, the system has to keep several processes in Main memory. Therefore Main memory is divided into fixed size blocks called Page Frames, which it can be in either secondary or in Main Memory. A CPU generated address is called logical address whereas physical address is generated by the Memory management unit. When the processor needs to execute a page and if the page is not in main memory then it is called as page fault [6] else it is Page Hit. When page fault occurs the operating system avoids page to secondary memory to make
space for the next reference page. Therefore the operating system applies various Page Replacement algorithm like FIFO,LRU , OPTIMAL , LRU page replacement algorithm.

II. LITERATURE SURYVEY

The traditional methods which include FIFO, LRU , OPTIMAL , LRU page replacement algorithm is the novel technique[4].

A. FIFO ALGORITHM

In this algorithm we create a queue to hold all pages in memory. we replace the page at the head of the queue. When it is brought into memory we insert at tail of the queue. To replace the page, we replace with the oldest page. In this algorithms we face Belady's anomaly problem [1]

B. LRU ALGORITHM :

Least recently used (LRU) page replacement [2] replaces the page that has not been used for the longest period of time. We can think of this strategy as the optimal page replacement algorithm looking back ward in time, rather than
forward foremost problem is how to put into operation LRU replacement. To implement an LRU page-replacement algorithm it may require hardware assistance.. The drawback in this algorithm is to decide an order for the frames defined by the time of last use.

C. Optimal Page Replacement algorithm

Optimal Page Replacement algorithm [3], selects whose reference is furthest. since they can predict the further memory reference to certain extend. This optimal result is referred to as Belady's MIN algorithm or the clairvoyant algorithm

III. ANALYSIS OF PAGE REPLACEMENT ALGORITHMS

Consider a 20 pages reference string 1,2,3,4,2,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6 for four frames in memory to find the page faults using FIFO, OPTIMAL AND LRU page replacement algorithms

A) FIFO ALGORITHM

Reference strings: 1 2 3 4 2 1 5 6 2 1 2 3 7 6 3 2 1 2 3 6

1	1	1	1	1	1	5	5	5	5	5	3	3	3	3	3	1	1	1	1
	2	2	2	2	2	2	6	6	6	6	6	7	7	7	7	7	7	3	3
		3	3	3	3	3	3	2	2	2	2	2	6	6	6	6	6	6	6
			4	4	4	4	4	4	1	1	1	1	1	1	2	2	2	2	2

Total number of page faults: 14
Page fault rate: No. of page faults/ Total No. of Reference strings*100
Page fault rate: 10/20*100= 70%
Total number of hits: 05
Avg Hit : total number of hits/ Total No. of Reference strings*100
=05/20*100=25%

B) OPTIMAL PAGE REPLACEMENT ALGORITHM

Reference strings: 1 2 3 4 2 1 5 6 2 1 2 3 7 6 3 2 1 2 3 6

1	1	1	1	1	1	1	1	1	1	1	1	7	7	7	7	1	1	1	1
	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
			4	4	4	5	6	6	6	6	6	6	6	6	6	6	6	6	6

Total number of page faults: 08
Page fault rate: No. of page faults/ Total No. of Reference strings*100

= 10/20*100= 40%

Total Hits : 12

Avg Hits : total number of hits/ Total No. of Reference strings*100
= 12/20*100=60%

C) LRU PAGE REPLACEMENT ALGORITHM

1	1	1	1	1	1	1	1	1	1	1	1	7	6	6	6	6	6	6	6
	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	3	3	3	3	3	5	5	5	5	5	3	3	3	3	3	3	3	3	3
			4	4	4	4	6	6	6	6	6	7	7	7	7	1	1	1	1

Total number of page faults: 10
Page fault: No. of page faults/ Total No. of Reference strings*100

Avg . Page fault: 10/20*100= 50
Total number of hits: 10

Avg Hits= Tota: total number of hits/ Total No. of Reference strings*100
=10%20*100= 50%

IV. PROPOSED ALGORITHM

1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	5	5	5	5	5
				2	2	2	2	2	2	2	2	2	2	2	2	6	6	6	6
										3	3	3	3	3	3	3	3	3	7
														4	4	4	4	4	4

Total number of page faults: 07

Page fault rate: No. of page faults/ Total No. of Reference strings*100

Page fault rate: 10/20*100= 35%
Total number of hits: 13

Hit ratio: total number of hits/ Total No. of Reference strings*100

Average Hit ratio: = 13/20*100= 65%

V. COMPARISON TABLE

Reference string: Reference strings: 1 2 3 4 2 1 5 6 2 1 2 3 7 6 3 2 1 2 3 6

Total Frame size : 4

Page Replacement algorithms	Total Page faults	Avg Page faults	Total Hits	Avg Hits
FIFO	14	70	5	25
OPTIMAL	11	40	12	60
LRU	10	50	10	50
PROPOSED	07	35	13	65

VI. GRAPH FOR DIFFERENT PAGE REPLACEMENT ALGORITHMS

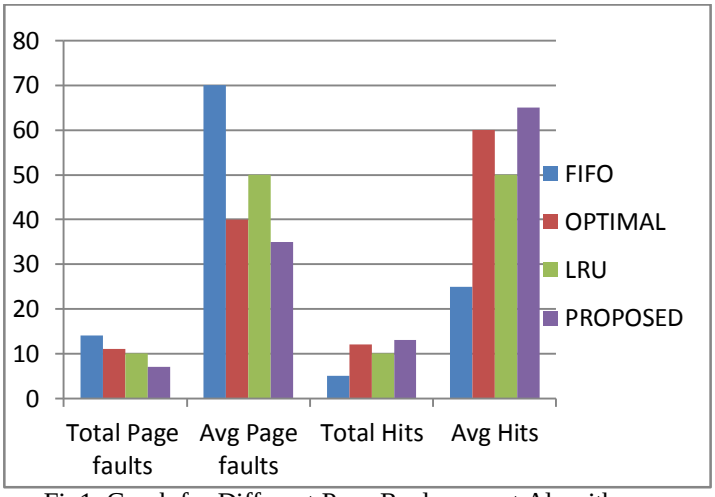

Fig1. Graph for Different Page Replacement Algorithm

VII. CONCLUSION

In this paper we have proposed a novel page replacement algorithm and compared with results with FIFO, LRU AND Optimal page replacement algorithms to proposed algorithms. From the results it is been observed that average fault rate decreases where the performance of the process increases.

VIII. REFERENCES

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Dr. G.Vijaya Lakshmi , Assistant Professor, Department of Computer Science, Vikrama Simhapuri University, Nellore, India. Her Research Interest includes Networks, Data Mining , Data sciences.