

CprE 308 Homework 3

Department of Electrical and Computer Engineering
Iowa State University

Student Name: Riley Larsen

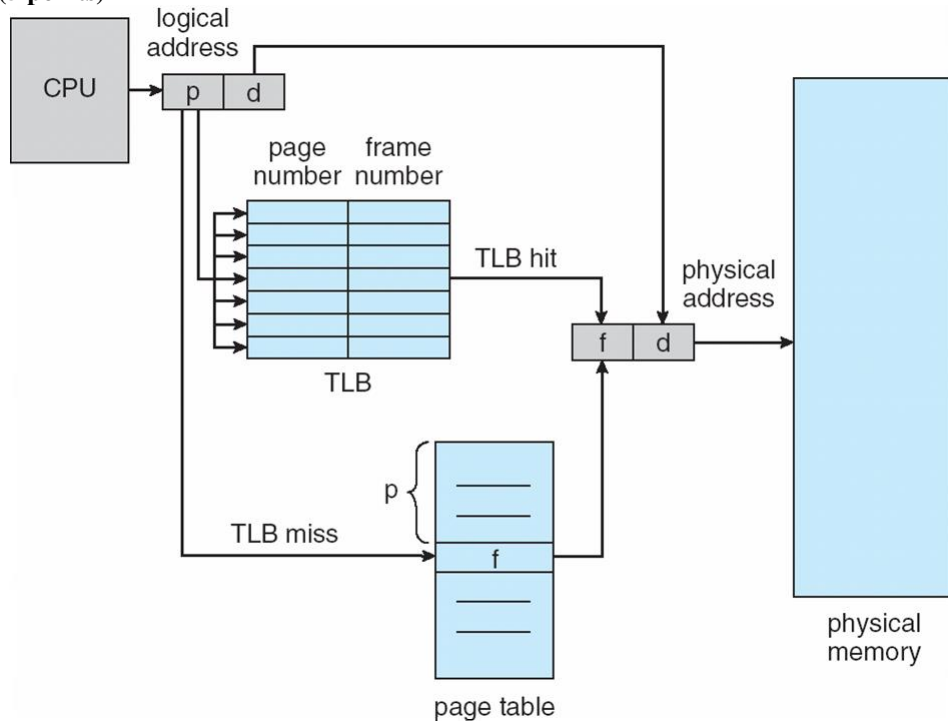
University-ID: rlarsen

Problem 1. (5 points)

Applications can be roughly classified into two types based on I/O pattern: sequential and random. Which type of applications tend to have better I/O performance on hard disk drives? Why?

Sequential is much faster because accessing data randomly is significantly slower and less efficient. If a hard drive reads something randomly in a single read then it would be faster than 25 different reads. This would take far more time to seek in the disk.

Problem 2. (5 points)



The figure above shows the basic workflow of paging with TLB. Assume the TLB hit ratio is R , which means the percentage of times that a page reference is found in the TLB. Also, assume the latency of memory access is L . Calculate the Effective Access Time (EAT) using R and L .

TLB Hit Ratio : % time memory is in TLB

EAT : $R \times \text{hit memory time} + (1 - R) \cdot (\text{miss memory time})$

TLB hit time : search time + memory access time

TLB miss time : search time +

EAT : miss time $\cdot (1 - \text{hit ratio}) + \text{TLB hit time}$

hit ratio

$$EAT = (R \cdot L) + (1 - R)(2L)$$

We can evaluate a page-replacement algorithm by running it on a particular string of memory references (reference string) and computing the number of page faults on that string. Each number in the reference string represents a page number. Assume there is a reference string as follows:

LRU

8	0	1	2	0	3	0	4	2	3	0	3	0	3	2	1	2	0	1	8
8	8	8	2	2	2	2	4	4	4	0	0	0	0	0	0	0	0	0	8
	0	0	0	0	3	3	3	2	2	2	2	2	2	2	1	1	1	1	1
		1	1	1	1	0	0	0	3	3	3	3	3	3	3	2	2	2	2

- 10 page Rev 25

- LRU - Least Recently used

- [illegible]