

CprE 308 Homework 3

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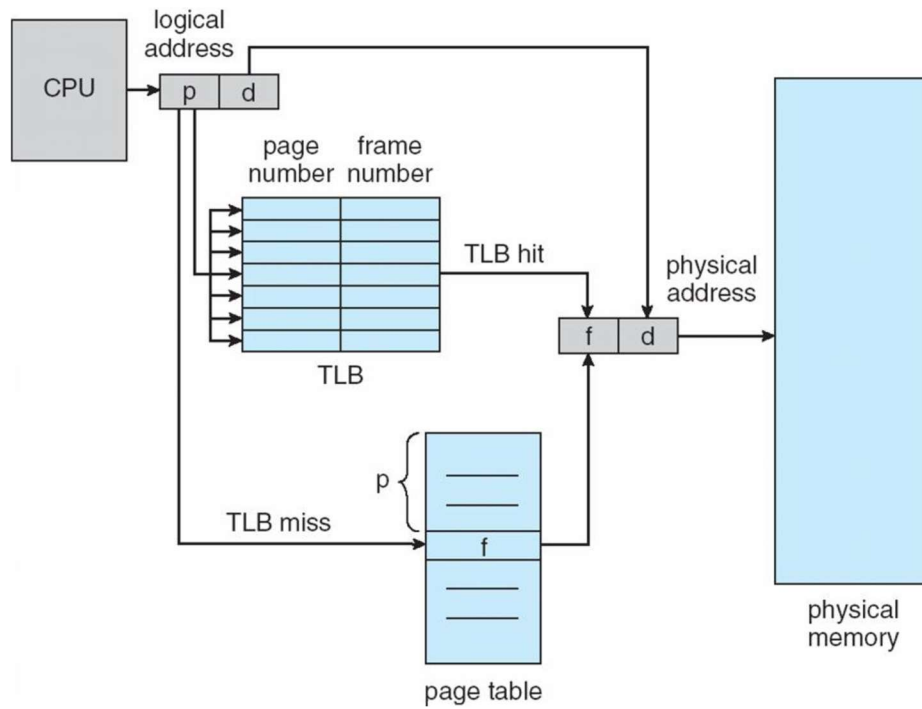
Problem 1. (5 points)

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 patterns tend to have better performance because of the time it takes for seeking and revolving hard drives. If the data is laid sequentially, finding the first block of data will mean the rest follow directly after, and there is no significant wait time.

If the data is random, grabbing each block of data will incur time penalties for seeking and revolving, as each block needs to be reached on its own.

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 .

$$EAT = (R * L) + ((1 - R) * (2 * L))$$

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:

Assume the system only has three physical memory frames, and the content of the frames corresponding to the reference string above is as follows:

(1) Based on the memory content above, how many page faults are there for the given reference string?

(2) Which page-replacement algorithm is used in the system?
FIFO

[illegible]