

Homework 3 – Comp3500

Haden Stuart - has0027

1.) Pages and Frames are both used in virtual memory however, pages are used to store things in virtual memory while frames are used to store things in the physical memory.

2.) Virtual memory doesn't actually exist, it is just an imaginary set of memory used to split a program up into pages. It is also how a program actually sees itself. Real memory is where everything is actually stored.

3.) **Advantages:** eliminates external fragmentation, eliminates need for address rewriting by loading things into memory, not all pages must be loaded into memory for a program to be executed, more processes can be executed at the same time

Disadvantages: internal fragmentation, have to waste physical memory on a page table, introduces page faults

4.) Page size will directly influence internal fragmentation. The smaller a page size is, the less space will go unused if a page cannot be filled entirely. The main problem of making page size small is the fact that we will still need to store information for each page in the page table. This could lead to the page table wasting large amounts of space.

5.) A page fault is an error that happens when a program tries to access a part of a program that is not currently stored in physical memory. When this occurs, the operating system must then retrieve the page from virtual memory and place it into physical memory.

6.) A fetch policy is an algorithm that determines when a page needs to be moved to physical memory. We need this in order to determine which parts of a program need to be moved into physical memory. The most common fetch policy is Fetch on Demand which only fetches a page if it is referenced. Another fetch policy is Anticipatory Fetch which involves the operating system predicting which parts of a program will likely be referenced and moving those into memory.

7.) A replacement policy is an algorithm that determines what processes to swap out to make room for a new process. The advantages and disadvantages of the four main policies are:

Replacement Policy	Advantages	Disadvantages
Optimal	1. Best time 2. Best performance	1. Impossible to implement
Least Recently Used	1. Performance is close to optimal	1. Hard to implement

First In First Out	1. Easy to implement	1. Bad performance
Clock	1. Easy to implement 2. Fairly fast 3. Good performance	1. Some scenarios create bad performance 2. Managing the clock table takes time

8.) In order to implement the optimal page replacement policy, the operating system would need to know exactly which processes will be used and at what time. Knowing this the operating system could swap in a process that needs to be used and swap out the process whose next use is farthest in the future.

9.) With Paging we have no external fragmentation, but we have internal fragmentation while Segmentation has the opposite. In Paging we can load multiple processes at the same time but in Segmentation we are limited. Segmentation is real therefor we can actually see it physically but with Paging it is just an imaginary set so we cannot physically see it.