Quiz 6: Memory Management

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Due date: noon of Thursday Apr 17, 2022

**[Question 1]** Rank the memory levels following from fastest to slowest:

Fastest to slowest (1-5)

1. Main memory **3**
2. Cache **2**
3. Register **1**
4. Solid state drive **4**
5. Magnetic disk **5**

**[Question 2]** Does the following reference string exhibit Belady’s Anomaly when moving from 3 frames to 4 frames?

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 4 | 1 | 2 | 5 | 1 | 2 | 3 | 4 | 5 |
|  |  |  |  |  |  |  |  |  |  |  |  |

No using FIFO with 3 frames there are 3 processes without page faults but when increasing it to 4 frames there are only 2 processes with page faults.

**[Question 3]** Can Belady’s Anomaly occur with Least Recently Used? Why?

No Belady’s Anomaly can’t occur with Least Recently Used because the set of pages in memory would be the n most recently referenced pages. If the number of frames increases then these n pages will still be the most recently referenced and so, will still be in the memory.

**[Question 4]** In a single statement, **explain** each of the following memory management schemes (mention one advantage):

1. Single-User Contiguous Memory: Is when the entire program is loaded into memory. Its advantages are that it has contiguous memory space and allocates space as needed; it processes jobs sequentially and its memory manger performs minimal work. It evaluates incoming process size and loads if small enough to fit, otherwise, it . It also Monitors occupied memory space rejects and evaluates next incoming process.
2. Fixed Partitions: In this type of allocation, main memory is divided into a number of fixed-sized partitions where each partition should contain only one process. One of its large advantages is that it permits multiprogramming
3. Dynamic Partitions: In this method the main memory is dynamically partitioned giving requested memory to processes when one is loaded and it store them in a continuous manner. The processes are partitioned in a FCFS way. A few big advantages of this method is that is helps prevent internal fragmentation because memory is dynamically assigned to jobs based on their need, this leads to another advantage is that there is no size limitation for a processes other than the total memory avalible, and because of this it is possible to have more multiprogramming.
4. Relocatable Dynamic Partitions: This is the same as dynamic partitions expect it also gets all the empty memory blocks and merges them into one large memory block to hep with memory defragmentation.
5. Paging: It uses a page table to translate physical addresses into logical ones and then uses that to keep track of all free frames (using n frames to run n programs) each fram represent a free space in memory. Its advantages are that it avoids external fragmentation, and it avoids problem of varying sized memory chunks.

**[Submission]**

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