

Assignment 3 OS -

Question 1 -

The problem explained by the figure 3.4 is the next one :

Every OS must work with a lot of processes in the same time, then, one of the issue was about the memory used by each process.

Indeed, each process use some memory in the RAM (Random Access Memory) (it could be until 200MB and more). Obviously, keeping all the processes running on the same time requires a lot of memory.

One of the answers is the “swapping”. It’s consist to put the process back on the disk from the time that the process finish his job.

On the figure 3.4, we can see some process blocks which contain some memory and the letter A, B and C represent some processes. We can read the figure in function of the time (from the left to the right as shown on the picture) and see all the swapping effectuate on the same process block.

Question 2 -

(a) One represents RAM memory using bitmaps by 0 for free and 1 for occupied.

Indeed, the RAM is separate by some allocation chooses by the OS, and like said above, we can know if the memory is used or not with the flags 0 and 1.

Something important to denote here is that the allocation of the memory in the RAM should be as efficiency as possible since it can have repercussion, in particular wasting some memory : if it’s too big, memory can be wasted, if it’s too small, the size of the bitmap may have a better use.

(b) One represents RAM memory using linked lists is use by this way :

The linked list is fulfill either by a Hole (H), or by a Process(P).

Then, it’s specified the address where the P or the H begin and his size.

(c) The algorithms: first fit, next fit, best fit, worst fit, quick fit mean :

All the algorithms speak about how to choose the allocation of the memory on the RAM.

First fit : we allocate the first hole found.

Next fit : we allocate the first hole found as the first fit but the difference is that the next time we need to allocate memory, it start searching from the place where it left off last time, instead of the beginning.

Best fit : It’s slower than first fit cause it’s searching in all the list the best allocation possible. By best allocation we mean the allocation which waste the less memory possible.

Quick fit : This algorithm build list of some hole of the same sizes like that the allocation must be quicker.

Question 3 -

(a) The MMU (Memory Management Unit) is mapping the virtual addresses onto the physical memory addresses.

(b) All the **virtual** address space into the RAM is divided into fixed_size called pages

(c) The corresponding address space in the **physical** memory is called page frame.

(d) Paging consist to across from virtual address to physical address.

(e) In the figure 3.10 we can see the paging of some addresses.

Question 4 -

(a) The page replacement algorithm is an algorithm which when a page fault occurs, make place for this page. To do this, the algorithm must choose a page to evict.

(b) The not recently used page algorithm evict the not recently used page from the RAM, to let the new page allocate memory.

(c) The 2nd chance page replacement algorithm work as :

If it's 0, the page is replaced immediately.

Otherwise, if the bit is 1, he his cleared and the page is put onto the end of pages.

(d) The LRU (Least Recently Used) page replacement algorithm is an algorithm which take as behavior that page that have been heavily used in the last few instructions will probably used in the next few.

So the LRU algorithm worried that if a page fault occurs, it throw out the page that have been unused for the longest time.

(e) The NFU (Not Frequently Used) page replacement algorithm is as is name indicate an algorithm which if a page fault occurs throw out the page that not frequently used (use of a counter).

The big problem with NFU is that's not forget anything.

(f) The 'aging' algorithm act as a new version of the NFU algorithm :

Initialization all the counter are shifted right 1 bit before the R bit is added in.

Second, the R bit is added to the leftmost rather that the rightmost bit.