Câu Hỏi Về Memory

1. Answer following questions – True or False
a. A smaller page size leads to smaller page tables
b. A smaller page size leads to more TLB misses
c. A smaller page size leads to fewer page faults
d. A smaller page size reduces paging I/O throughput
e. Threads are cheaper to create than processes
f. Kernel-scheduled threads are cheaper to create than user-level threads
g. A blocking kernel-scheduled thread blocks all threads in the process
h. Threads are cheaper to context switch than processes
i. A blocking user-level thread blocks the process
j. Different user-level threads of the same process can have different scheduling priorities
k. All kernel-scheduled threads of a process share the same virtual address space
l. The optimal page replacement algorithm is the best choice in practice
m. The operating system is not responsible for resource allocation between competing processes
n. System calls do not change to privilege mode of the processor
o. A scheduler favouring I/O-bound processes usually does not significantly delay the completion of CPU-bound processes

2. Describe the difference between external and internal fragmentation. Indicate which of the two are most likely to be an issues on a) a simple memory memory mangement machine using base limit registers and static partitioning, and b) a similar machine using dynamic partitioning.
3. List and describe the four memory allocation algorithms covered in lectures. Which two of the four are more commonly used in practice?
4. Base-limit MMUs can support swapping. What is swapping? Can swapping permit an application requiring 16M memory to run on a machine with 8M of RAM?
5. Describe page-based virtual memory. You should consider pages, frames, page tables, and Memory Management Units in your answer.
6. Give some advantages of a system with page-based virtual memory compared to a simply system with base-limit registers that implements swapping.
7. Describe segmentation-based virtual memory. You should consider the components of a memory address, the segment table and its contents, and how the final physical address is formed in your answer.
8. *What is a translation look-aside buffer? What is contained in each entry it contains?*
9. *Describe a two-level page table? How does it compare to a simple page table array?*
10. *What is an inverted page table? How does it compare to a two-level page table?*
11. *What are temporal locality and spatial locality?*
12. *What is the working set of a process?*
13. *How does page size of a particular achitecture affect working set size?*
14. *What is thrashing? How might it be detected? How might one recover from it once detected?*
15. *Enumerate some pros and cons for increasing the page size.*
16. *Describe two virtual memory page fetch policies. Which is less common in practice? Why?*
17. *What operating system event might we observe and use as input to an algorithm that decides how many frames an application receives (i.e. an algorithm that determines the application's resident set size)?*
18. *Name and describe four page replacement algorithms. Critically compare them with each other.*
19. *Describe buffering in the I/O subsystem of an operating system. Give reasons why it is required, and give a case where it is an advantage, and a case where it is a disadvantage.*
20. Describe internal and external fragmentation.?
21. What are the problems with multiprogrammed systems with fixed-partitioning?
22. Assume a system protected with base-limit registers. What are the advantages and problems with such a protected system (compared to either a unprotected system or a paged or segmented VM system)?
23. A program is to run on a multiprogrammed machine. Describe at which points in time during program development to execution time where addresses within the program

can be bound to the actual physical memory it uses for execution? What are the implication of using each of the three binding times?

24. Describe four algorithms for allocating regions of contiguous memory, and comment on their properties.
25. What is compaction? Why would it be used ?
26. What is swapping? What benefit might it provide? What is the main limitation of swapping?
27. What is Paging?
28. Why do all virtual memory system page sizes have to be a power of 2? Draw a picture.
29. What is a TLB? What is its function?
30. Describe a two-level page table and how it is used to translate a virtual address into a physical address.?
31. What are the two broad categories of events causing page faults? What other event might cause page faults?
32. Describe an inverted page table and how it is used to translate a virtual address into a physical address.?
33. Describe a hashed page table and how it is used to translate a virtual address into a physical address.?
34. Of the three page table types covered in lectures, which ones are most appropriate for large virtual address spaces that are sparsely populated (e.g. many single pages scattered through memory)?