

# Seminar questions

## Module 5

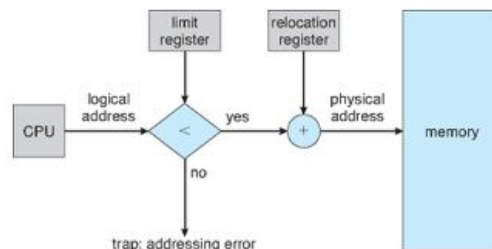
### Memory management, files and file systems

### Internet history and governance

Computer systems with project work (1DT003) Uppsala university spring 2020

## Memory management

1. When creating a new process the operating system must allocate memory for two structures, name and explain the purpose of these structures.
2. One option is to allocate the memory needed by a single process contiguously in a sequential sequence of physical memory addresses. Describe two major problems with this approach.
3. Explain the purpose of logical memory addresses and how logical memory addresses relates to physical memory addresses.
4. Explain what memory compaction is and why it cannot be done without introducing logical memory.
5. What is the meant by external fragmentation?
6. What does the acronym MMU stand for and what is the purpose of the MMU?
7. In the below figure, a simple MMU is shown.



- a) Explain the purpose of the relocation registers.
- b) What problems could occur if the check against the limit register was omitted?
8. What is the purpose of virtual memory?
9. How is a virtual memory address space similar to a logical address space and how are they different?
10. What problem with contiguous memory allocation is solved by introducing a page table?
11. How are pages and frames similar? How are they different?
12. What is the purpose of the page table?
13. With a logical address length of 16 bits and a page size of 8K byte, a process in the system gets the following page table:

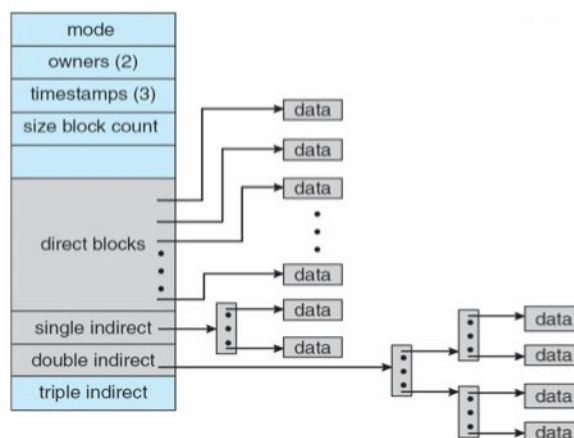
Page	0	1	2	3	4	5	6	7
Frame	4	3	7	1	2	5	6	0

Compute the physical addresses for the following logical addresses a) 0x0F51 b) 0xA619 c) 0x86BC d) 0x70AD presented here in hexadecimal form. Your answers should be in hexadecimal.

14. Why is the translation lookaside buffer (TLB) introduced?
15. Draw a diagram showing how a logical (or virtual) address as seen by the CPU is translated to a physical address using a page table and TLB.
16. What problem is solved by introducing hierarchical page tables?

## Files and file systems

17. What is meant by persistent data storage?
18. Describe the relation between the system-wide open file table and the per-process open file table.
19. What is the purpose of the directory structure?
20. To store a file on secondary storage, blocks of storage must be allocated to a file. What is meant by random access time in relation to secondary storage access?
21. What are the limitations of contiguous block allocation?
22. Discuss and compare random access time for a) linked allocation and b) FAT.
23. Why does the Unix inode uses direct, indirect, double indirect and triple indirect data blocks?



## Internet history and governance

24. What was the top-level goal of the DARPA Internet architecture?
25. What are the key responsibilities of the Internet task force (the IETF)?
26. What was the main new feature of the CYCLADES network?
27. What organization manages the top-level domain for Sweden (.se) ?
28. What does the end-to-end principle mean?
29. What organization published the first registered web page in Sweden?
30. One important person in the history of the Internet is Jon Postel. He formulated what is referred to as "Postel's law". What does Postel's law say and what does it mean?