

2007 Paper 1 Question 7

Operating Systems

- (a) Describe carefully how a 32-bit virtual address could be translated to a physical address during the execution of a memory reference instruction on a typical modern CPU that supports paged virtual memory. You should assume that the page size is 4096 bytes and that the system uses two-level paging with page tables at both levels holding 1024 entries. [5 marks]
- (b) List the protection bits that you would expect to find in a page-table entry and briefly explain how they are used. [5 marks]
- (c) Outline the main differences between paging and segmentation, and show how a segmentation scheme can be implemented with reasonable efficiency in a system that supports paging. [4 marks]
- (d) Outline how you would implement, on a machine with 64-bit virtual addresses, the MULTICS-like view of files in which open files are mapped onto positions in virtual memory. [6 marks]