

## 2002 Paper 10 Question 7

### Operating System Foundations

- (a) Explain briefly the memory-management scheme of *paging*. [4 marks]
- (b) Give *two* disadvantages of paging. [2 marks]
- (c) A translation look-aside buffer (TLB) is sometimes used to optimise paging systems. Explain carefully how a TLB can be used in this way, and how it can optimise a paging system. [3 marks]
- (d) The fictional Letni 2P chip uses (single-level) paging and has a memory access time of 8 nanoseconds and a TLB search time of 2 nanoseconds. What hit ratio (the probability that an item is in the TLB) must be achieved if we require an average (paged) memory access time of 12 nanoseconds? [4 marks]
- (e) The management of the Letni Corporation wish you to design and evaluate a *multi-level* paging system for their new 64-bit processor, the 3P, which has 4K-sized pages.
- (i) Give details of your proposed multi-level paging system. [5 marks]
- (ii) State, and justify briefly, whether you think this proposal is realistic. [2 marks]