2002 Paper 1 Question 11

Operating Systems

(*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]