2005 Paper 3 Question 5

Operating Systems II

(*a*) Modern operating systems typically support both *threads* and *processes*. What is the basic difference between a thread and a process? Why do operating systems support both concepts? [2 marks]

(*b*) You get a summer job with a company which has an in-house operating system called sOs. sOs uses static priority scheduling, supports at most 32 concurrently-executing processes, and works only on uniprocessor machines. Describe with justification how you would modify sOs in order to:

    (*i*)   support up to 50000 concurrently executing processes; [2 marks]

    (*ii*) reduce or eliminate the possibility of starvation; [3 marks]

    (*iii*) efficiently schedule processes on an 8 CPU symmetric multiprocessor (SMP) machine; [5 marks]

    (*iv*) support threads in addition to processes on SMP machines. [3 marks]

(*c*) How would you go about reducing the time taken to boot a modern operating system? [5 marks]