2004 Paper 7 Question 5

Computer Systems Modelling

(a) Consider an interactive system with average system response time R and system throughput X. Derive the *interactive response time law* when there are M users present, each with an average think time Z. [6 marks]

(b) Consider an interactive timesharing system with M users, one CPU and two disks labelled A and B respectively. Suppose that measurements of the system have determined that: the average user think time Z is 5 seconds; the average time spent by a job in the CPU is 40 ms per request; the average time spent by a job at the individual disks per request is 30 ms for disk A and 25 ms for disk B; the visit counts per job are 25 requests for the CPU, 20 requests for disk A and 4 requests for disk B.

(i) For each of the devices: CPU, disk A and disk B, determine the service demands. [4 marks]

(ii) If disk A has a utilisation of 60%, what is the utilisation of the CPU and of disk B? [5 marks]

(iii) If the utilisation of disk B is 10%, what is the average response time when there are 20 users present? [5 marks]

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