Operating Systems (Part IA)

Tripos Questions ~~2000~~/2001 (with extended model answers)

Paper 1 Question ~~3/4~~ 4 (10 Marks)

For each of the following, indicate if the statement is true or false, and explain why this is the case (no marks will be awarded for an answer with no explanation).

(a) Round-robin scheduling can suffer from the so-called 'convoy effect'.

(b) System calls are an optional extra in modern operating systems like Windows 2000.

(c) A paged virtual memory is smaller than a segmented one.

(d) In UNIX, hard-links cannot span mount points.

(e) Direct memory access (DMA) makes devices go faster. [2 marks each]

Answers to Paper 1 Question ~~3/4~~ 4

The intention in this question is to get a sensible justification of why each statement is true or false. Hence the caveat regarding monosyllabic answers.

Convoy Effect

False. The convoy effect occurs when a short(er) job gets stuck behind a large(er) one. This can happen with FCFS, but is not possible with standard preemptive round robin.

System Calls

False. System calls are the only way[1] we can securely transfer control from user-space into the kernel. This is true even in modern micro-kernel operating systems such as W2K.

Paged versus Segmented Memory

False. The overall size of virtual memory has very little/nothing to do with the underlying choice of paged versus segmented translation and protection.

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[1] If a student describes a polled message-based scheme, I'll allow a 'True' here. But unlikely.

Hard-links

True. UNIX does not allow hard-links to span mount points because each path name inside a file-system simply maps to an inode within that file-system. Hence a hard-link across file-systems would require that (a) all relevant file-systems were mounted every time the file were accessed, and that (b) synchronized updates were performed to each copy of the file's inode.

DMA

False. DMA takes some load of the processor (CPU), and can hence improve overall performance. However it does nothing whatsoever to the speed to the device itself.