# Advanced Operating Systems (M): Exercise 3

Dr Colin Perkins

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The lectures in weeks 5 and 6 of the course have considered ways in which systems programming might develop in the coming years, with a particular focus on the use of high-level programming language features for operating systems kernel development. This problem set asks you to reflect on some of the ideas discussed in the lectures, and to provide your judgement and opinion on their validity. You should answer both questions.

Question 1: We discussed the MacOS X I/O Kit, which allows writing device drivers in a restricted subset of C++. While many operating systems have used an object-oriented design for device drivers, their implementation is usually in C, and the use of C++ in the MacOS X kernel is unusual. Indeed, Linus Torvalds, expressed a popular viewpoint when he said "Trust me - writing kernel code in C++ is a BLOODY STUPID IDEA" in a post to the Linux kernel mailing list in 2004.[1] Is Linus right in his criticism of C++ for kernel development? Discuss the advantages and disadvantages of the MacOS X I/O model for device drivers, compared to the more traditional, C-based, device driver framework implemented in Linux, and many other systems. [10 marks]

Question 2: We discussed the Singularity operating system from Microsoft Research, in particular the idea of software isolated processes that can communicate through strongly-typed message passing channels. Discuss the advantages and disadvantages of this approach to structuring an operating system, as compared to the traditional monolithic kernel approach, as employed in Unix and Windows. [10 marks]

Answers must be submitted by 9:00am on 7 March 2011, and will be marked based on the technical points raised in your discussion, and quality of your argument and writing. A drop box will be available for submissions in outside the Teaching Office in Lilybank Gardens, and submissions will only be accepted via that drop box. It is requested that submissions are printed, rather than hand-written, where possible. This problem set is worth 10% of the mark for this course. Ensure that your name and matriculation number are included on each submission, and that you have completed a statement of originality form.

[1] Message ID <Pine.LNX.4.58.0401192241080.2311@home.osdl.org> sent on 19 January 2004