University of Glasgow | School of Computing Science

Assessed Coursework

Course Name	**Advanced Operating Systems (M)**			
Coursework Number	**Exercise 3**			
Deadline	**Time:**	**9:00am**	**Date:**	**5 March 2012**
% Contribution to final course mark	**10%**			
Solo or Group ✓	**Solo**	✓	**Group**	
Anticipated Hours	**8**			
Submission Instructions	**Submit via drop-box outside Teaching Office**			
Please Note: This Coursework cannot be Re-Done				

Code of Assessment Rules for Coursework Submission

Deadlines for the submission of coursework which is to be formally assessed will be published in course documentation, and work which is submitted later than the deadline will be subject to penalty as set out below.

The primary grade and secondary band awarded for coursework which is submitted after the published deadline will be calculated as follows:

(i) in respect of work submitted not more than five working days after the deadline
   a. the work will be assessed in the usual way;
   b. the primary grade and secondary band so determined will then be reduced by two secondary bands for each working day (or part of a working day) the work was submitted late.

(ii) work submitted more than five working days after the deadline will be awarded Grade H.

Penalties for late submission of coursework will not be imposed if good cause is established for the late submission. You should submit documents supporting good cause via MyCampus.

Penalty for non-adherence to Submission Instructions is 2 bands

You must complete an "Own Work" form via
https://webapps.dcs.gla.ac.uk/ETHICS for all coursework
UNLESS submitted via Moodle

Advanced Operating Systems (M): Exercise 3

Dr Colin Perkins

16 February 2012

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. This allows kernel device drivers to be written in an object-oriented manner, using a limited 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, the inventor of Linux, expressed a common view when he said "Trust me - writing kernel code in C++ is a ... stupid idea" in a post to the Linux kernel mailing list in 2004 (message ID <Pine.LNX.4.58.0401192241080.2311@home.osdl.org> sent on 19 January 2004). 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 a traditional monolithic kernel. [10 marks]

Answers must be submitted by 9:00am on 5 March 2012, 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 declaration of originality.