Department of Computer Science
University College London

1B11 Operating Systems Coursework

December 2001

Answer all parts of both questions

1. a) Assume that the operating system on your machine uses paging. Describe on a step-by-step basis how the first user process might be loaded and started. You should indicate clearly which memory pages are in user space and which are in kernel space, whether the processor is in user or kernel mode at different stages. Your description should cover execution of the first few instructions in the process. Assume that there is plenty of memory for this process, ie. the process's memory will not need to be swapped out while this process is running.

   (I am not looking for an in-depth description of what Unix or Windows actually does – I am looking for you to use the lecture materials and explain them in your own words.)

   b) Now consider the case where the operating system is supporting a large number of processes which are all active (ie. they continually move from running to blocked to ready-to-run or running to ready-to-run and do not remain blocked for long periods). In a similar way to part a) describe how a new process is loaded and started. Identify any particular problems that occur in this second scenario. Hint: think of the *Start Program* part of the operating system as a kernel process.

2. Describe the data structures that will be set up on a disk when it is formatted a) for a Unix-like file system b) for a DOS/FAT file system. Assume that the disk is being formatted into 1kByte blocks (sectors) and that 16-bit addressing is being used. Explain where the important areas are on disk in each case and estimate the maximum file size that can be accommodated in each case.

PLEASE NOTE THAT THIS IS GRADED COURSEWORK. A STUDENT WHO FAILS TO COMPLETE IT WILL BE AWARDED ZERO MARKS FOR IT.

THIS COURSEWORK SHOULD BE HANDED IN TO THE DEPARTMENTAL OFFICE NO LATER THAN:

12 noon on Friday 18th January 2002.

THERE ARE FIXED PENALTIES FOR HANDING YOUR WORK IN LATE -- THEY ARE:

<= 2 WORKING DAYS 10% OF MARK OBTAINED

> 2 WORKING DAYS 100% OF MARK OBTAINED