CMPUT 480 - Operating Systems

Final Examination - Monday April 18, 1988

Marked out of 65 (8 questions)

3) (15 marks)

For each of the following, answer true or false. DO NOT GUESS: wrong answers will be subtracted from right! Do not give an explanation for your answer.

a)   In a Public Key Encryption System, everything necessary for encoding and decoding a message is made publicly available.

b)   Normal operation of the VTM ReceiveNode call has it blocking until enough data has been received.

c)   Mutual exclusion can be achieved with the aid of a test-and-set instruction.

d)   In general, the larger the page size, the less efficiently memory is used.

e)   Paging memory management schemes suffer from checkerboarding.

f)   The Not Used Recently page replacement algorithm choses to replace pages that have been refer-enced the fewest times.

g)   An audit log is used to keep track of resources used on the system, usually to be used for charging users for CPU usage, disk storage, etc.

h)   The Unix exec system call is used to execute a program.

i)   Cargill's distributed solution to the Dining Philosophers problem is deadlock free but not starvation free. (This refers to the paper handed out in class).

j)   A processor is a program in execution.

k)   When servicing an I/O interrupt, it is necessary that all interrupts be disabled.

l)   With 2 or more processes resident in memory, saving the state of the executing process and then switching to another one is called swapping.

m)   DMA access greatly enhances the level of multi-programming in a system.

n)   On a Myrias machine, the memories of parallel tasks are merged back to the parent task.

o)   On a Myrias machine, the cost of servicing a page fault depends on which processor the page is located.

5) (10 marks)

Simulate the traffic at an intersection of a busy highway and a country road. Cars on the country road approaching the intersection may only cross the highway if there are no cars approaching along the highway from either direction. Cars traveling along the highway do not need to stop at the intersection. Using semaphores, write the code fragments to ensure that there are no accidents caused by cars on the country road trying to cross the busy highway. This is not a difficult question; don't turn it into one!

6) (5 marks)

Part of the UNIX philosophy is to provide a uniform view of I/O to the user. From the user's point of view, all I/O is done to and from "files". A UNIX "file" may in fact be a disk file, a directory in a file system, a terminal, a printer, etc. This has enormous advantages to the user in that he can use the same routines for doing all his I/O. What underlying implementation problems might this cause the operating system?

7) (5 marks)

I have a program that I want to modify so that it will run for a specified amount of CPU time (such as 10 seconds) and then exit. Write the code for me that will set up an interrupt to go off after the specified amount of CPU time has elapsed and give me the interrupt handling routine. Do not worry about syntax and getting the exact calling sequence to the system routines you require perfect. You need only demonstrate that you have the right idea.

8) (5 marks)

In a demand paged environment a process is known to have a high page fault rate. Argue both for and against a high CPU priority for this process.