Homework for Week 2
(Due Date: Check Canvas)

1. A typical hardware architecture provides an instruction called "return from interrupt", and abbreviated by something like `rti`. This instruction switches the mode of operation from supervisor mode to user mode. This instruction is usually only available while the machine is running in supervisor mode.

   (a) Explain where in the operating system this instruction would be used.

   (b) What happens if an application program executes this instruction?

2. A hardware designer argues that there are enough transistors on the chip to provide 1024 integer registers and 512 floating point registers. You have been invited as the operating system guru to give opinion about the new design.

   (a) What is the effect of having such a large number of registers on the operating system?

   (b) What happens if the hardware designer also wants to add a 16-station pipeline into the CPU. How would that affect the context switching overhead?

3. Consider a uniprocessor kernel that user programs can trap into using system calls. The kernel receives and handles interrupt requests from I/O devices. Would there be any need for critical sections within that kernel?

References

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[3] A. S. Tanenbaum, *Modern Operating Systems*, Pearson / Prentice Hall, 2008.

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[5] C. Crowley, *Operating Systems, A Design-Oriented Approach*, Irwin 1997.

[6] M. Herlihy, N. Shavit, *The Art of Multiprocessor Programming*, Elsevier, 2008