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Pre-class Assignment #3

1. What is the purpose of a hardware timer?

   A device which is set to interrupt the processor after a specified delay, which can be a after some number of instructions are executed or some time has passed.

2. What are the three ways the textbook lists for a transfer from user mode to kernel mode?

   1. interrupts
   2. Processor exceptions
   3. System calls

3. What are the three minimum attributes the textbook lists for the sequence of hardware actions to transfer from user mode to kernel mode?

   1. Limited kernel entry
   2. Atomic changes to processor state
   3. Transparent, restart able execution

4. What does an interrupt vector table contain?

   An interrupt vector table contains pointers to code to run in response to different events.

5. What are the four actions in the generic interrupt response that is described in the Chapter 2B slides?

   1. Save PC and PSR
   2. Change execution mode to kernel
   3. Disable or restrict further interrupts
   4. Load new PC from interrupt vector table

6. Why would one process need both a user stack and a kernel stack?

The kernel stack will always be valid and it prevents the user program fro overriding data saved by the kernel.

7. Why should the hardware allow the masking of interrupts?

Since interrupts could arrive asynchronously which means a interrupt handler could be interrupted and cause confusion in the system. The interrupt could cause the stack pointer to be set to the base of newest interrupt and destroy the stack of currently executing handler.

8. Why should the operating system copy system call parameters before checking their validity?

The reason why the operating system should copy the system call parameters before checking is to prevent the application from modifying the parameter after the stub checks the value.

9. What is a bootloader?

A program stored at a fixed position on disk to load the operating system into memory and start it executing.

10. What is the difference between a host operating system and a guest operating system?

The operating system that provides the virtual machine abstraction is the host operating system, while the guest operating system runs inside the virtual machine.