

Handout #4 (Interrupts)

You are given the following information about the devices connected to a computer:

Device	Priority (0 is worst)	Arrival Rate	Execution Time
CLOCK	4	75/second	4 ms
SOUND	3	10/second	10 ms
DISK	1	5/second	20 ms

Part A:

You know that your application will take 20 seconds of processor time to complete. How much actual time (wall-clock time) will your application need to execute on this computer? You may assume that your application is the only one running.

$$(75 \cdot 4) + (10 \cdot 10) + (5 \cdot 20) = 300 + 100 + 100 = 500 \text{ ms}$$

So, the application receives 500ms of processing time per second of real-time, or one half (50%) of the total processing time. As a result, it will take 40s ($2 \cdot 20$) of real time to execute.

Part B:

We wish to add a USB device to this computer that has Priority 2, and generates an interrupt ten times per second and each interrupt requires 10ms of execution time. What is the maximum possible time that can elapse from the time the USB device requests an interrupt until that interrupt is acknowledged. Explain your answer and show your work.

If they all arrive at once, then the USB device would need to wait on the clock and the sound device for 14ms, and during that time another clock interrupt arrives, so the USB device's interrupt is acknowledged only after 18ms