Homework 15   (40 points)

Watch from 45:01 to 50:16 of Grace Hopper's Lecture at MIT Lincoln Laboratory in 1985, recorded here: https://youtu.be/ZR0ujwlvbkQ?t=2701.
1. When Hopper asked, "please cut off a nanosecond and send it over to me," what did she want?   (2 points)
2. What are the measurements of her nanosecond and her microsecond?   (2 points)
3. Broadly speaking, why does the transition from uniprocessors to multiprocessors seem like a logical step when looking for more processing power?   (4 points)

Look at the estimates of time that it takes for various types of memory access (L1 cache, L2 cache, main memory, disk) shown here:
https://gist.github.com/hellerbarde/2843375.
4. To get a sense of scale for the difference between memory access times, suppose that instead of nanoseconds and memory access, we were looking at hours needed to walk somewhere. Where could you walk to from our classroom in Sitterson in the corresponding time for L1 cache, L2 cache and main memory references? (For example, for the L1-cache-corresponding question, where could you walk to in 0.5 hours?)   (6 points)
5. How many times slower is it to read 1 MB from SSD than it is to read 1 MB from memory? How many times slower is it to read 1 MB from disk than it is to read 1 MB from memory?   (2 points)

"Mixed-Criticality on Multicore (MC^2): A Status Report"
6. How is each level scheduled in the given framework? State whether the scheduler is partitioned, clustered, or global, and which scheduling algorithm it uses.   (6 points)
7. Summarize the differences between the two MC^2 branches.   (6 points)

Look at the table of tasks below for the following questions. Assume we are using EDF on a uniprocessor.

Task Number	T	C_A	C_B
1	10	2	1
2	20	5	2
3	40	10	7
4	40	12	5
5	50	7	6

8. Can the above tasks all be guaranteed to meet the Level A assurance requirements? Show your work.   (4 points)

9. Can we instead guarantee Tasks 1-3 to Level B assurance and Tasks 4-5 to Level A assurance? Show your work.   (4 points)

10. Assuming that we may choose either criticality level for any task, is it possible to guarantee four of the five tasks to Level A assurance?   (4 points)

Feedback

1. How much time did you spend completing this assignment (ignoring interruptions)?
2. How much time did you spend doing the assigned reading (ignoring interruptions)?
3. How much time did you spend doing Programming Assignment 4?
4. Any other feedback?