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Project 3

I created a Scheduler class to define the rate monotonic scheduler. The priority was decided by the shortest cycle duration of a task to be highest priority.

The timer thread thrT is initiated in Scheduler::begin() as the first thread called. Within Scheduler::timer() I set processor affinity at the start of the function to 1. The time iterates for a cycle, and at time == 0 the timer will schedule task threads thr1, thr2, thr3, and thr4 to begin, followed by a semaphore sem1->signal() to signal the task with the lowest priority to begin. Each thread uses a semaphore to signal the next priority thread to begin. I use chrono::milliseconds to set each time period to 10 milliseconds.

I set processor affinity again in Scheduler::execute() to 1, which is a function called by each thread. Through execute(), each task thread calls the function Scheduler::doWork(). By default doWork() is called an assigned number of times based on the unit. Forced overruns will call doWork() until the overrun condition is induced. When thr4 is in overrun, the program will interrupt thr4 in order to schedule the next cycle. When thr1, thr2, or thr3 are in overrun, the program will pick up the unfinished thread in the next cycle.

When any task threads thr1, thr2, or thr3 have an overrun, the program holds the thread and allows the next task to begin. When the unfinished task is called in the next cycle, the program continues the unfinished task instead. During Case 2, the forced overrun in task 2 caused one overrun in task 3 at time 21. It was able to continue in the next cycle and complete. However, this overrun did not repeat itself in other cycles. During Case 3, the forced overrun in task 3 did not cause any overruns of the other tasks.

