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Introduction

For this PW, we will create an RTOS with the following tasks:

• Periodic Task 1: To print “Working”

• Periodic Task 2: Convert a fixed Fahrenheit temperature value to degree Celsius

• Periodic Task 3: Define any two long int big numbers and multiply them, print the result

• Periodic Task 4: Binary search a list of 50 elements

Method

In first, we want the WCET for each task. To do this, we'll create the tasks in 4 C-coded files. These files are named “task1.c”, “task2.c”, “task3.c” and “task4.c”. Once these 4 files were created, we wrote a Python code (called WCET.py) to run each task 10,000 times. At the end, we noted the longest time for each task. This will be the WCET. So we have :

- Task1 : WCET = 897ms
- Task2 : WCET = 702ms
- Task3 : WCET = 813ms
- Task4 : WCET = 1165ms

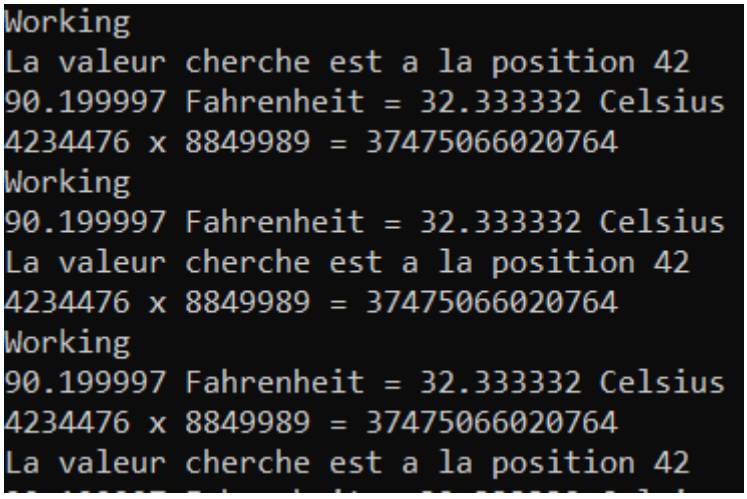
Once these WCETs have been calculated, we need to create a scheduler using FreeRTOS.

In this scheduler, we place the 4 tasks previously coded into “xTask”. In each “xTask”, we add a delay corresponding to the WCET of each task, rounded up to give a safety margin.

Finally, we're creating a FP scheduler, so we need to define a priority for each task. We've chosen to respect the task order, so task 1 has the highest priority and task 4 the lowest.

Result

We can now compile our code and run FreeRTOS main, specifying our scheduler. The result is as follows:



You'll notice that every task is completed, but occasionally they're not in the right order. This may be due to the fact that our scheduler is preemptive.