

LAB EXERCISE:

RTOS

OVERVIEW

In this lab, you will integrate the functions developed in the previous modules, and run them concurrently in the mbed RTOS. Each of the previous tasks will be executed in one thread that is scheduled by the RTOS. There are four threads:

1. Display the temperature on the PC
2. Adjust the frequency of a sound wave using a potentiometer
3. Display an incrementing counter on the PC
4. Blink an LED

IMPLEMENTATION DETAILS

HARDWARE

All pin connections have been given in the previous modules, refer to previous lab documents.

SOFTWARE FUNCTIONS

You can use all previous lab functions to make up your application.

BEFORE STARTING

Before starting the exercise, you need to add two files to the Project tree.

When you open the .uvproj file you will see the project tree in on the left.

Double click on the *src* folder to open the *Add Files to Group 'src'* menu.

Then navigate to: *mbed-rtos/rtx/TARGET_XX/TOOLCHAIN_ARM/* (where *XX* stands for the Cortex core name).

Add *HAL_CMx.c* and *SVC_Table.s* files to the project.

If you skip this step, your program won't compile properly.

YOUR APPLICATION CODE

- Create 4 threads to:
 1. Display the temperature on the PC

2. Adjust the frequency of a sound wave using a potentiometer
 3. Display an incrementing counter on the PC
 4. Blink an LED
- Note that:
 - Every thread contains an infinite loop
 - Tasks are scheduled in a cooperative manner, namely, threads can go to waiting state after each update, to let the next thread be scheduled
 - Since the PC has to be accessed exclusively, we need a mutex to protect its single-access
 - In the main program:
 - Clear the PC display
 - Start all threads
 - Use sleep mode to reduce power consumption