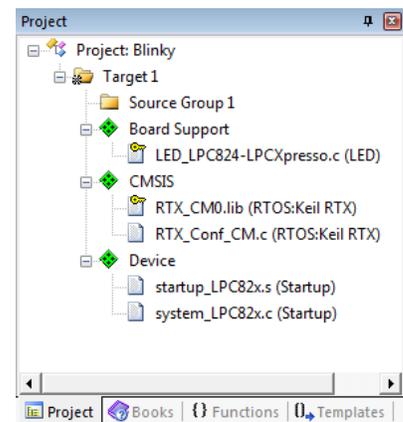## Abstract

This tutorial shows how to create the Blinky project using the NXP LPCXpresso824-MAX development board.
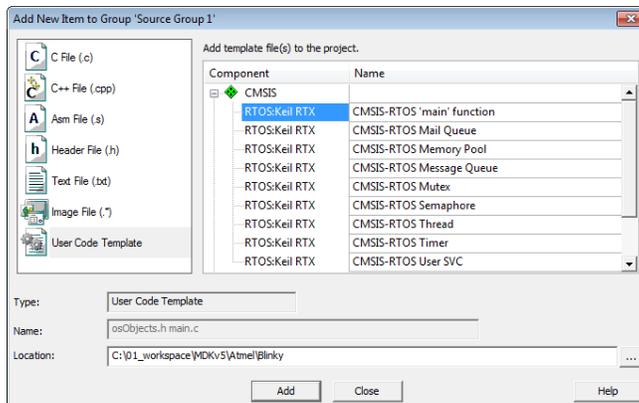
**Create a New Project for the LPCXpresso824-MAX Board**

1.  In the main µVision menu, select **Project → New µVision Project…**
    The 'Create New Project' window opens up.
2.  Create a new directory called **Blinky** and enter **Blinky** for the File name. Press **Save**.
3.  In the 'Select Device for Target' window select **LPC824M201JHI33** and press **OK**.
4.  In the 'Manage Run-Time Environment' window select the following Software Components:
    a.  **CMSIS:RTOS (API):Keil RTX**
    b.  **Board Support:LED (API):LED**
    c.  When done, press **Resolve** and afterwards **OK**.
5.  The Project window should look like this



**Add user code templates *main.c* and *Thread.c***

6.  Right-Click **Source Group 1** and select **Add New Item to Group 'Source Group 1'…**
7.  In the upcoming window, select **User Code Template** and then expand **CMSIS**. Select **CMSIS-RTOS 'main' function** and click **Add**:



8.  Repeat the process and choose **CMSIS-RTOS Thread**. You now should see a *main.c* and a *Thread.c* file below the Source Group 1.

**Configure CMSIS-RTOS RTX**

9.  Open *RTX_Conf_CM.c*, select the **Configuration Wizard** tab and press **Expand All**.
10. Change the **RTOS Kernel Timer input clock frequency [Hz]** to **24000000** as the board runs on 24 MHz.

**Configure the Target Options**

11. Click on  or press **ALT+F7**
12. Select the **Debug** tab and choose **CMSIS-DAP Debugger**. Press **OK**.

## Add the Blinky code

13.  Change *main.c* as follows:

```c
#define osObjectsPublic                 // define objects in main module
#include "osObjects.h"                  // RTOS object definitions
#include "LPC82x.h"                      // Device header
#include "Board_LED.h"                   // ::Board Support:LED


extern int Init_blink_LED (void);

int main (void) {
  osKernelInitialize ();                 // initialize CMSIS-RTOS

  LED_Initialize();
  Init_blink_LED();

  osKernelStart ();                      // start thread execution
  while(1);
}
```

14.  Change *Thread.c* as follows:

```c
#include <cmsis_os.h>                    // CMSIS RTOS header file
#include "Board_LED.h"                   // ::Board Support:LED

void blink_LED (void const *argument);           // thread function
osThreadId tid_blink_LED;                          // thread id
osThreadDef (blink_LED, osPriorityNormal, 1, 0);   // thread object

int Init_blink_LED (void) {

  tid_blink_LED = osThreadCreate (osThread(blink_LED), NULL);
  if(!tid_blink_LED) return(-1);

  return(0);
}

void blink_LED (void const *argument) {

  while (1) {
    LED_On (0);
    osDelay(500);
    LED_Off (0);
    osDelay(500);
    osThreadYield();
  }
}
```

## Build the Project and run it on the Target

15.  Go to **File → Save All**
16.  Go to **Project → Build Target** (or press **F7**)
17.  Connect the PC using a Micro-USB cable to **J3** USB port
18.  Go to **Flash → Download** to flash the project to the target
19.  Go to **Debug → Start/Stop Debug Session** (or press **CTRL+F5**)
20.  Go to **Debug → Run** (or press **F5**) to run the project on the target. LED **D1** will start flashing.