

Lab 2:

The purpose of this lab is to just implement the introduction code to blink an LED using RTOS.

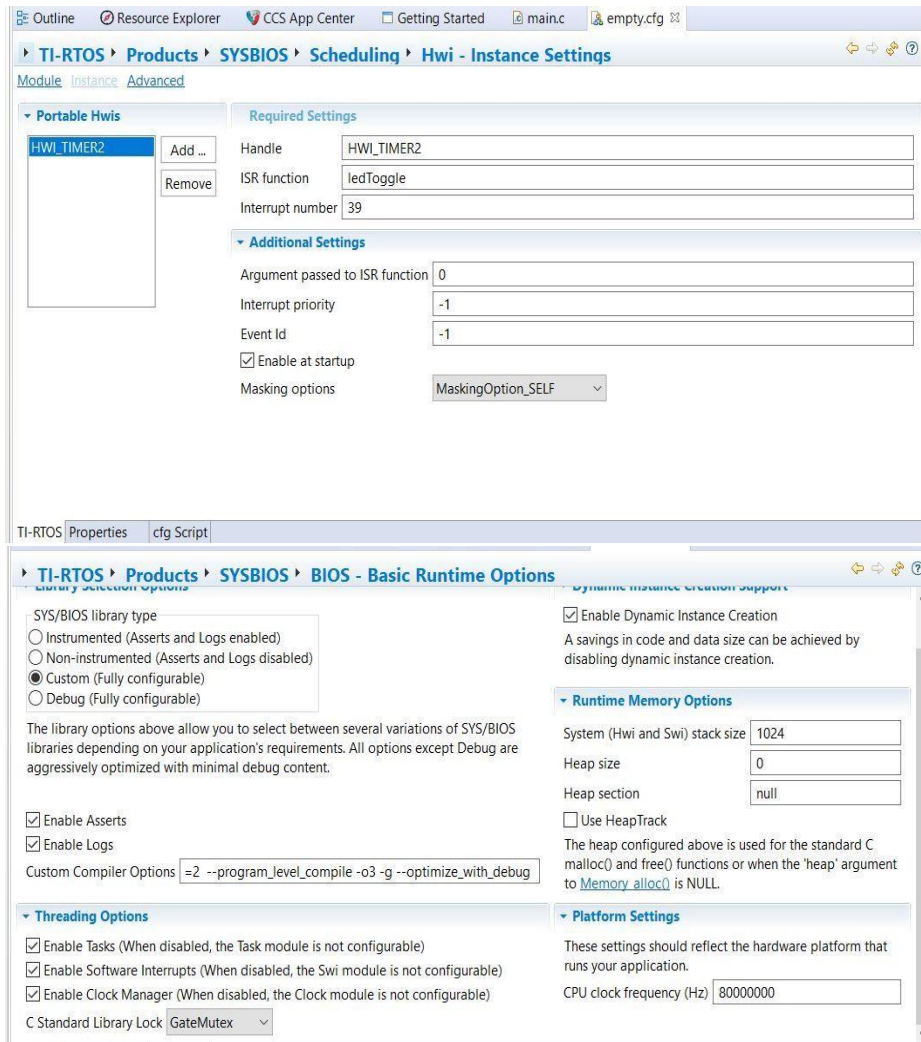
Lab 4:

The screenshot displays the TI-RTOS configuration interface for the BIOS - Basic Runtime Options. The configuration is set for a SYS/BIOS library type of 'Instrumented (Asserts and Logs enabled)'. The 'Dynamic Instance Creation Support' is enabled. The 'Runtime Memory Options' show a system stack size of 1024, heap size of 0, and heap section of null. The 'Threading Options' are configured with 'Enable Tasks', 'Enable Software Interrupts', and 'Enable Clock Manager' all checked. The 'Platform Settings' show a CPU clock frequency of 80000000 Hz.

Below the configuration window, a log window titled 'Problems' shows a list of events. The log entries are as follows:

Type	Time	Error	Master	Message	Event	EventClass	Dg
1.. i	3789719637		CORT...	[./rtos_lab4.c:107] LED TO...	Log_L_info	Info	
1.. i	4042366412		CORT...	[./rtos_lab4.c:107] LED TO...	Log_L_info	Info	
1.. i	4295012862		CORT...	[./rtos_lab4.c:107] LED TO...	Log_L_info	Info	
1.. i	4547659637		CORT...	[./rtos_lab4.c:107] LED TO...	Log_L_info	Info	
1.. i	4800311600		CORT...	[./rtos_lab4.c:107] LED TO...	Log_L_info	Info	
2.. i	5052952887		CORT...	[./rtos_lab4.c:107] LED TO...	Log_L_info	Info	
2.. i	5305604837		CORT...	[./rtos_lab4.c:107] LED TO...	Log_L_info	Info	
2.. i	5558251625		CORT...	[./rtos_lab4.c:107] LED TO...	Log_L_info	Info	
2.. i	5810898087		CORT...	[./rtos_lab4.c:107] LED TO...	Log_L_info	Info	
2.. i	6063544862		CORT...	[./rtos_lab4.c:107] LED TO...	Log_L_info	Info	
2.. i	6316196800		CORT...	[./rtos_lab4.c:107] LED TO...	Log_L_info	Info	
2.. i	6568838087		CORT...	[./rtos_lab4.c:107] LED TO...	Log_L_info	Info	
2.. i	6821490050		CORT...	[./rtos_lab4.c:107] LED TO...	Log_L_info	Info	

Lab 5:



GitHub: https://github.com/mendos1/Submission_Link/tree/master/TivaC_RTOS_Labs

The image displays two screenshots of the TI-RTOS IDE interface, specifically the CCS App Center and the RTOS Object View (ROV).

Top Screenshot: Task Configuration

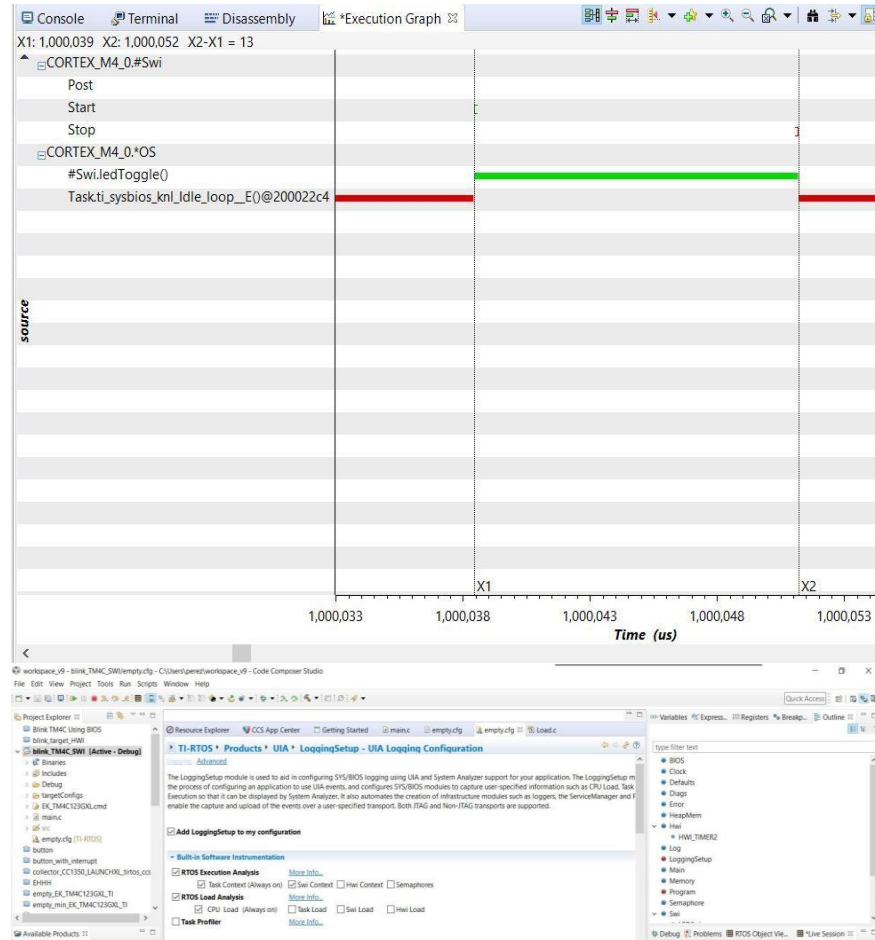
The "Resource Explorer" shows the project structure. The "Instance Settings" for the task "ledToggle" are configured as follows:

- Module:** LEDToggle
- Function:** ledToggle
- Interrupt priority:** -1
- Initial trigger:** Deb
- Thread Context:**
 - Argument 0: 0
 - Argument 1: 0

The "Type Error Text" pane on the right lists various error types, including BIOS, Clock, Defaults, Diag, Error, HeapMem, Mail, HW_TIMER2, Log, LoggingSetup, Main, Memory, Program, Semaphore, and Set.

Bottom Screenshot: Execution Graph

The "Execution Graph" shows the execution flow of the task. The task "CORTEX_M4_0#Swi" is shown with its execution timeline. The task "CORTEX_M4_0#OS" is shown with its execution timeline. The task "SwiLedToggle()" is shown with its execution timeline. The task "Taskti_sysbios_knl_idle_loop_E()@200022c4" is shown with its execution timeline.



The screenshot displays the TI-RTOS IDE interface. The top pane shows a log of events from a Master processor, listing messages and events for CORTEX_M4_0. The bottom pane shows the 'Instance Settings' for the 'ledToggleCik' module, including required settings and thread context.

Problems RTOS Object View (ROV) *Live Session

Processor	Master	Message	Event
CORTEX_M4_0		LS_cpuLoad: 0%	Load
CORTEX_M4_0		LS_cpuLoad: 0%	Load
CORTEX_M4_0		LS_cpuLoad: 0%	Load
CORTEX_M4_0		[./main.c:146] LED TOGGLED [3] TIMES	Log_L_info
CORTEX_M4_0		LS_cpuLoad: 0%	Load
CORTEX_M4_0		[./main.c:146] LED TOGGLED [4] TIMES	Log_L_info
CORTEX_M4_0		LS_cpuLoad: 0%	Load
CORTEX_M4_0		[./main.c:137] LED BENCHMARK = [11] TM4C...	Log_L_info
CORTEX_M4_0		[./main.c:146] LED TOGGLED [5] TIMES	Log_L_info
CORTEX_M4_0		LS_cpuLoad: 0%	Load
CORTEX_M4_0		[./main.c:146] LED TOGGLED [6] TIMES	Log_L_info
CORTEX_M4_0		LS_cpuLoad: 0%	Load
CORTEX_M4_0		[./main.c:137] LED BENCHMARK = [11] TM4C...	Log_L_info
CORTEX_M4_0		[./main.c:146] LED TOGGLED [7] TIMES	Log_L_info
CORTEX_M4_0		LS_cpuLoad: 0%	Load
CORTEX_M4_0		[./main.c:146] LED TOGGLED [8] TIMES	Log_L_info
CORTEX_M4_0		LS_cpuLoad: 0%	Load
CORTEX_M4_0		[./main.c:137] LED BENCHMARK = [11] TM4C...	Log_L_info
CORTEX_M4_0		[./main.c:146] LED TOGGLED [9] TIMES	Log_L_info
CORTEX_M4_0		LS_cpuLoad: 0%	Load

Resource Explorer CCS App Center Getting Started main.c empty.cfg

TI-RTOS Products SYMBIOS Scheduling Clock - Instance Settings

Module Instance Advanced

Portable Clocks

ledToggleCik

Add ... Remove

Required Settings

Handle: ledToggleCik

Function: ledToggle

Initial timeout: 1

Period: 1

☒ Start at boot time when instance is created

Thread Context

Argument: null

TI-RTOS ▸ Products ▸ SYSBIOS ▸ Scheduling ▸ Clock - Module Settings

☒ Add the Clock support module to my configuration

Time Base

☒ Internally configure a Timer to periodically call Clock_tick()
☐ Application code calls Clock_tick()
☐ The Clock module is disabled

When the Clock Manager is enabled, the Time Base setting will follow the user's configuration.
When the Clock Manager is disabled, the Time Base setting will be internally forced to "The Clock module is disabled".
See the SYS/BIOS 'Enable Clock Manager' setting under 'Threading Options'.

Scheduling

Swi priority: 15

The priority above sets the priority for all Clock functions independent of their period. Higher numbers have higher priority.

Timer Control

Tick period (us): 500000

Timer Id: ANY

Tick mode: Unnecessary timer ticks will be suppressed

TI-RTOS | Properties | **cfg Script**

X1: 11,000 X2: 11,501 X2-X1 = 500

source

CORTEX_M4_0_#Swi

Post

Start

Stop

CORTEX_M4_0_OS

X1

X2

Resource Explorer CCS App Center Getting Started main.c empty.cfg empty.cfg Hwi.c

TI-RTOS Products SYSBIOS Scheduling Task - Module Settings

The Task module allows you to create one or more prioritized threads, each with a separate stack, that can block on one or more events.

☒ Add the Task threads module to my configuration

Global Task Options	Default Task Options
Number of priorities 16	Default stack size 2048
All blocked function null	Default stack section .bsstaskStackSection
<input checked="" type="checkbox"/> Initialize stack	Default stack heap null
<input checked="" type="checkbox"/> Check for task stack overflow	
<input type="checkbox"/> Delete terminated tasks	

Idle Task Options

☒ Enable Idle Task

☒ Idle Task is vital

Idle Task stack size 2048

Idle Task stack section .bsstaskStackSection

Resource Explorer CCS App Center Getting Started main.c empty.cfg empty.cfg Hwi.c

TI-RTOS Products SYSBIOS Synchronization Semaphore - Instance Settings

Module Instance Advanced

Semaphores	Required Settings
LEDsem Add ... Remove	Handle LEDsem
	Initial count 0
	Semaphore type <input checked="" type="radio"/> Counting (FIFO) <input type="radio"/> Binary (FIFO) <input type="radio"/> Counting (priority-based) <input type="radio"/> Binary (priority-based)

Event Support

These options are only available when [Event](#) support is enabled by the [Semaphore module](#).

Event instance null Event Id Event_Id_00

The screenshot displays the RTOS Object View (ROV) tool interface. The top panel shows a list of events with columns: Message, Event, EventClass, Data1, Data2, SeqNo, Logger, Module, Domain, Process, PID, Local Time, Arg1, Arg2, and Av. The bottom panel shows the RTOS Object View (ROV) with a tree view on the left and a table on the right.

Event List:

Message	Event	EventClass	Data1	Data2	SeqNo	Logger	Module	Domain	Process	PID	Local Time	Arg1	Arg2	Av
LM_post: sem: 0x20002d38, count: 0	Semaphore_LM_post	Unknown			96	SYSBL...	ti.sysb...	ti.sysbi...			291112325	0x2...	0x0	
LD_ready: tsk: 0x200027b0, func: 0x2c39, pri...	Task_LD_ready	Unknown	ledT...		97	SYSBL...	ti.sysb...	ti.sysbi...			291112640	0x2...	0x2...	C
LM_switch: oldtsk: 0x20002800, oldfunc: 0x5...	CtxChg	TSK	ledT...		98	SYSBL...	ti.uiu...	ti.sysbi...			291113319	0x2...	0x5...	0x
[./main.c:134] LED TOGGLED [16] TIMES	Log_L_info	Info			15	Main...	xdcrn...	xdcrn...			291113750	0x2...	0x86	0x
LM_pend: sem: 0x20002d38, count: 0, timeo...	Semaphore_LM_pend	Unknown			99	SYSBL...	ti.sysb...	ti.sysbi...			291114003	0x2...	0x0	0x
LD_block: tsk: 0x200027b0, func: 0x2c39	Task_LD_block	Unknown	ledT...		100	SYSBL...	ti.sysb...	ti.sysbi...			291114349	0x2...	0x2...	
LM_switch: oldtsk: 0x200027b0, oldfunc: 0x...	CtxChg	TSK	ti.sy...		101	SYSBL...	ti.uiu...	ti.sysbi...			291114894	0x2...	0x2...	0x
LS_taskLoad: 0x200027b0,1575,20000389,0x...	Load	TSK	ledT...	0.01	42	Load...	ti.sysb...	ti.sysbi...			300009751	0x2...	0x6...	0x
LS_taskLoad: 0x20002800,19998814,200003...	Load	TSK	ti.sy...	99.99	43	Load...	ti.sysb...	ti.sysbi...			300009994	0x2...	0x1...	0x
LS_cpuLoad: 0%	Load	CPU	CPU	0.00	44	Load...	ti.sysb...	ti.sysbi...			300010293	0x0		
LM_post: sem: 0x20002d38, count: 0	Semaphore_LM_post	Unknown			102	SYSBL...	ti.sysb...	ti.sysbi...			311112326	0x2...	0x0	
LD_ready: tsk: 0x200027b0, func: 0x2c39, pri...	Task_LD_ready	Unknown	ledT...		103	SYSBL...	ti.sysb...	ti.sysbi...			311114894	0x2...	0x2...	C
LM_switch: oldtsk: 0x20002800, oldfunc: 0x5...	CtxChg	TSK	ledT...		104	SYSBL...	ti.uiu...	ti.sysbi...			311113320	0x2...	0x5...	0x
[./main.c:134] LED TOGGLED [17] TIMES	Log_L_info	Info			16	Main...	xdcrn...	xdcrn...			311113719	0x2...	0x86	0x
LM_pend: sem: 0x20002d38, count: 0, timeo...	Semaphore_LM_pend	Unknown			105	SYSBL...	ti.sysb...	ti.sysbi...			311113972	0x2...	0x0	0x
LD_block: tsk: 0x200027b0, func: 0x2c39	Task_LD_block	Unknown	ledT...		106	SYSBL...	ti.sysb...	ti.sysbi...			311114318	0x2...	0x2...	
LM_switch: oldtsk: 0x200027b0, oldfunc: 0x...	CtxChg	TSK	ti.sy...		107	SYSBL...	ti.uiu...	ti.sysbi...			311114863	0x2...	0x2...	0x
LS_taskLoad: 0x200027b0,1543,20000611,0x...	Load	TSK	ledT...	0.01	45	Load...	ti.sysb...	ti.sysbi...			320010362	0x2...	0x6...	0x
LS_taskLoad: 0x20002800,19999068,200006...	Load	TSK	ti.sy...	99.99	46	Load...	ti.sysb...	ti.sysbi...			320010605	0x2...	0x1...	0x
LS_cpuLoad: 0%	Load	CPU	CPU	0.00	47	Load...	ti.sysb...	ti.sysbi...			320010904	0x0		
LM_post: sem: 0x20002d38, count: 0	Semaphore_LM_post	Unknown			108	SYSBL...	ti.sysb...	ti.sysbi...			331112327	0x2...	0x0	
LD_ready: tsk: 0x200027b0, func: 0x2c39, pri...	Task_LD_ready	Unknown	ledT...		109	SYSBL...	ti.sysb...	ti.sysbi...			331112642	0x2...	0x2...	C
LM_switch: oldtsk: 0x20002800, oldfunc: 0x5...	CtxChg	TSK	ledT...		110	SYSBL...	ti.uiu...	ti.sysbi...			331113321	0x2...	0x5...	0x
[./main.c:134] LED TOGGLED [18] TIMES	Log_L_info	Info			17	Main...	xdcrn...	xdcrn...			331113720	0x2...	0x86	0x
LM_pend: sem: 0x20002d38, count: 0, timeo...	Semaphore_LM_pend	Unknown			111	SYSBL...	ti.sysb...	ti.sysbi...			331113973	0x2...	0x0	0x
LD_block: tsk: 0x200027b0, func: 0x2c39	Task_LD_block	Unknown	ledT...		112	SYSBL...	ti.sysb...	ti.sysbi...			331114319	0x2...	0x2...	
LM_switch: oldtsk: 0x200027b0, oldfunc: 0x...	CtxChg	TSK	ti.sy...		113	SYSBL...	ti.uiu...	ti.sysbi...			331114864	0x2...	0x2...	0x

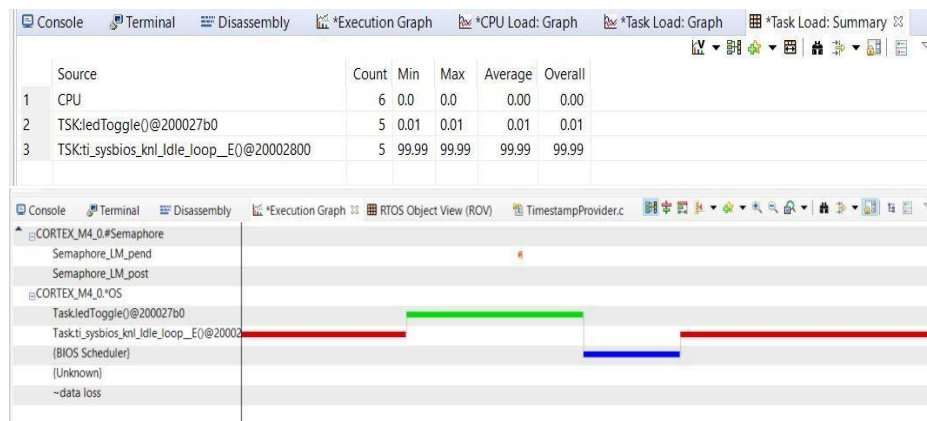
RTOS Object View (ROV):

Basic View:

address	label	event	eventid	mode	count	pendTasks
0x20002d38	LEDsem	none	n/a	count...	0	Label: ledToggleTask, priority: 1, pendState: Waiting forever

Detailed View:

address	label	priority	mode	fn	arg0	arg1	stackSize	stackBase	curCoreId	affinity
0x200027b0	ledToggleTask	1	Blocked	ledToggle	0x0	0x0	2048	0x20000...	n/a	n/a
0x20002800	ti.sysbios.knl.TaskIdleTask	0	Running	ti.sysbios_knl_idle_loop_E	0x0	0x0	2048	0x20000...	n/a	n/a



Lab 9:

Part A & B

TI-RTOS ▸ Products ▸ SYSBIOS ▸ Scheduling ▸ Hwi - Instance Settings

Module Instance Advanced

Portable Hwis

Timer_2A_INT
Add ...
Remove

Required Settings

Handle
Timer_2A_INT

ISR function
Timer_ISR

Interrupt number
39

Additional Settings

Argument passed to ISR function
0

Interrupt priority
-1

Event Id
-1

☒ Enable at startup

Masking options
MaskingOption_SELF

TI-RTOS ▸ Products ▸ SYSBIOS ▸ Synchronization ▸ Mailbox - Instance Settings

Module Instance Advanced

Mailboxes

LED_Mbx
Add ...
Remove

Required Settings

Handle
LED_Mbx

Size of messages (chars)
4

Max number of messages
2

Event Synchronization

The events below can be used to synchronize with threads that need to wait for messages to arrive in the mailbox (reader event) or for space to become available in the mailbox for a new message to be posted (writer event). These options are only available when [Event](#) support is enabled by the [Semaphore module](#).

Reader event
null
Event id
Event_Id_00

Writer event
null
Event id
Event_Id_00

Message Memory Management

Heap
null

Buffer section
null

Buffer pointer
null

Buffer size (chars)
0

TI-RTOS ▸ Products ▸ SYSBIOS ▸ Synchronization ▸ Queue - Instance Settings

Module Instance

Queues

LED_Queue

Add ...
Remove

Required Settings

Handle LED_Queue

TI-RTOS ▸ Products ▸ SYSBIOS ▸ Synchronization ▸ Semaphore - Instance Settings

Module Instance Advanced

Semaphores

mailbox_queue_Sem
QueSem

Add ...
Remove

Required Settings

Handle mailbox_queue_Sem

Initial count 0

Semaphore type
☒ Counting (FIFO)
☐ Binary (FIFO)
☐ Counting (priority-based)
☐ Binary (priority-based)

Event Support

These options are only available when [Event](#) support is enabled by the [Semaphore module](#).

Event instance null Event Id Event_Id_00

TI-RTOSProductsSYSBIOSynchronizationSemaphore - Instance Settings

ModuleInstanceAdvanced

Semaphores

mailbox_queue_Sem
QueSem

Add ...
Remove

Required Settings

HandleQueSem

Initial count0

Semaphore type

☒ Counting (FIFO)
☐ Binary (FIFO)
☐ Counting (priority-based)
☐ Binary (priority-based)

Event Support

These options are only available when [Event](#) support is enabled by the [Semaphore module](#).

Event instance nullEvent Id Event_Id_00

ModuleInstanceAdvanced

Tasks

ledToggleTask
mailbox_queue_Task

Add ...
Remove

Required Settings

HandleledToggleTask

FunctionledToggle

Priority1

Use the vital flag to prevent system exit until this thread exits
☒ Task is vital

Stack Control

Stack size2048

Stack memory section.bss:taskStackSection

Stack pointernull

Stack heapnull

Thread Context

Argument 00

Argument 10

Environment pointernull

TI-RTOScfa Script

TI-RTOS ▸ Products ▸ SYSBIOS ▸ Scheduling ▸ Task - Instance Settings

Module Instance Advanced

▼ Tasks

ledToggleTask mailbox_queue_Task

Add ... Remove

▼ Required Settings

Handle mailbox_queue_Task

Function mailbox_queue

Priority 2

Use the vital flag to prevent system exit until this thread exits

☒ Task is vital

▼ Stack Control

Stack size 2048

Stack memory section .bss.taskStackSection

Stack pointer null

Stack heap null

▼ Thread Context

Argument 0 0

Argument 1 0

Environment pointer null

TI-RTOS cfq Script

Lab 10:

[illegible]