KLE TECHNOLOGICAL UNIVERSITY | Belagavi Campus
Creating Value, Leveraging Knowledge
DR. M. S. SHESHGIRI COLLEGE OF ENGINEERING AND TECHNOLOGY

GROUP-15

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Problem statement:

Write C program to demonstrate the concept of mailbox. Task 1- Take data from serial port and save in mailbox. Task 2- take data from mailbox and display on UART using LPC2148.

Under the Guidance of

Dr.Swati M

Guide Signature

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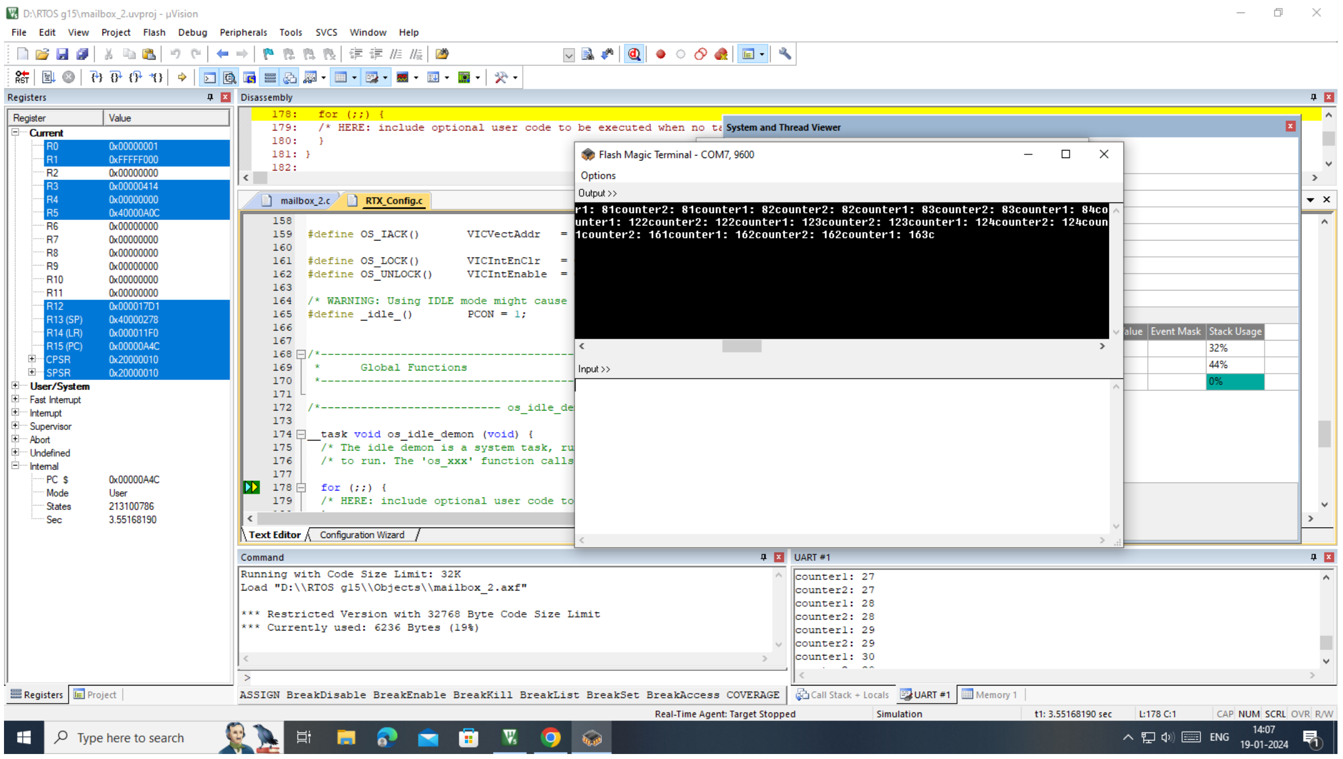
Code

```
#include <rtl.h>
#include <stdio.h>
#include <lpc214x.h>

OS_TID t1;
os_mbx_declare(MsgBox, 100);                /* Declare an RTX mailbox */
U32 mpool[8 * sizeof(U32)];               /* Reserve memory for 16 messages */
unsigned int cnt1, cnt2;
char arr1[20];
char arr2[20];
int i = 0;

__task void task2(void);

__task void task1(void)
{
   /* This task will send a count value. */
   U32 *mptr;
   os_tsk_create(task2, 0);
   os_mbx_init(MsgBox, sizeof(MsgBox));
   mptr = _alloc_box(mpool);                /* Allocate memory for the message */

   // Initialize UART0 for LPC2148
   PINSEL0 |= 0x00000005;   // Select TXD0 and RXD0
   U0LCR = 0x83;            // 8-bit data, 1 stop bit, no parity, enable DLAB
   U0DLL = 97;              // 9600 baud rate for PCLK = 15MHz
   U0LCR = 0x03;            // 8-bit data, 1 stop bit, no parity

   while (1)
   {
      cnt1++;

      sprintf(arr1, "counter1: %d", cnt1);
      while (arr1[i] != '\0')
      {
         os_dly_wait(1);
         while (!(U0LSR & 0x20))
            ;
         U0THR = arr1[i];
         i++;
      }
      i = 0;
      while (!(U0LSR & 0x20))
         ;
      U0THR = '\n';
      os_dly_wait(5);

      // Send the count value to 'task2' continuously
      mptr[0] = cnt1;
      os_mbx_send(MsgBox, mptr, 0xffff);
      os_dly_wait(100);
   }
}
```

```
__task void task2(void)
{
   /* This task will receive and display the count value. */
   U32 *rptr;
   os_mbx_wait(MsgBox, (void** )&rptr, 0xffff); /*Wait for the initial message to arrive. */

   while (1)
   {
      cnt2 = rptr[0]; /*Copy the count value from task1 to cnt2*/

      sprintf(arr2, "counter2: %d", cnt2);
      os_dly_wait(2);
      while (arr2[i] != '\0')
      {
         os_dly_wait(1);
         while (!(U0LSR & 0x20))
            ;
         U0THR = arr2[i];
         i++;
      }
      i = 0;
      while (!(U0LSR & 0x20))
         ;
      U0THR = '\n';

      os_mbx_wait(MsgBox, (void** )&rptr, 0xffff); /*Wait for the next message to arrive. */
   }
}

void main(void)
{
   _init_box(mpool, sizeof(mpool), sizeof(U32));
   os_sys_init_prio(task1, 10);
}
```

Output / Hardware

Implementation



D:\RTOS g15\mailbox_2.uvproj - µVision

Register	Value
Current	
R0	0x00000001
R1	0xFFFFF000
R2	0x00000000
R3	0x00000414
R4	0x00000000
R5	0x40000A0C
R6	0x00000000
R7	0x00000000
R8	0x00000000
R9	0x00000000
R10	0x00000000
R11	0x00000000
R12	0x000017D1
R13 (SP)	0x40000278
R14 (LR)	0x000011F0
R15 (PC)	0x00000A4C
CPSR	0x20000010
SPSR	0x20000010
User/System	
Fast Interrupt	
Interrupt	
Supervisor	
Abort	
Undefined	
Internal	
PC $	0x00000A4C
Mode	User
States	213100786
Sec	3.55168190

```
   178:     for (;;) {
   179:     /* HERE: include optional user code to be executed when no ta
   180:     }
   181: }
   182:
```

```
#define OS_IACK()         VICVectAddr   =
#define OS_LOCK()         VICIntEnClr   =
#define OS_UNLOCK()       VICIntEnable  =

/* WARNING: Using IDLE mode might cause
#define _idle_()          PCON = 1;

/*--------------------------------------
 *      Global Functions
 *--------------------------------------

/*--------------------------- os_idle_de

__task void os_idle_demon (void) {
  /* The idle demon is a system task, ru
  /* to run. The 'os_xxx' function calls

  for (;;) {
  /* HERE: include optional user code to
```

Flash Magic Terminal - COM7, 9600

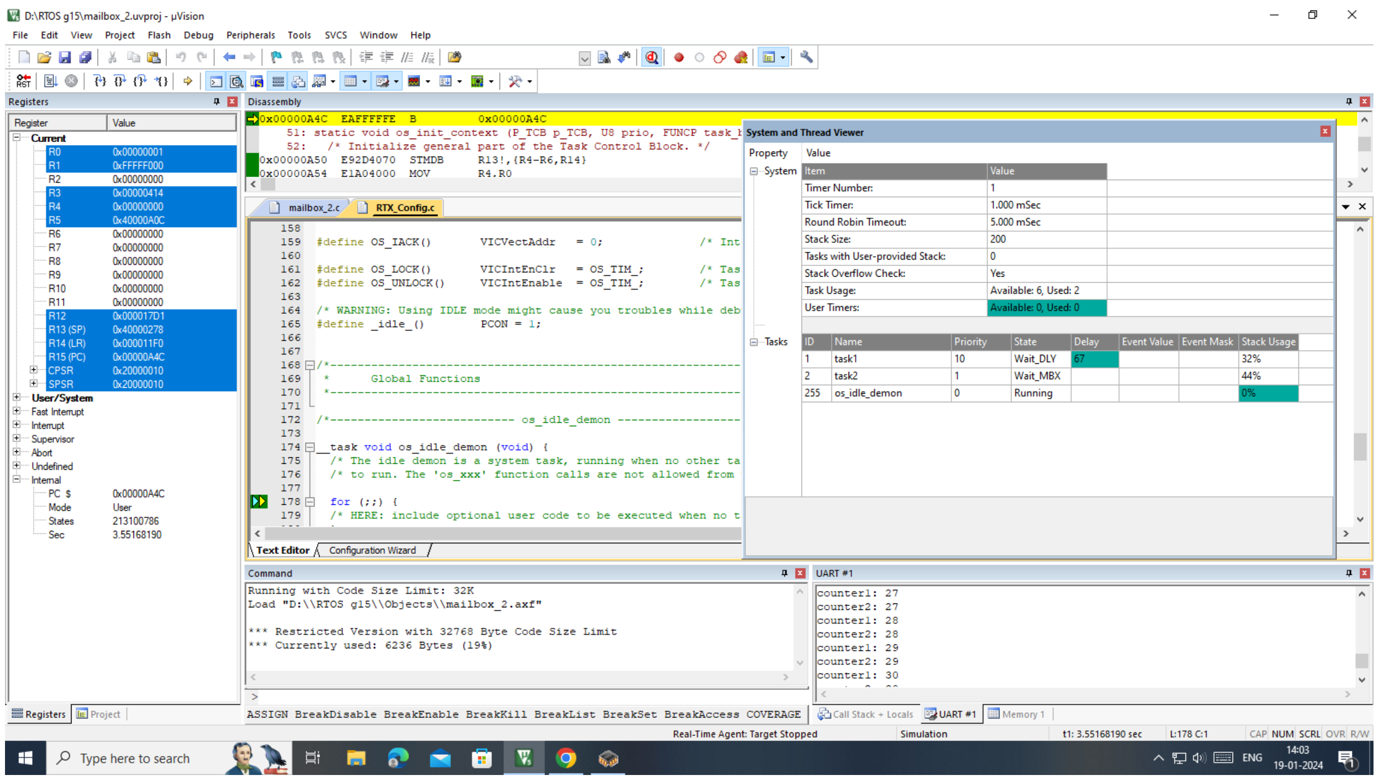
```
r1: 81counter2: 81counter1: 82counter2: 82counter1: 83counter2: 83counter1: 84co
unter1: 122counter2: 122counter1: 123counter2: 123counter1: 124counter2: 124coun
1counter2: 161counter1: 162counter2: 162counter1: 163c
```

```
Running with Code Size Limit: 32K
Load "D:\\RTOS g15\\Objects\\mailbox_2.axf"

*** Restricted Version with 32768 Byte Code Size Limit
*** Currently used: 6236 Bytes (19%)
```

```
counter1: 27
counter2: 27
counter1: 28
counter2: 28
counter1: 29
counter2: 29
counter1: 30
```

```
ASSIGN BreakDisable BreakEnable BreakKill BreakList BreakSet BreakAccess COVERAGE
```

Real-Time Agent: Target Stopped   Simulation   t1: 3.55168190 sec   L:178 C:1



D:\RTOS g15\mailbox_2.uvproj - µVision

```
0x00000A4C  EAFFFFFE  B         0x00000A4C
    51: static void os_init_context (P_TCB p_TCB, U8 prio, FUNCP task_k
    52:   /* Initialize general part of the Task Control Block. */
0x00000A50  E92D4070  STMDB     R13!,{R4-R6,R14}
0x00000A54  E1A04000  MOV       R4.R0
```

```
#define OS_IACK()         VICVectAddr   = 0;                /* Int
#define OS_LOCK()         VICIntEnClr   = OS_TIM_;          /* Tas
#define OS_UNLOCK()       VICIntEnable  = OS_TIM_;          /* Tas

/* WARNING: Using IDLE mode might cause you troubles while deb
#define _idle_()          PCON = 1;

/*----------------------------------------------------------
 *      Global Functions
 *----------------------------------------------------------

/*--------------------------- os_idle_demon ----------------

__task void os_idle_demon (void) {
  /* The idle demon is a system task, running when no other ta
  /* to run. The 'os_xxx' function calls are not allowed from

  for (;;) {
  /* HERE: include optional user code to be executed when no t
```

System and Thread Viewer

Item	Value
Timer Number:	1
Tick Timer:	1.000 mSec
Round Robin Timeout:	5.000 mSec
Stack Size:	200
Tasks with User-provided Stack:	0
Stack Overflow Check:	Yes
Task Usage:	Available: 6, Used: 2
User Timers:	Available: 0, Used: 0

ID	Name	Priority	State	Delay	Event Value	Event Mask	Stack Usage
1	task1	10	Wait_DLY	67			32%
2	task2	1	Wait_MBX				44%
255	os_idle_demon	0	Running				0%

```
Running with Code Size Limit: 32K
Load "D:\\RTOS g15\\Objects\\mailbox_2.axf"

*** Restricted Version with 32768 Byte Code Size Limit
*** Currently used: 6236 Bytes (19%)
```

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counter2: 27
counter1: 28
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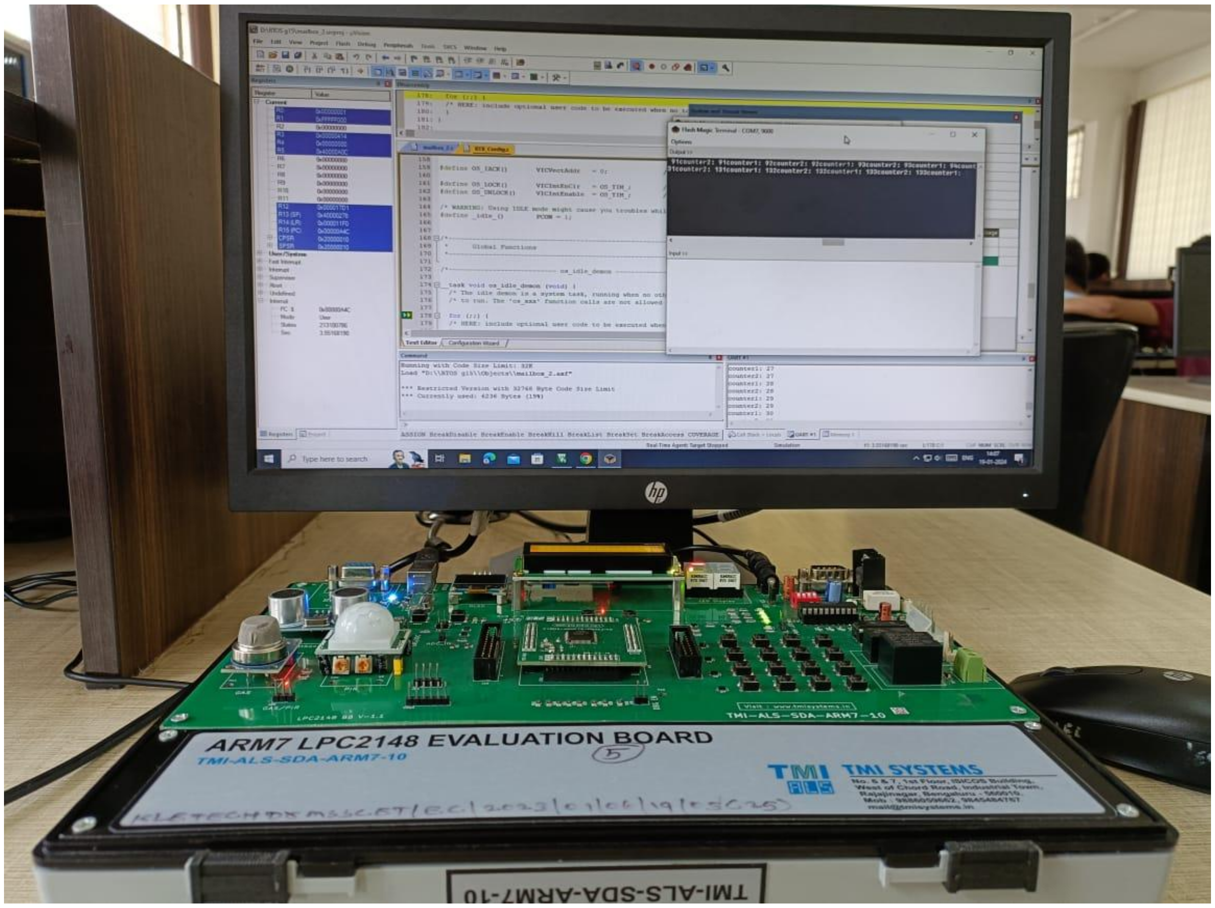
Flash Magic Terminal - COM7, 9600
ARM7 LPC2148 EVALUATION BOARD
TMI-ALS-SDA-ARM7-10
TMI SYSTEMS
TMI-ALS-SDA-ARM7-10

```
91counter2: 91counter1: 92counter2: 92counter1: 93counter2: 93counter1: 94count
91counter2: 131counter1: 132counter2: 132counter1: 133counter2: 133counter1:
```

```
Running with Code Size Limit: 32K
Load "D:\\RTOS gi5\\Objects\\mailbox_2.axf"

*** Restricted Version with 32768 Byte Code Size Limit
*** Currently used: 4236 Bytes (13%)
```

```
counter1: 27
counter2: 27
counter1: 28
counter2: 28
counter1: 29
counter2: 29
counter1: 30
```