

TinyOS HANDS-ON ASSIGNMENT REPORT

Blink Application

Blink is composed of a configuration and a module. All TinyOS applications are composed of a configuration file and an implementation file. The configuration is used to assemble the needed components together. The implementation provides the functionality of the implementation.

The Blink Configuration – BlinkAppC.nc

The configuration section indicates this is a configuration file. No other clauses are used by the configuration. The implementation section describes the set of components referenced, MainC, BlinkC, LedsC, TimerMilliC. The TimerMilliC are further qualified using the 'as' keyword. The MainC.Boot allow for the LEDs to be initialized as part of the boot sequence. The Timer0-2 and LedsC lines connect interfaces between BlinkC and TimerMiliC and LedsC.

```
* @author tinyos-help@millennium.berkeley.edu
**/

configuration BlinkAppC
{
}
implementation
{
    components MainC, BlinkC, LedsC;
    components new TimerMilliC() as Timer0;
    components new TimerMilliC() as Timer1;
    components new TimerMilliC() as Timer2;

    BlinkC -> MainC.Boot;

    BlinkC.Timer0 -> Timer0;
    BlinkC.Timer1 -> Timer1;
    BlinkC.Timer2 -> Timer2;
    BlinkC.Leds -> LedsC;
}
```

Blink Implementation – BlinkC.nc

Implementation of the Blink application. The first section, module, indicates this is the BlinkC module and that it uses interfaces Timer, Leds, and Boot.

The implementation is coded to start the 3 periodic timers when the booted event is received. Event handlers for the timer event received and then toggle the Timer.

```
/**
 * Implementation for Blink application. Toggle the red LED when a
 * Timer fires.
 */

#include "Timer.h"

module BlinkC @safe()
{
  uses interface Timer<TMilli> as Timer0;
  uses interface Timer<TMilli> as Timer1;
  uses interface Timer<TMilli> as Timer2;
  uses interface Leds;
  uses interface Boot;
}

implementation
{
  event void Boot.booted()
  {
    call Timer0.startPeriodic( 250 );
    call Timer1.startPeriodic( 500 );
    call Timer2.startPeriodic( 1000 );
  }

  event void Timer0.fired()
  {
    dbg("BlinkC", "Timer 0 fired @ %s.\n", sim_time_string());
    call Leds.led0Toggle();
  }

  event void Timer1.fired()
  {
    dbg("BlinkC", "Timer 1 fired @ %s \n", sim_time_string());
    call Leds.led1Toggle();
  }

  event void Timer2.fired()
  {
    dbg("BlinkC", "Timer 2 fired @ %s.\n", sim_time_string());
    call Leds.led2Toggle();
  }
}
```

Create a python script to run the application – runblink.py

```
#!/usr/bin/python from TOSSIM import *
```

```
import sys
```

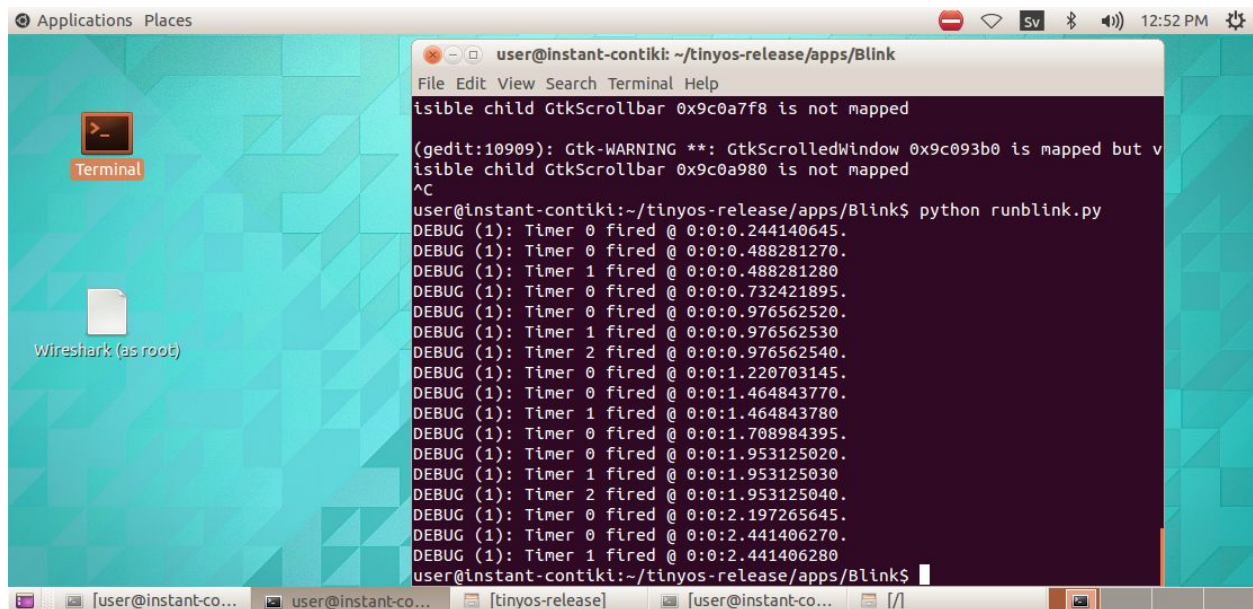
```
t = Tossim([])
```

```

r = t.radio()
t.addChannel("BlinkC", sys.stdout)
m = t.getNode(1)
m.bootAtTime(100)
while (m.isOn() == 0):
    t.runNextEvent() for i in range(0, 100):
        t.runNextEvent()

```

After compiling and running the file blink.py



```

user@instant-contiki: ~/tinyos-release/apps/Blink
File Edit View Search Terminal Help
visible child GtkScrollbar 0x9c0a7f8 is not mapped
(gedit:10909): Gtk-WARNING **: GtkScrolledWindow 0x9c093b0 is mapped but v
visible child GtkScrollbar 0x9c0a980 is not mapped
^C
user@instant-contiki:~/tinyos-release/apps/Blink$ python runblink.py
DEBUG (1): Timer 0 fired @ 0:0:0.244140645.
DEBUG (1): Timer 0 fired @ 0:0:0.488281270.
DEBUG (1): Timer 1 fired @ 0:0:0.488281280.
DEBUG (1): Timer 0 fired @ 0:0:0.732421895.
DEBUG (1): Timer 0 fired @ 0:0:0.976562520.
DEBUG (1): Timer 1 fired @ 0:0:0.976562530.
DEBUG (1): Timer 2 fired @ 0:0:0.976562540.
DEBUG (1): Timer 0 fired @ 0:0:1.220703145.
DEBUG (1): Timer 0 fired @ 0:0:1.464843770.
DEBUG (1): Timer 1 fired @ 0:0:1.464843780.
DEBUG (1): Timer 0 fired @ 0:0:1.708984395.
DEBUG (1): Timer 0 fired @ 0:0:1.953125020.
DEBUG (1): Timer 1 fired @ 0:0:1.953125030.
DEBUG (1): Timer 2 fired @ 0:0:1.953125040.
DEBUG (1): Timer 0 fired @ 0:0:2.197265645.
DEBUG (1): Timer 0 fired @ 0:0:2.441406270.
DEBUG (1): Timer 1 fired @ 0:0:2.441406280.
user@instant-contiki:~/tinyos-release/apps/Blink$

```

The two following modifications should be made to the Blink application code:

- 1) Add another timer called "Timer3" and schedule it every 100ms. User this timer to print out the message "I am Timer 3 and I have the shortest period!"
- 2) Make the simulation run for 2000 events instead of 100

After making modifications in the code,

BlinkAppC.nc

```
* It does so by starting a Timer that fires every second. It uses the
* OSKI TimerMilli service to achieve this goal.
*
* @author tinyos-help@millennium.berkeley.edu
**/

configuration BlinkAppC
{
}
implementation
{
  components MainC, BlinkC, LedsC;
  components new TimerMilliC() as Timer0;
  components new TimerMilliC() as Timer1;
  components new TimerMilliC() as Timer2;
  components new TimerMilliC() as Timer3;

  BlinkC -> MainC.Boot;

  BlinkC.Timer0 -> Timer0;
  BlinkC.Timer1 -> Timer1;
  BlinkC.Timer2 -> Timer2;
  BlinkC.Timer3 -> Timer3;
  BlinkC.Leds -> LedsC;
}
```

BlinkC.nc

```
module BlinkC @safe()
{
  uses interface Timer<TMilli> as Timer0;
  uses interface Timer<TMilli> as Timer1;
  uses interface Timer<TMilli> as Timer2;
  uses interface Timer<TMilli> as Timer3;
  uses interface Leds;
  uses interface Boot;
}
implementation
{
  event void Boot.booted()
  {
    call Timer0.startPeriodic( 250 );
    call Timer1.startPeriodic( 500 );
    call Timer2.startPeriodic( 1000 );
    call Timer3.startPeriodic( 100 );
  }

  event void Timer0.fired()
  {
    dbg("BlinkC", "Timer 0 fired @ %s.\n", sim_time_string());
    call Leds.led0Toggle();
  }

  event void Timer1.fired()
  {
    dbg("BlinkC", "Timer 1 fired @ %s \n", sim_time_string());
    call Leds.led1Toggle();
  }

  event void Timer2.fired()
  {
    dbg("BlinkC", "Timer 2 fired @ %s.\n", sim_time_string());
    call Leds.led2Toggle();
  }

  event void Timer3.fired()
  {
    dbg("BlinkC", "I am Timer 3 and I have the shortest period!\n");
  }
}
```

runblink.py

```
runblink.py x
#!/usr/bin/python
from TOSSIM import *
import sys
t = Tossim([])
r = t.radio()
t.addChannel("BlinkC", sys.stdout)
m = t.getNode(1)
m.bootAtTime(100)
while (m.isOn() == 0):
    t.runNextEvent()
for i in range(0, 2000):
    t.runNextEvent()
```

OUTPUT:


```
user@instant-contiki:~/tinyos-release/apps/Blink$ python runblink.py
while loop
for loop
DEBUG (1): I am Timer 3 and I have the shortest period!
DEBUG (1): I am Timer 3 and I have the shortest period!
DEBUG (1): Timer 0 fired @ 0:0:0.244140645.
DEBUG (1): I am Timer 3 and I have the shortest period!
DEBUG (1): I am Timer 3 and I have the shortest period!
DEBUG (1): Timer 0 fired @ 0:0:0.488281270.
DEBUG (1): Timer 1 fired @ 0:0:0.488281280
DEBUG (1): I am Timer 3 and I have the shortest period!
DEBUG (1): I am Timer 3 and I have the shortest period!
DEBUG (1): I am Timer 3 and I have the shortest period!
DEBUG (1): Timer 0 fired @ 0:0:0.732421895.
DEBUG (1): I am Timer 3 and I have the shortest period!
DEBUG (1): I am Timer 3 and I have the shortest period!
DEBUG (1): Timer 0 fired @ 0:0:0.976562520.
DEBUG (1): Timer 1 fired @ 0:0:0.976562530
DEBUG (1): Timer 2 fired @ 0:0:0.976562540.
DEBUG (1): I am Timer 3 and I have the shortest period!
DEBUG (1): I am Timer 3 and I have the shortest period!
DEBUG (1): I am Timer 3 and I have the shortest period!
DEBUG (1): Timer 0 fired @ 0:0:1.220703145.
DEBUG (1): I am Timer 3 and I have the shortest period!
DEBUG (1): I am Timer 3 and I have the shortest period!
DEBUG (1): Timer 0 fired @ 0:0:1.464843770.
DEBUG (1): Timer 1 fired @ 0:0:1.464843780
DEBUG (1): I am Timer 3 and I have the shortest period!
DEBUG (1): I am Timer 3 and I have the shortest period!
DEBUG (1): I am Timer 3 and I have the shortest period!
DEBUG (1): Timer 0 fired @ 0:0:1.708984395.
DEBUG (1): I am Timer 3 and I have the shortest period!
DEBUG (1): I am Timer 3 and I have the shortest period!
DEBUG (1): Timer 0 fired @ 0:0:1.953125020.
DEBUG (1): Timer 1 fired @ 0:0:1.953125030
```

```
DEBUG (1): Timer 1 fired @ 0:0:20.507812530
DEBUG (1): Timer 2 fired @ 0:0:20.507812540.
DEBUG (1): I am Timer 3 and I have the shortest period!
DEBUG (1): I am Timer 3 and I have the shortest period!
DEBUG (1): I am Timer 3 and I have the shortest period!
DEBUG (1): Timer 0 fired @ 0:0:20.751953145.
DEBUG (1): I am Timer 3 and I have the shortest period!
DEBUG (1): I am Timer 3 and I have the shortest period!
DEBUG (1): Timer 0 fired @ 0:0:20.996093770.
DEBUG (1): Timer 1 fired @ 0:0:20.996093780
DEBUG (1): I am Timer 3 and I have the shortest period!
DEBUG (1): I am Timer 3 and I have the shortest period!
DEBUG (1): I am Timer 3 and I have the shortest period!
DEBUG (1): Timer 0 fired @ 0:0:21.240234395.
DEBUG (1): I am Timer 3 and I have the shortest period!
DEBUG (1): I am Timer 3 and I have the shortest period!
DEBUG (1): Timer 0 fired @ 0:0:21.484375020.
DEBUG (1): Timer 1 fired @ 0:0:21.484375030
DEBUG (1): Timer 2 fired @ 0:0:21.484375040.
DEBUG (1): I am Timer 3 and I have the shortest period!
DEBUG (1): I am Timer 3 and I have the shortest period!
DEBUG (1): I am Timer 3 and I have the shortest period!
DEBUG (1): Timer 0 fired @ 0:0:21.728515645.
DEBUG (1): I am Timer 3 and I have the shortest period!
DEBUG (1): I am Timer 3 and I have the shortest period!
DEBUG (1): Timer 0 fired @ 0:0:21.972656270.
DEBUG (1): Timer 1 fired @ 0:0:21.972656280
DEBUG (1): I am Timer 3 and I have the shortest period!
user@instant-contiki:~/tinyos-release/apps/Blink$
```

NOTE:

I have made modifications in the original file itself and don't have a clue of how to upload folder. So I'm uploading only pdf file.