

```

/* Homework 2 Problem 5
 *
 * Count the number of times SW0 is moved to the "1" position,
 * and display this on the 7-segment display.
 *
 * After a count of 9, it wraps around to 0.
 *
 */

.include "ubc-de1media-macros.s"

.equ    SW0mask,      0x01

.global _start

.text
_start:      movia    r23, IOBASE
             movi     r4, 0

loop:

/* display count on LEDs and 7SEG */
display:     call     count2ten           /* keeps count between 0
    and 9 */
             stwio    r2, LEDR(r23)
             mov      r4, r2

             call     ten2hex7seg        /* converts decimal to 7seg value
    */
             stwio    r2, HEX7SEG(r23)

/* wait for SW1 to go from 1 to 0 */
while1:      ldwio    r3, SWITCH(r23)
             andi     r3, r3, SW0mask
             bne      r3, r0, while1    /* wait while SW0=1 */

/* wait for SW0 to go from 0 to 1 */
while0:      ldwio    r3, SWITCH(r23)
             andi     r3, r3, SW0mask
             beq      r3, r0, while0    /* wait while SW0=0 */

increment:   addi     r4, r4, 1

             br       loop

/* function: count2ten
 * operation: reduces the count to a value between 0 and 9
 *             by subtracting all multiples of 10.
 * incoming parameter: r4 is a count
 * return value: r2 is between 0 and 9 inclusive
 */

count2ten:

```

```
movi    r2, 10
div     r2, r4, r2
muli    r2, r2, 10
sub     r2, r4, r2
ret
```

```
/* function: ten2hex7seg
```

```
* operation: converts a value between 0 and 9 into the 32-bit
*            value needed for the 7-segment display.
```

```
* incoming parameter: r4 is a value between 0 and 9 inclusive
```

```
* return value: r2 is a 32-bit value for the 7-segment display
```

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*/
```

```
ten2hex7seg:
```

```
movia   r2, TABLE                /* use a lookup table */
muli    r3, r4, 4
add     r2, r2, r3                /* 4*r4 is # of bytes into
    table for 7segment value */
ldw     r2, 0(r2)                /* lookup value at address
    TABLE + 4*r4 */
orhi    r2, r2, 0xffff /* turn off LEDs in HEX3 and HEX2
    */
ori     r2, r2, 0xff00 /* turn off LEDs in HEX1 */
ret
```

```
.data
```

```
TABLE:
```

```
.word DIGIT0, DIGIT1, DIGIT2, DIGIT3, DIGIT4
```

```
.word DIGIT5, DIGIT6, DIGIT7, DIGIT8, DIGIT9
```

```
.end
```