Ve373 Design of Microprocessor Based System

Homework 1

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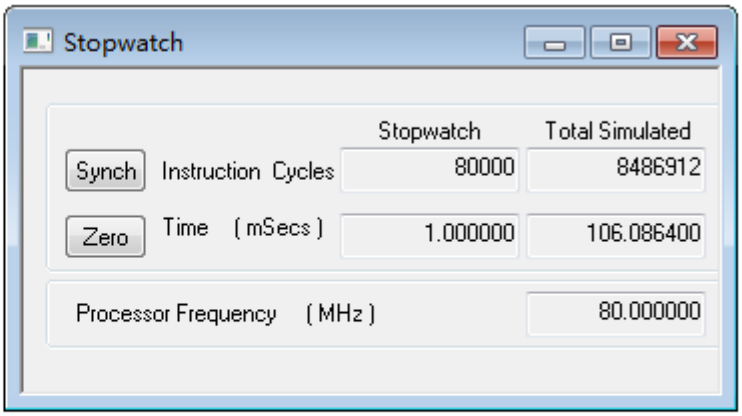
Ex1. Sol

```
#include<p32xxxx.h>
.global main
.text
.ent main
   main:
         add  $s0, $0,  19999
         nop
   Loop:
         beq  $s0, $0,  exit
         sub  $s0, $s0, 1
         j    Loop
   exit:
         jr   $ra
.end main
```

```
#include<p32xxxx.h>
.global main
.text
.ent main
   main:
         add  $s0, $0, 19999
         nop
   Loop:
         beq  $s0, $0, exit
         addi $s0, $s0, -1
         j    Loop
   exit:
         jr   $ra
.end main
```



Ex2. Sol

```
#include <p32xxxx.h>

void genSec(int n)
   {
     int i = 0;
     while (i <= 5333333*n)
        {
          i++;
        }
   }

int main()
   {
     asm("nop");
     genSec(1);
     asm("nop");

     return 0;
    }
```

Ex3. Sol

__PORTAbits_t is defined as follows:

```
typedef union {
  struct {
    unsigned LATA0:1;
    unsigned LATA1:1;
    unsigned LATA2:1;
    unsigned LATA3:1;
    unsigned LATA4:1;
    unsigned LATA5:1;
    unsigned LATA6:1;
    unsigned LATA7:1;
    unsigned :1;
    unsigned LATA9:1;
    unsigned LATA10:1;
    unsigned :3;
    unsigned LATA14:1;
    unsigned LATA15:1;
  };
  struct {
    unsigned w:32;
  };
} __LATAbits_t;
```

PORTAbits is an instance of the structure.

Ex4. Sol

```
#include <p32xxxx.h>

int main()
   {
     TRISA = 0xff00;
     while(1)
        {
          int i=0, j=0;

          while (i <= 14000000)
             {
               PORTA = 1;
               i++;
             }

          while (j <= 7000000)
             {
               PORTA = 0;
               j++;
             }
        }
     return 0;
   }
```

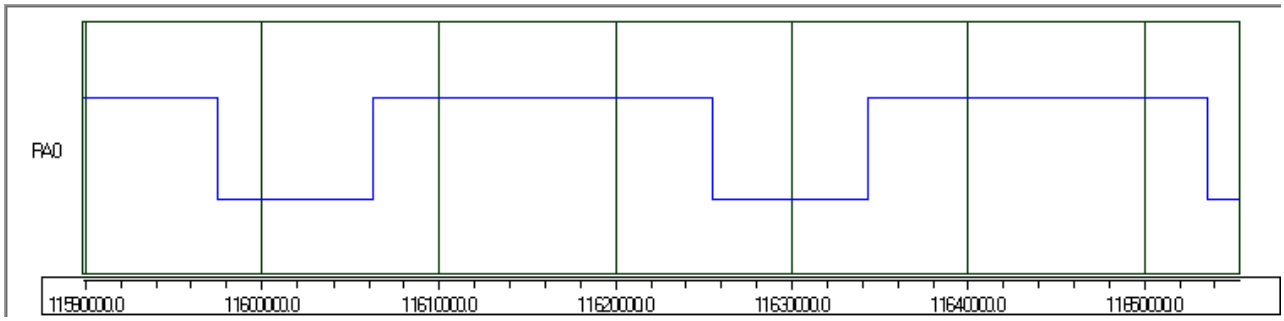
For 2s and 1s are obciously out of the maximum range of the analyzer, I choose a 10000:1 scaling-down code to measure the accuracy. i.e.

```
#include <p32xxxx.h>

int main()
   {
     TRISA = 0xff00;
     while(1)
        {
          int i=0, j=0;

          while (i <= 1400)
             {
               PORTA = 1;
               i++;
             }

          while (j <= 700)
             {
               PORTA = 0;
               j++;
             }
        }
     return 0;
   }
```


PA0
115900000.0
116000000.0
116100000.0
116200000.0
116300000.0
116400000.0
116500000.0