

Assignment 3 (100 points)**Received: 10/01/2008**
Due: 4:00 p.m., 10/13/2008

1. [0] Contact TA to check out an ARM evaluation board for this assignment. Please be careful with the rented board. It is YOUR RESPONSIBILITY to return the board in the same state as you checked out from TA.
2. [0] The ARM evaluation board was preinstalled with RedBoot firmware (from Red Hat). Study how this boot loader handles software interrupt exceptions. In particular, understand how the SWI handler is called. The source code of RedBoot is available in the CD included with the ARM evaluation board.
3. [50] Implement the following routines on the ARM evaluation board:

void my_swi_handler()

This is your own software interrupt handler. In this function, you must extract the software interrupt code and invoke the corresponding service routine as we discussed in the class. Assume that we have two software interrupt codes, 0 and 2. The service routine for SWI 0 should print I/D cache size of the current system and the service routine for SWI 2 should print translation table base by accessing CP15 register.

void register_swi_handler(unsigned *swi_handler)

This routine registers `swi_handler` as a software interrupt service routine for SWI.

void request_SWI(int n)

This function requests software interrupt `n`.

- Note that your programs run in the supervisor mode in the evaluation board (under Velos).
- Test your implementation using the following test program:

```
void Main()
{
    register_swi_handler(my_swi_handler);
    request_SWI(0);
    request_SWI(2);
}
```

4. [50] Modify the implementation of Prob. 3 as follows:

- 5 SWI interrupt codes are supported: 1, 2, 3, 4 and 5.

SWI 1

Start OS-Timer 2 of PXA255 and count ticks every milli-second. (Use IRQ service handler.)

SWI 2

Stop OS-Timer 2 of PXA255 and print elapsed time (in milli-seconds) from the last SWI 1 request.

SWI 3

Change CPU clock frequency, PXbus clock frequency and SDRAM clock frequency to 400 MHz, 200 MHz and 100 MHz, respectively.

SWI 4

Change CPU clock frequency, PXbus clock frequency and SDRAM clock frequency to 332 MHz, 166 MHz and 83 MHz, respectively.

SWI 5

Change CPU clock frequency, PXbus clock frequency and SDRAM clock frequency to 266 MHz, 133 MHz and 66 MHz, respectively.

(Refer 'Intel PXA255 Processor Developer's Manual' included in the CD for changing clock frequency and timer control.)

- Test your implementation using the following test program:

```
int fibo(int n)
{
    if (n<=2) return 1;
    else fibo(n-1)+fibo(n-2);
}

void Main()
{
    int fiboval;

    register_swi_handler(my_swi_handler);

    request_SWI(3); // Change CPU clock to 400 MHz
```

```
printf("CPU clock is 400 MHz now...\n");
request_SWI(1);
fiboval = fibo(40);
request_SWI(2);

request_SWI(4); // Change CPU clock to 332 MHz
printf("CPU clock is 332 MHz now...\n");
request_SWI(1);
fiboval = fibo(40);
request_SWI(2);

request_SWI(5); // Change CPU clock to 266 MHz
printf("CPU clock is 266 MHz now...\n");
request_SWI(1);
fiboval = fibo(40);
request_SWI(2);

}
```