LAB08_312651057

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實驗目的

將ARM與FPGA環境透過Bridge建立起來，並成功跑出流水燈以及每跑完一次計數器+1。

實驗程式碼

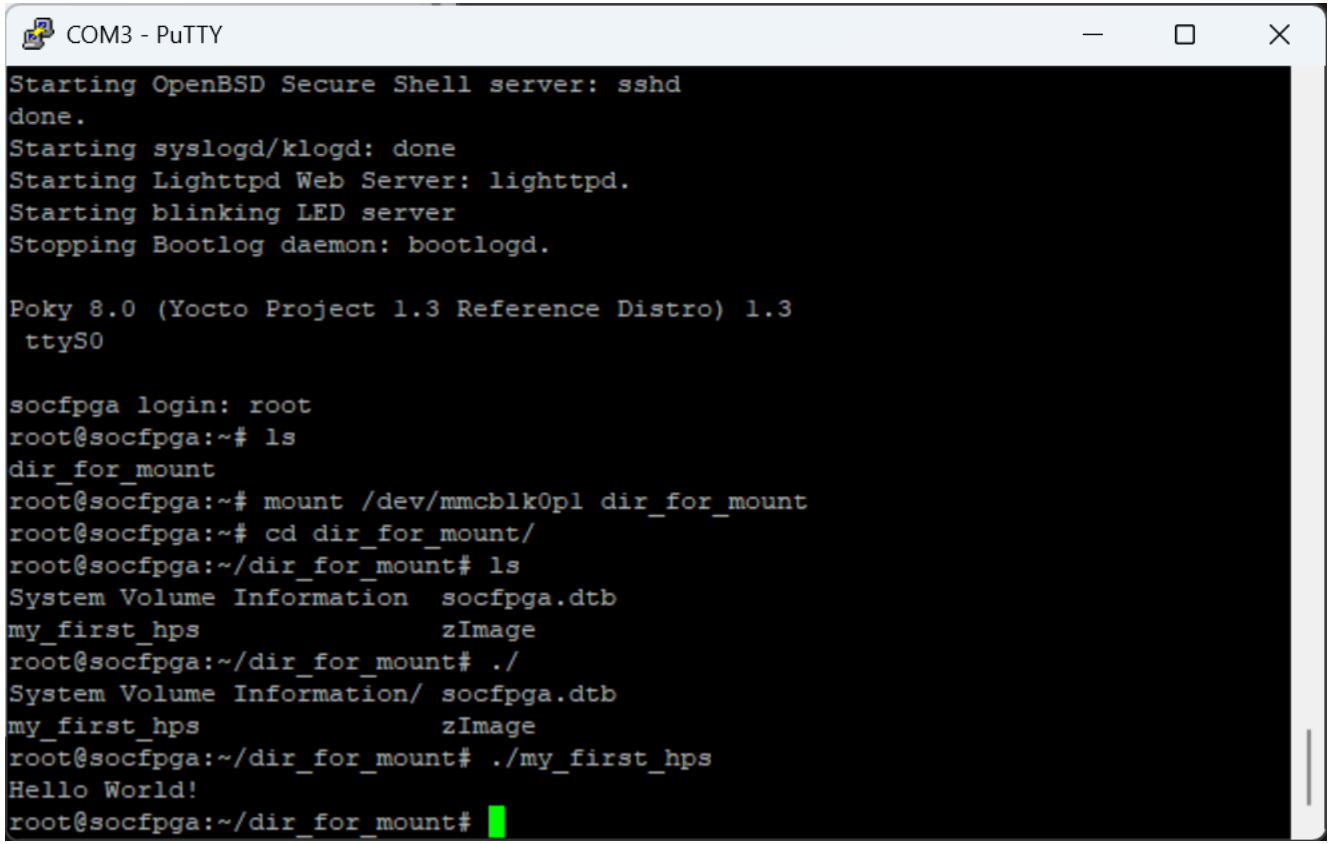
```c
#include <stdio.h>
#include <unistd.h>
#include <fcntl.h>
#include <sys/mman.h>
#include "hwlib.h"
#include "socal/socal.h"
#include "socal/hps.h"
#include "socal/alt_gpio.h"
#include "hps_0.h"

#define HW_REGS_BASE (ALT_STM_OFST)
#define HW_REGS_SPAN (0x04000000)
#define HW_REGS_MASK (HW_REGS_SPAN - 1)

int main()
{

    void *virtual_base;
    int fd;
    int loop_count;
    int led_direction;
    int led_mask;
    void *h2p_lw_led_addr;
    void *h2p_lw_seg_addr;

    // map the address space for the LED registers into user space so we can interact with them.
    // we'll actually map in the entire CSR span of the HPS since we want to access various registers within that span

    if ((fd = open("/dev/mem", (O_RDWR | O_SYNC))) == -1)
    {
        printf("ERROR: could not open \"/dev/mem\"...\n");
        return (1);
    }

    virtual_base = mmap(NULL, HW_REGS_SPAN, (PROT_READ | PROT_WRITE), MAP_SHARED, fd, HW_REGS_BASE);

    if (virtual_base == MAP_FAILED)
    {
        printf("ERROR: mmap() failed...\n");
        close(fd);
        return (1);
    }

    h2p_lw_led_addr = virtual_base + ((unsigned long)(ALT_LWFPGASLVS_OFST + PIO_LED_BASE) & (unsigned long)(HW_REGS_MASK));
    h2p_lw_seg_addr = virtual_base + ((unsigned long)(ALT_LWFPGASLVS_OFST + SEG7_LUT_0_BASE) & (unsigned long)(HW_REGS_MASK));

    // toggle the LEDs a bit
```

main.c 6

E: > APLSDA > Altera_TRAN > my_first_hps-fpga_sw > main.c > ...

```
16  {
47      // toggle the LEDs a bit
48
49      loop_count = 0;
50      led_mask = 0x01;
51      led_direction = 0; // 0: left to right direction
52      while (loop_count < 60)
53      {
54
55          // control led,  add ~ because the led is High-active
56          *(uint32_t *)h2p_lw_led_addr = led_mask;
57          usleep(100 * 1000);
58          *(uint32_t *)h2p_lw_seg_addr = loop_count;
59
60          // wait 100ms
61          usleep(1000 * 1000);
62
63          // update led mask
64          if (led_direction == 0)
65          {
66              led_mask <<= 1;
67              if (led_mask == (0x01 << (PIO_LED_DATA_WIDTH - 1)))
68                  led_direction = 1;
69          }
70          else
71          {
72              led_mask >>= 1;
73              if (led_mask == 0x01)
74              {
75                  led_direction = 0;
76                  loop_count++;
77              }
78          }
79
80      } // while
81
82      // clean up our memory mapping and exit
83
84      if (munmap(virtual_base, HW_REGS_SPAN) != 0)
85      {
86          printf("ERROR: munmap() failed...\n");
87          close(fd);
88          return (1);
89      }
90
91      close(fd);
92
```

實驗結果照片


COM3 - PuTTY
Starting OpenBSD Secure Shell server: sshd
done.
Starting syslogd/klogd: done
Starting Lighttpd Web Server: lighttpd.
Starting blinking LED server
Stopping Bootlog daemon: bootlogd.
Poky 8.0 (Yocto Project 1.3 Reference Distro) 1.3
ttyS0
socfpga login: root
root@socfpga:~# ls
dir_for_mount
root@socfpga:~# mount /dev/mmcblk0p1 dir_for_mount
root@socfpga:~# cd dir_for_mount/
root@socfpga:~/dir_for_mount# ls
System Volume Information socfpga.dtb
my_first_hps zImage
root@socfpga:~/dir_for_mount# ./
System Volume Information/ socfpga.dtb
my_first_hps zImage
root@socfpga:~/dir_for_mount# ./my_first_hps
Hello World!
root@socfpga:~/dir_for_mount#

問題與討論

問題 : 在安裝環境時出現諸多問題，如makefile無法編譯c等。

討論 : 經過排查後，發覺是環境沒有安裝好。