[2015 網路系統程式設計 Homework 6]

◆ 主旨 :

本次作業著重於讓學生練習 shared memory 以及 semaphore。

◆ 題目 :

1. Communicate with a server using shared memory and IPC semaphores. The following provides some information about the code you are going to develop.

2. User one of the semaphores for mutual exclusion, so that one client at a time talks to the server and the other is used for synchronization between client and server as follows:
   I. It is the client's turn to talk when the synch semaphore value is 0. It is the server's turn when the value is non-zero.
   II. The initial value is 0.
   III. The server attempts to decrement and is blocked.
   IV. The client increments the semaphore by 2 to alert the server and then waits until is 0 before looking for reply.
   V. The server wakes up when the client increments the semaphore and does a look-up. It then attempts to decrement and wakes up the client.

3. The server should be named shm_server and is built from lookup5.c (the module which performs the dictionary look ups) and shm_server.c (which interfaces with the client through the shared memory and semaphore).

4. The client should be named shm_client and is built from main.c (the user interface module) and lookup6.c (which interfaces with the server through the shared memory and semaphores).

5. Edit the lookup6.c file to communicate using shared memory and synchronization by using two semaphores. Edit the shm_server.c file to wait on a semaphore, do look-up, use shared memory for communication, and notify the client using the second semaphore described above.
   If you want to kill shared memory and semaphore, first using ipcs command to display IPC status, then using ipcrm –m shmid to kill shared memory and using ipcrm –s semid to kill semaphore.

6. Files provided:
   I. dict.h
   II. fixrec
   III. lookup5.c
   IV. lookup6.c
   V. main.c

7. 執行結果如下:

```
f5018@XS35:~/HW6$ ./shm_server fixrec 0xbcde &
[1] 6839
f5018@XS35:~/HW6$ ipcs

------ 共用記憶體資料段 --------
鍵值      shmid      擁有者  perms      位元組   使用數  狀態
0x0000bcde 8912911    f5018      666        512        1
0x00000000 8945680    f5018      600        524288     2          目標
0x00000000 9207825    f5018      600        524288     2          目標
0x00000000 9240594    f5018      600        4194304    2          目標

------ 號誌陣列 --------
鍵值      semid      擁有者  perms      nsems
0x0000bcde 0          f5018      666        2

------ 訊息佇列 --------
鍵值      msqid      擁有者  perms      已用位元組 訊息

f5018@XS35:~/HW6$ ./shm_client 0xbcde
What word do you want : cynic
cynic : A blackguard who sees things as they are and not as they ought to be.
What word do you want : ambition
ambition : An overmastering desire to be vilified by enemies while living and ma
de ridiculous by friends when dead.
What word do you want : ^C
f5018@XS35:~/HW6$
```

◆ 限制:

1. 請在 Ubuntu 14.04 系統上使用 C 語言寫本次作業並進行測試，Demo 時只接受題目上的執行結果。
2. 本作業必須上傳能編譯本作業之 Makefile，內容不拘，未寫要扣分。
3. 嚴禁抄襲其他同學作業，參與者(抄襲與被抄襲)均以零分計算。
4. 請對你的程式碼有深入瞭解，demo 時助教會問。
5. 對題目有問題可以寄信問助教群(sp_ta@net.nsysu.edu.tw)或是到實驗室(F5018)詢問，但不幫忙 debug。
6. 逾期以零分計算，不接受補交，有問題請事先告知，Demo 時間會另外通知。

◆ 作業上傳:

1. 請壓縮成 zip 或 tar 的壓縮檔，並上傳至中山網路大學，作業命名規則為”學號_SP_HW6”，Example: M043040001_SP_HW6.zip。
2. 作業截止時間為 2015/11/10 (Tue.) 23:59，請在時間內上傳作業。