[2014] Network System Programming Homework 2

➕ 主旨：

本次作業著重於讓學生練習製作簡單的system programming與pipe的練習。

➕ 第一部分：

1. Write, compile, and run a program named **hostinfo** that prints out system information in the following format.

   執行結果：

   ```
   ebby@ebby-VirtualBox:/home/SP_homework/sp_hw2/part1$ ./hostinfo
   hostname: ebby-VirtualBox
   Linux Release 3.13.0-32-generic (x86_64)
   hostid: 8323329
   ebby@ebby-VirtualBox:/home/SP_homework/sp_hw2/part1$
   ```

2. Write, compile, and run a program named **mydate** that prints out the day and time in the following format.

   執行結果：

   ```
   ebby@ebby-VirtualBox:/home/SP_homework/sp_hw2/part1$ ./mydate
   Sep 28(Sun), 2014  07:17 AM
   ebby@ebby-VirtualBox:/home/SP_homework/sp_hw2/part1$
   ```

3. Write a program called **printdir** that prints the current directory. Determine what size buffer to pass to **getcwd()** for dynamic allocation.

   執行結果：

   ```
   ebby@ebby-VirtualBox:/home/SP_homework/sp_hw2/part1$ ./printdir
   /home/SP_homework/sp_hw2/part1
   ebby@ebby-VirtualBox:/home/SP_homework/sp_hw2/part1$
   ```

4. Write a program called **mycat.c** that is a simple version of the program cat. The program takes exactly one file name as argument; you should open it for reading and display its contents to the screen. Check that there is exactly one argument (argc==2) and if not, display the usage message "**Usage: mycat filename**".

   執行結果：

   ```
   ebby@ebby-VirtualBox:/home/SP_homework/sp_hw2/part1$ cat 123
   123456
   ABCDE
   ***
   ebby@ebby-VirtualBox:/home/SP_homework/sp_hw2/part1$ ./mycat 123
   123456
   ABCDE
   ***
   ebby@ebby-VirtualBox:/home/SP_homework/sp_hw2/part1$ ./mycat 123 456
   Usage: mycat filename
   ebby@ebby-VirtualBox:/home/SP_homework/sp_hw2/part1$
   ```

5. Write a program **mychmod.c**, which is a simple version of the chmod command. The program only need support octal mode, Ex: "mychmod 0777 file", "mychmod 555 file". **Bonus**: Add a limited symbolic mode. The answer only supports symbolic mode for things like "a+w", "g+x", not "uo+x" or "uo-x, go+r".

執行結果：

```
root@ebby-VirtualBox:/home/SP_homework/sp_hw2/part1/test# ./mychmod 0777 123
root@ebby-VirtualBox:/home/SP_homework/sp_hw2/part1/test# ls -al
total 24
drwxr-xr-x 2 root root 4096  9月 28 07:48 .
drwxrwxrwx 3 root root 4096  9月 28 07:47 ..
-rwxrwxrwx 1 root root   17  9月 28 07:44 123
-rwxrwxr-x 1 root root 8846  9月 28 07:11 mychmod
root@ebby-VirtualBox:/home/SP_homework/sp_hw2/part1/test# ./mychmod 555 123
root@ebby-VirtualBox:/home/SP_homework/sp_hw2/part1/test# ls -al
total 24
drwxr-xr-x 2 root root 4096  9月 28 07:48 .
drwxrwxrwx 3 root root 4096  9月 28 07:47 ..
-r-xr-xr-x 1 root root   17  9月 28 07:44 123
-rwxrwxr-x 1 root root 8846  9月 28 07:11 mychmod
root@ebby-VirtualBox:/home/SP_homework/sp_hw2/part1/test# ./mychmod a+w 123
root@ebby-VirtualBox:/home/SP_homework/sp_hw2/part1/test# ls -al
total 24
drwxr-xr-x 2 root root 4096  9月 28 07:48 .
drwxrwxrwx 3 root root 4096  9月 28 07:47 ..
-rwxrwxrwx 1 root root   17  9月 28 07:44 123
-rwxrwxr-x 1 root root 8846  9月 28 07:11 mychmod
root@ebby-VirtualBox:/home/SP_homework/sp_hw2/part1/test#
```

6. Write **pipe_ls** to practice using **pipe()** and **dup()**. Have your process start ls(using **fork()** and **exec()**) but read the output from **ls** over a pipe. The **ls** program writes output on descriptor 1, so some work has to be done to get the pipe connected. Write what you read on the pipe to **stdout**.

執行結果：

```
root@ebby-VirtualBox:/home/SP_homework/sp_hw2/part1# ./pipe_ls
total 136
-rwxrwxrwx 1 root root   17  9月 28 07:44 123
-r-xr-xr-x 1 root root   17  9月 28 07:44 123~
-rwxrwxr-x 1 ebby ebby 8790  9月 28 07:11 hostinfo
-rwxrwxrwx 1 root root  424 10月  5  2013 hostinfo.c
-rw-rw-r-- 1 ebby ebby 2240  9月 28 07:11 hostinfo.o
-rwxrwxrwx 1 root root  636 10月  7  2013 Makefile
-rwxrwxr-x 1 ebby ebby 9237  9月 28 07:11 mycat
-rwxrwxrwx 1 root root  950 10月  5  2013 mycat.c
-rw-rw-r-- 1 ebby ebby 2952  9月 28 07:11 mycat.o
-rwxrwxr-x 1 ebby ebby 8846  9月 28 07:11 mychmod
-rwxrwxrwx 1 root root 1537  9月 25 17:07 mychmod.c
-rw-rw-r-- 1 ebby ebby 2824  9月 28 07:11 mychmod.o
-rwxrwxr-x 1 ebby ebby 8731  9月 28 07:11 mydate
-rwxrwxrwx 1 root root  288 10月  5  2013 mydate.c
-rw-rw-r-- 1 ebby ebby 1816  9月 28 07:11 mydate.o
-rwxrwxr-x 1 ebby ebby 9023  9月 28 07:11 pipe_ls
-rwxrwxrwx 1 root root  703  9月 25 18:01 pipe_ls.c
-rw-rw-r-- 1 ebby ebby 2408  9月 28 07:11 pipe_ls.o
-rwxrwxr-x 1 ebby ebby 8772  9月 28 07:11 printdir
-rwxrwxrwx 1 root root  292 10月  5  2013 printdir.c
-rw-rw-r-- 1 ebby ebby 1840  9月 28 07:11 printdir.o
drwxr-xr-x 2 root root 4096  9月 28 07:48 test
root@ebby-VirtualBox:/home/SP_homework/sp_hw2/part1#
```

第二部分：

1. Edit the **builtin.c** file to recognize cd, pwd, id, hostname and builtin. Write functions implementing these commands, and compile them into your shell. The builtin command lists the functions built into your shell.

   Files provided：

   i. builtin.c   iii. shell.c

   ii. parse.c   iv. shell.h

   執行結果：

   ```
   root@ebby-VirtualBox:/home/SP_homework/sp_hw2/part2# ./myshell
   myshell -> cd /etc
   myshell -> pwd
   /etc
   myshell -> id
   UserID = 0(root), GroupID = 0(master)
   myshell -> hostname
   hostname: ebby-VirtualBox
   myshell -> builtin quit
   quit is a builtin feature
   myshell -> builtin pwd
   pwd is a builtin feature
   myshell -> builtin abc
   abc is NOT a builtin feature
   myshell -> quit
   root@ebby-VirtualBox:/home/SP_homework/sp_hw2/part2#
   ```

2. Modify the **redirect_in.c** file to recognize standard input and the **redirect_out.c** file to recognize standard output. Add code to the **pipe_present.c** file to check for the pipe symbol. Add code to the **pipe_command.c** file to create a process to execute each of the pipe. Modify **is_background.c** to check the "&" symbol. Alter the **run_command.c** file to call these functions.

   Files provided：

   i. redirect_in.c   iii. run_command.c   v. pipe_present.c

   ii. redirect_out.c   iv. pipe_command.c   vi. is_background.c

   執行結果：

   ```
   root@ebby-VirtualBox:/home/SP_homework/sp_hw2/part2# ./myshell
   myshell -> cat 123 > mess
   myshell -> cat mess | sort -u
   myshell -> APPLE
   BUG
   CANDY
   DEFINE
   ENTER
   FINISH

   myshell -> cat mess
   CANDY
   ENTER
   APPLE
   DEFINE
   BUG
   FINISH
   myshell -> wc -l < mess
   6
   myshell -> quit
   root@ebby-VirtualBox:/home/SP_homework/sp_hw2/part2#
   ```

第三部分：

1. The first look up project lab familiarizes you with the format of the dictionary by completing the **convert.c** program that creates the dictionary of fixed-length records (fixrec) from a file of variable-length entries (dict). Add code to **convert.c** to changean editable file into a fixed-length record format.

   Files provided：

   i. convert.c

   ii. dict.h

   iii. dict

   執行結果：

```
root@ebby-VirtualBox:/home/SP_homework/sp_hw2/part3# ./convert dict myfixrec
root@ebby-VirtualBox:/home/SP_homework/sp_hw2/part3# ls -l dict myfixrec
-rwxrwxrwx 1 root root  1919  9月  27 10:31 dict
-rw-r--r-- 1 root root 10240  9月  28 08:27 myfixrec
root@ebby-VirtualBox:/home/SP_homework/sp_hw2/part3#
```

2. Add code to the **lookup1.c** file to do a simple linear search through a file of fixed length records. Link with **main.c**, the user inertface module.

   Files provided：

   i. lookup1.c

   ii. main.c

   執行結果如下：

```
root@ebby-VirtualBox:/home/SP_homework/sp_hw2/part3# ./file_lookup myfixrec
What word do you want : work
work : The curse of the drinking classes.
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 : beauty
beauty : The power by which a woman charms a lover and terrifies a husband.
What word do you want : homework
homework : Not Found!
What word do you want : ^C
root@ebby-VirtualBox:/home/SP_homework/sp_hw2/part3#
```

✚ 限制：

1. 請使用C語言寫本次作業並在Ubuntu 14.04系統上進行執行、測試。

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. 對作業有問題歡迎來信助教群(sp_ta@net.nsysu.edu.tw)或是到實驗室(F5018)詢問，但請先研讀相關內容，助教不幫忙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檔案，作業命名規則為"學號_SP_HW2.zip"。
   Example: "M055050123_SP_HW2.zip"

2. 請各位將作業上傳至**中山網路大學**。

3. 請於**2014年10月7日(週二) 23:59**前上傳完畢，逾期以零分計算，不接受補交，有問題請事先告知，再次強調，Demo 時間會另外通知。