HW12 noHup

408410019 資工二 徐怡娟

1. 註解掉 (1) freopen("/dev/null", "R+", stdin);   // 標準輸入仍然為鍵盤

   程式會停在 int c = getchar();，等待使用者從鍵盤輸入字元讀取，因此若無輸入

   字元直接將 terminal 關掉，stdout、stderr 不會有任何內容；若輸入十個以上的

   字元（for 跑十次等於讀十個字元），程式會開始往下運行，因為有

   signal(SIGHUP, SIG_IGN); 會忽略 terminal 關掉收到的 SIGHUP 因此 stdout、

   stderr 會得到 ls / -R 的結果。

```
accepted@ubuntu:~/system-programming/ch10/HW12$ ./a.out
```

```
accepted@ubuntu:~/system-programming/ch10/HW12$ cat stdout.log
accepted@ubuntu:~/system-programming/ch10/HW12$ cat stderr.log
```

```
accepted@ubuntu:~/system-programming/ch10/HW12$ ./a.out
qawsedrftg
```

```
  1 /:
  2 bin
  3 boot
  4 cdrom
  5 dev
  6 etc
  7 home
  8 lib
  9 lib32
 10 lib64
 11 libx32
 12 lost+found
 13 media
 14 mnt
 15 opt
 16 proc
 17 root
 18 run
 19 sbin
 20 snap
 21 srv
 22 swapfile
"stdout.log" 1046202L, 16532391C
```

```
  1 ls: cannot open directory '/boot/efi': Permission
  2 ls: cannot open directory '/etc/cups/ssl': Permiss
  3 ls: cannot open directory '/etc/polkit-1/localauth
  4 ls: cannot open directory '/etc/ssl/private': Perm
  5 ls: cannot open directory '/home/accepted/system-p
  6 ls: cannot open directory '/lost+found': Permissio
  7 ls: cannot open directory '/proc/1/fd': Permission
  8 ls: cannot open directory '/proc/1/fdinfo': Permis
  9 ls: cannot open directory '/proc/1/map_files': Per
 10 ls: cannot open directory '/proc/1/ns': Permission
 11 ls: cannot open directory '/proc/1/task/1/fd': Per
 12 ls: cannot open directory '/proc/1/task/1/fdinfo':
 13 ls: cannot open directory '/proc/1/task/1/ns': Per
 14 ls: cannot open directory '/proc/10/fd': Permissio
 15 ls: cannot open directory '/proc/10/fdinfo': Permi
 16 ls: cannot open directory '/proc/10/map_files': Pe
 17 ls: cannot open directory '/proc/10/ns': Permissio
 18 ls: cannot open directory '/proc/10/task/10/fd': P
 19 ls: cannot open directory '/proc/10/task/10/fdinfo
 20 ls: cannot open directory '/proc/10/task/10/ns': P
 21 ls: cannot open directory '/proc/100/fd': Permissi
 22 ls: cannot open directory '/proc/100/fdinfo': Perm
"stderr.log" 2033L, 137050C
```

2. 註解掉 (2) freopen("stdout.log", "w+", stdout);　　// 標準輸出仍為螢幕

程式只會建立 stderr.log 且 ls / -R 輸出到標準輸出的結果會直接呈現在螢幕上

```
accepted@ubuntu:~/system-programming/ch10/HW12$ ./a.out
0: hello
1: hello
2: hello
3: hello
4: hello
5: hello
6: hello
7: hello
8: hello
9: hello
試著在20秒內切斷連線
```

```
accepted@ubuntu:~/system-programming/ch10/HW12$ ls
408410019.pdf  a.out  inotify  lovelyRon.c  stderr.log  watchFile.c
accepted@ubuntu:~/system-programming/ch10/HW12$ cat stderr.log
ls: cannot open directory '/boot/efi': Permission denied
ls: cannot open directory '/etc/cups/ssl': Permission denied
ls: cannot open directory '/etc/polkit-1/localauthority': Permission denied
ls: cannot open directory '/etc/ssl/private': Permission denied
ls: cannot open directory '/home/accepted/system-programming/ch06/jail': Permission denied
ls: cannot open directory '/lost+found': Permission denied
ls: cannot open directory '/proc/1/fd': Permission denied
ls: cannot open directory '/proc/1/fdinfo': Permission denied
ls: cannot open directory '/proc/1/map_files': Permission denied
ls: cannot open directory '/proc/1/ns': Permission denied
ls: cannot open directory '/proc/1/task/1/fd': Permission denied
ls: cannot open directory '/proc/1/task/1/fdinfo': Permission denied
ls: cannot open directory '/proc/1/task/1/ns': Permission denied
ls: cannot open directory '/proc/10/fd': Permission denied
ls: cannot open directory '/proc/10/fdinfo': Permission denied
```

3. 註解掉 (3) freopen("stderr.log", "w+", stderr);　　// 標準錯誤仍為螢幕

程式只會建立 stdout.log 且 ls / -R 輸出到標準錯誤的結果會直接呈現在螢幕上

```
accepted@ubuntu:~/system-programming/ch10/HW12$ ./a.out
******
```

```
accepted@ubuntu:~/system-programming/ch10/HW12$ ls
408410019.pdf  a.out  inotify  lovelyRon.c  stdout.log  watchFile.c
```

```
      1 /:
      2 bin
      3 boot
      4 cdrom
      5 dev
      6 etc
      7 home
      8 lib
      9 lib32
     10 lib64
     11 libx32
     12 lost+found
     13 media
     14 mnt
     15 opt
     16 proc
     17 root
     18 run
     19 sbin
     20 snap
     21 srv
     22 swapfile
"stdout.log" 1050992L, 16577602C
```

4. 註解掉 (6) signal(SIGHUP, SIG_IGN);   // 當 terminal 關閉會收到 SIGHUP 並

   執行 default 動作：終止該 terminal 執行的所有應用程式

   stdout.log 和 stderr.log 都不會被寫入內容，當 stdout（line buffer）和 stderr

   （no buffer）被重新導向為檔案輸出，因為檔案為 block device，所以 stdout 和

   stderr 都會轉為 full buffer 才會輸出至檔案，因此當程式收到 SIGHUP 後，要輸

   出的內容還在 buffer 中來不及被輸出至檔案，程式就終止執行，連帶著 ls / -R 也

   不會執行。(使用 fflush(fd); 每次都清空緩衝區，可以達到 no buffer 的效果)

```
accepted@ubuntu:~/system-programming/ch10/HW12$ ./a.out
```

```
accepted@ubuntu:~/system-programming/ch10/HW12$ cat stdout.log
accepted@ubuntu:~/system-programming/ch10/HW12$ cat stderr.log
```