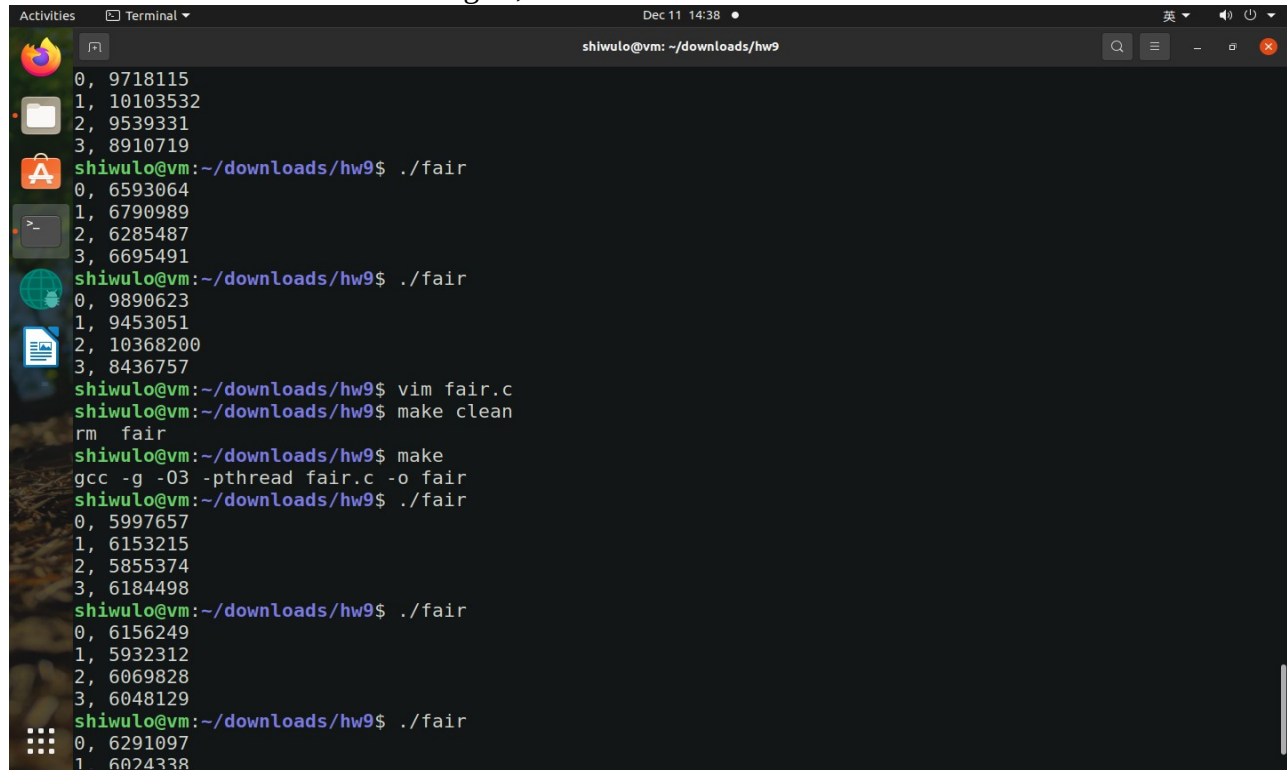


408410007 鄭 O 云

老師總共試了 3 種方法，我也試試看，以下是我的結果：

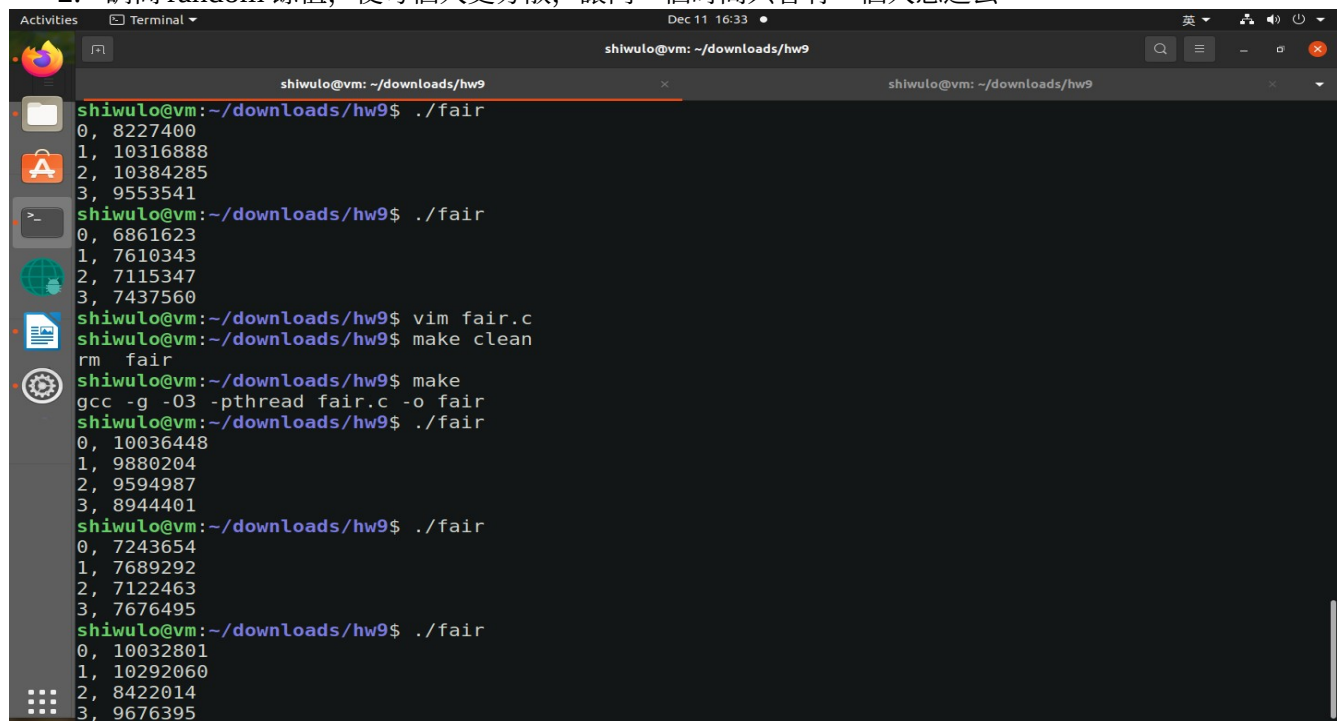
1. 讓 for 不被 O3 優化掉 => 加上 g++;



```
shiwulo@vm: ~/downloads/hw9
0, 9718115
1, 10103532
2, 9539331
3, 8910719
shiwulo@vm:~/downloads/hw9$ ./fair
0, 6593064
1, 6790989
2, 6285487
3, 6695491
shiwulo@vm:~/downloads/hw9$ ./fair
0, 9890623
1, 9453051
2, 10368200
3, 8436757
shiwulo@vm:~/downloads/hw9$ vim fair.c
shiwulo@vm:~/downloads/hw9$ make clean
rm fair
shiwulo@vm:~/downloads/hw9$ make
gcc -g -O3 -pthread fair.c -o fair
shiwulo@vm:~/downloads/hw9$ ./fair
0, 5997657
1, 6153215
2, 5855374
3, 6184498
shiwulo@vm:~/downloads/hw9$ ./fair
0, 6156249
1, 5932312
2, 6069828
3, 6048129
shiwulo@vm:~/downloads/hw9$ ./fair
0, 6291097
1, 6074338
```

實做：上面是 for 會被優化掉的結果，有差到 16 的；下面修改過 fair.c，在 for 裡加入 g++ 之後的結果，就相差的比較小了。

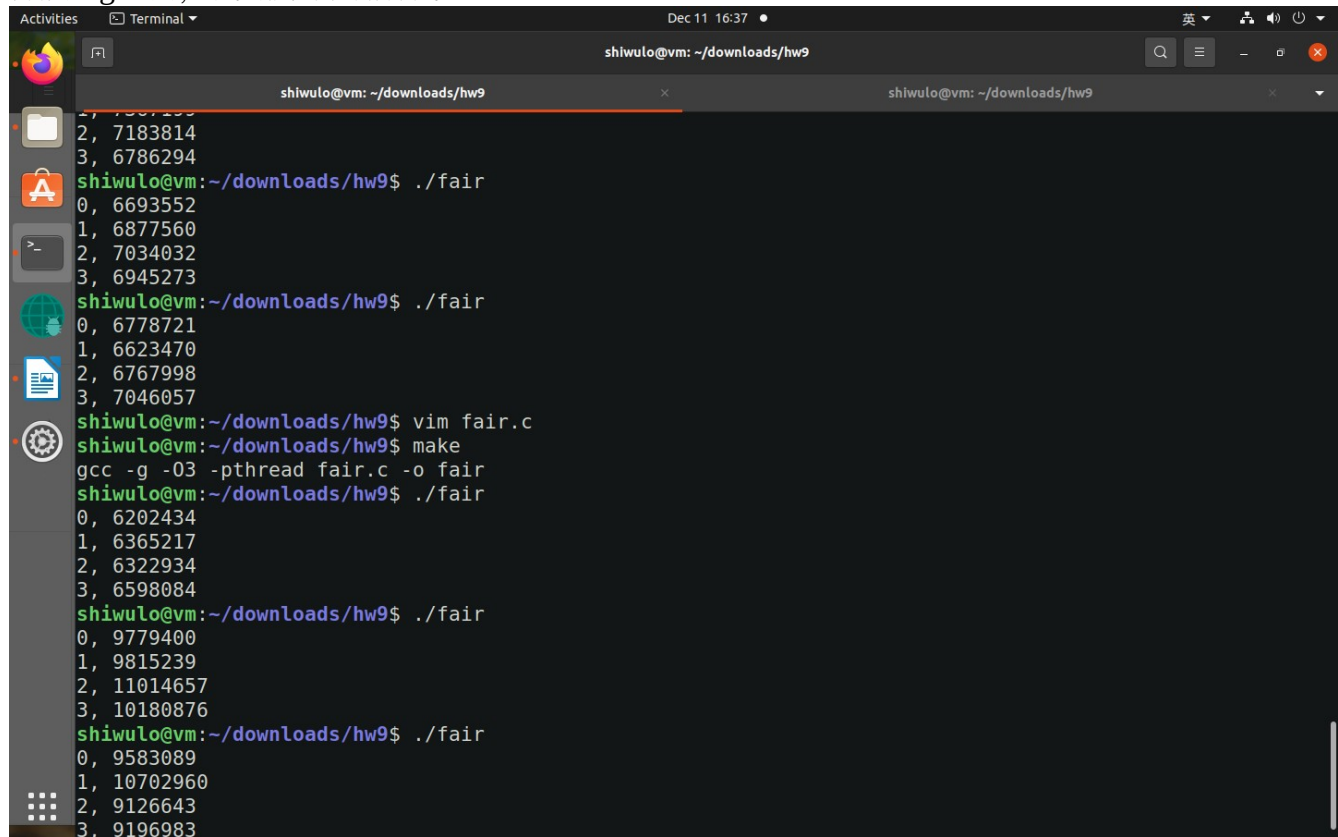
2. 調高 random 餘值，使每個人更分散，讓同一個時間只會有一個人想進去



```
shiwulo@vm: ~/downloads/hw9
shiwulo@vm:~/downloads/hw9$ ./fair
0, 8227400
1, 10316888
2, 10384285
3, 9553541
shiwulo@vm:~/downloads/hw9$ ./fair
0, 6861623
1, 7610343
2, 7115347
3, 7437560
shiwulo@vm:~/downloads/hw9$ vim fair.c
shiwulo@vm:~/downloads/hw9$ make clean
rm fair
shiwulo@vm:~/downloads/hw9$ make
gcc -g -O3 -pthread fair.c -o fair
shiwulo@vm:~/downloads/hw9$ ./fair
0, 10036448
1, 9880204
2, 9594987
3, 8944401
shiwulo@vm:~/downloads/hw9$ ./fair
0, 7243654
1, 7689292
2, 7122463
3, 7676495
shiwulo@vm:~/downloads/hw9$ ./fair
0, 10032801
1, 10292060
2, 8422014
3, 9676395
```

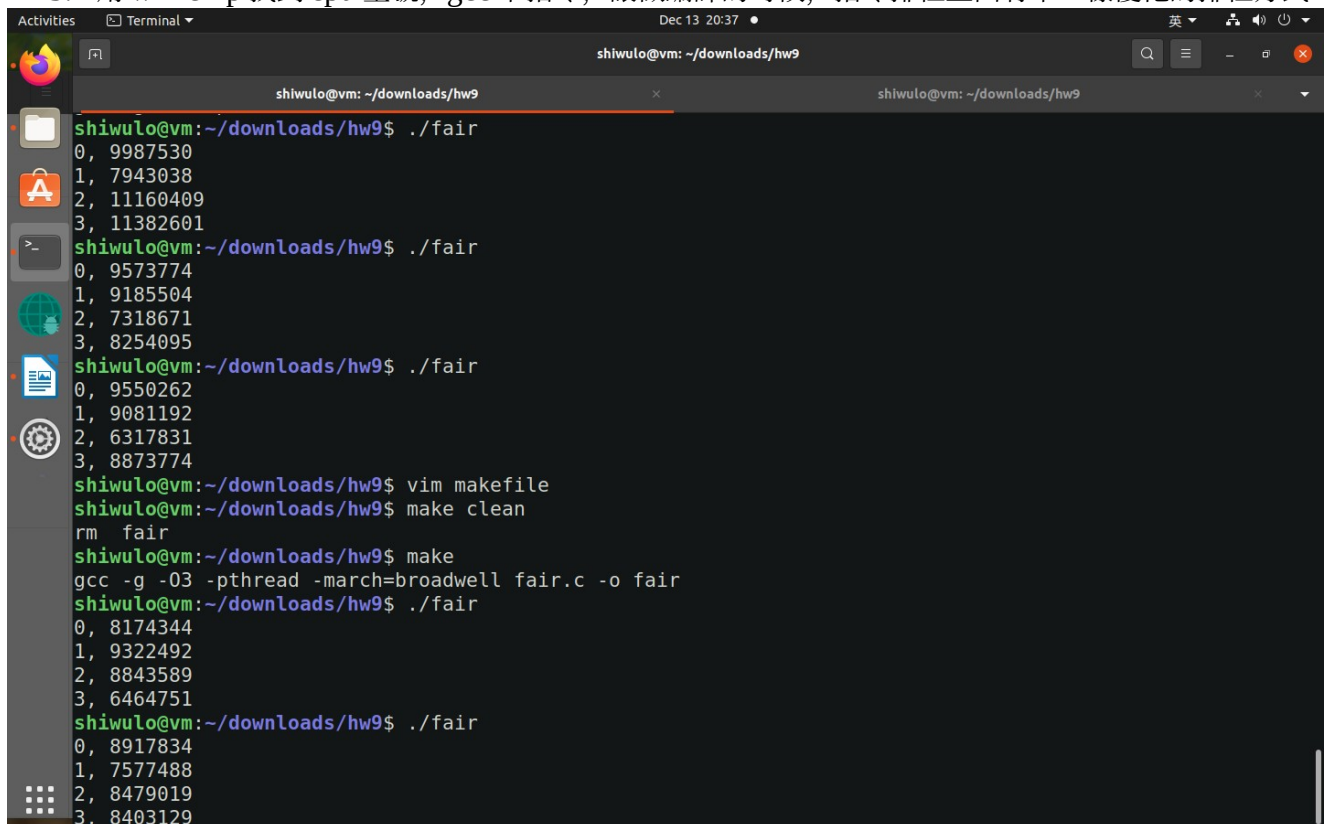
實做：其實我覺得只有些微的改變

再搭配 g++ 用，改變就更不明顯了。



```
shiwulo@vm: ~/downloads/hw9
2, 7183814
3, 6786294
shiwulo@vm:~/downloads/hw9$ ./fair
0, 6693552
1, 6877560
2, 7034032
3, 6945273
shiwulo@vm:~/downloads/hw9$ ./fair
0, 6778721
1, 6623470
2, 6767998
3, 7046057
shiwulo@vm:~/downloads/hw9$ vim fair.c
shiwulo@vm:~/downloads/hw9$ make
gcc -g -O3 -pthread fair.c -o fair
shiwulo@vm:~/downloads/hw9$ ./fair
0, 6202434
1, 6365217
2, 6322934
3, 6598084
shiwulo@vm:~/downloads/hw9$ ./fair
0, 9779400
1, 9815239
2, 11014657
3, 10180876
shiwulo@vm:~/downloads/hw9$ ./fair
0, 9583089
1, 10702960
2, 9126643
3, 9196983
```

3. 用 wikichip 找到 cpu 型號，gcc 下指令，讓做編譯的時候，指令排程上面有不一樣優化的排程方式



```
shiwulo@vm: ~/downloads/hw9$ ./fair
0, 9987530
1, 7943038
2, 11160409
3, 11382601
shiwulo@vm:~/downloads/hw9$ ./fair
0, 9573774
1, 9185504
2, 7318671
3, 8254095
shiwulo@vm:~/downloads/hw9$ ./fair
0, 9550262
1, 9081192
2, 6317831
3, 8873774
shiwulo@vm:~/downloads/hw9$ vim makefile
shiwulo@vm:~/downloads/hw9$ make clean
rm fair
shiwulo@vm:~/downloads/hw9$ make
gcc -g -O3 -pthread -march=broadwell fair.c -o fair
shiwulo@vm:~/downloads/hw9$ ./fair
0, 8174344
1, 9322492
2, 8843589
3, 6464751
shiwulo@vm:~/downloads/hw9$ ./fair
0, 8917834
1, 7577488
2, 8479019
3, 8403129
```

實做：我的 cpu 是 i5-5250U，在 wikichip 上找不到，在維基百科有找到這個是屬於 Broadwell-U 微架構，  
以下是連結：[https://zh.wikipedia.org/wiki/Intel\\_Core\\_i5%E8%99%95%E7%90%86%E5%99%A8%E5%88%97%E8%A1%A8](https://zh.wikipedia.org/wiki/Intel_Core_i5%E8%99%95%E7%90%86%E5%99%A8%E5%88%97%E8%A1%A8)

```
shiwulo@vm:~/downloads/hw9$ cat /proc/cpuinfo
processor      : 0
vendor_id     : GenuineIntel
cpu family    : 6
model         : 61
model name    : Intel(R) Core(TM) i5-5250U CPU @ 1.60GHz
stepping      : 4
cpu MHz       : 1600.000
cache size    : 3072 KB
```

所以下在 makefile 下指令加上 -march=broadwell，做編譯器優化支援，結果有比較公平。