2019 OS Project 1 – Report

Group 22

1. Design

We use main process to control time, and we sort the process according to their ready time. Once the process arrives, we fork a child process and record its start CPU time. Then we schedule processes by different policies. When the process ends, we record its end time, and print its information to the *dmesg*.

2. Result

Unit time test: 0.0022445352 s

FIFO_1

```
P1 28515
P2 28516
P3 28517
P4 28518
P5 28519
```

```
[Project1] 28515 1556647864.943425622 1556647866.151195745
[Project1] 28516 1556647864.943508455 1556647867.281811690
[Project1] 28517 1556647864.943601968 1556647868.562470269
[Project1] 28518 1556647864.943678457 1556647869.854213979
[Project1] 28519 1556647864.943755397 1556647871.177450110
```

FIFO_2

```
P1 28564
P2 28565
P3 28566
P4 28567
```

```
[Project1] 28564 1556648115.774510017 1556648132.842671992
[Project1] 28565 1556648116.088568977 1556648143.796210009
[Project1] 28566 1556648116.374624307 1556648146.300989375
[Project1] 28567 1556648116.598837891 1556648148.585036007
```

FIFO_3

```
P1 28597
P2 28598
P3 28599
P4 28600
P5 28601
P6 28602
P7 28603
```

```
[Project1] 28597 1556648210.774870495 1556648228.131755121
[Project1] 28598 1556648211.371497274 1556648238.972948211
[Project1] 28599 1556648211.591233354 1556648245.836661757
[Project1] 28600 1556648211.808788893 1556648248.385711855
[Project1] 28601 1556648212.026019773 1556648250.962165435
[Project1] 28602 1556648212.026053866 1556648253.492944527
[Project1] 28603 1556648212.243141066 1556648262.428187916
```

FIFO_4

```
P1 28652
P2 28653
P3 28654
P4 28655
```

```
[Project1] 28652 1556648331.471004987 1556648336.014382775
[Project1] 28653 1556648332.741774671 1556648337.317538613
[Project1] 28654 1556648332.741803279 1556648337.844633898
[Project1] 28655 1556648334.925518988 1556648339.032464436
```

FIFO_5

```
P1 28686
P2 28687
P3 28688
P4 28689
P5 28690
P6 28691
P7 28692
```

```
[Project1] 28686 1556648395.943112664 1556648413.401960202
[Project1] 28687 1556648396.540081461 1556648424.373780728
[Project1] 28688 1556648396.540112223 1556648431.554213886
[Project1] 28689 1556648396.968319783 1556648434.132419873
[Project1] 28690 1556648396.968353123 1556648436.332083454
[Project1] 28691 1556648397.413575422 1556648438.839827206
[Project1] 28692 1556648397.413609665 1556648448.487268408
```

RR_1

```
P1 28740
P2 28741
P3 28742
P4 28743
P5 28744
```

```
[Project1] 28740 1556648536.119795703 1556648537.408220828
[Project1] 28741 1556648536.119871106 1556648538.674282333
[Project1] 28742 1556648536.119941535 1556648539.883747271
[Project1] 28743 1556648536.120013355 1556648541.132921898
[Project1] 28744 1556648536.120086908 1556648542.395409988
```

RR_2

```
P1 28781
P2 28782
```

```
[Project1] 28782 1556648584.663575357 1556648586.837454420
[Project1] 28781 1556648584.663494438 1556648587.106349267
```

RR_3

```
P1 28802
P2 28803
P3 28804
P4 28805
P5 28806
P6 28807
```

```
[Project1] 28804 1556648658.469402403 1556648689.412634790
[Project1] 28802 1556648653.469567640 1556648693.770843277
[Project1] 28803 1556648655.978130167 1556648695.053519306
[Project1] 28807 1556648663.006350596 1556648711.989051178
[Project1] 28806 1556648661.773893766 1556648717.205223865
[Project1] 28805 1556648660.959584783 1556648719.799748567
```

RR_4

```
P1 28851
P2 28852
P3 28853
P4 28854
P5 28855
P6 28856
P7 28857
```

```
[Project1] 28854 1556648782.341771886 1556648793.196177169
[Project1] 28855 1556648782.563170054 1556648794.442396689
[Project1] 28856 1556648782.563209637 1556648795.715581002
[Project1] 28853 1556648782.131384044 1556648813.371127595
[Project1] 28857 1556648782.768837313 1556648821.540099557
[Project1] 28852 1556648781.910971576 1556648826.595517215
[Project1] 28851 1556648781.312208261 1556648834.190740619
```

RR_5

```
P1 28903
P2 28904
P3 28905
P4 28906
P5 28907
P6 28908
P7 28909
```

```
[Project1] 28906 1556648872.649864849 1556648883.302107249
[Project1] 28907 1556648872.649892060 1556648884.566760534
[Project1] 28908 1556648873.071353164 1556648885.879526962
[Project1] 28905 1556648872.225692427 1556648902.241099026
[Project1] 28909 1556648873.071384325 1556648910.077861098
[Project1] 28904 1556648872.225662024 1556648914.777055995
[Project1] 28903 1556648871.624299636 1556648921.691882293
```

SJF_1

```
P1 28956 [Project1] 28957 1556648984.048793103 1556648988.428447597
P2 28957 [Project1] 28958 1556648984.360730214 1556648990.929473010
P3 28958 [Project1] 28959 1556648984.646730125 1556648999.902281086
P4 28959 [Project1] 28956 1556648984.048723637 1556649015.582289965
```

SJF_2

```
P1 28989 [Project1] 28989 1556649060.305874310 1556649060.591950903
P2 28990 [Project1] 28996 1556649060.607877843 1556649061.106066929
P3 28996 [Project1] 28990 1556649060.305915347 1556649070.219709841
P4 28997 [Project1] 28997 1556649060.607905186 1556649079.218861067
P5 28998 [Project1] 28998 1556649060.607934039 1556649095.006511758
```

SJF_3

```
P1 29028 [Project1] 29028 1556649134.528916538 1556649140.860183722
P2 29029 [Project1] 29031 1556649134.815002657 1556649140.897949349
P3 29030 [Project1] 29032 1556649134.815039465 1556649140.945754945
P4 29031 [Project1] 29034 1556649135.227981320 1556649149.648602545
P5 29032 [Project1] 29033 1556649135.024676078 1556649158.938837586
P6 29033 [Project1] 29029 1556649134.528954621 1556649170.816426902
P7 29034 [Project1] 29030 1556649134.528986768 1556649186.167407088
P8 29035 [Project1] 29035 1556649135.442223977 1556649205.294229698
```

SJF_4

```
P1 29085 [Project1] 29085 1556649243.730062294 1556649250.163306726
P2 29086 [Project1] 29086 1556649245.987697444 1556649252.351362977
P3 29087 [Project1] 29087 1556649248.002743773 1556649261.756821150
P4 29098 [Project1] 29099 1556649259.604967050 1556649264.292291775
P5 29099 [Project1] 29098 1556649254.897553436 1556649268.968019679
```

SJF_5

```
P1 29128 [Project1] 29128 1556649308.969830225 1556649313.432448009
P2 29129 [Project1] 29131 1556649312.367912001 1556649314.663278768
P3 29130 [Project1] 29130 1556649311.302915242 1556649315.926395206
P4 29131 [Project1] 29129 1556649310.215064392 1556649317.216381918
```

PSJF_1

```
P1 29163 [Project1] 29166 1556649357.822421496 1556649358.446331169
P2 29164 [Project1] 29165 1556649357.595383609 1556649359.329535715
P3 29165 [Project1] 29164 1556649357.309360537 1556649360.876718203
P4 29166 [Project1] 29163 1556649356.993524173 1556649362.957032932
```

PSJF_2

```
P1 29197 [Project1] 29198 1556649413.724820983 1556649415.870116113
P2 29198 [Project1] 29197 1556649411.433746305 1556649420.563068941
P3 29204 [Project1] 29210 1556649423.113207652 1556649427.797862632
P4 29210 [Project1] 29216 1556649427.815845424 1556649430.277912176
P5 29216 [Project1] 29204 1556649415.891843829 1556649437.343533502
```

PSJF_3

```
P1 29236 [Project1] 29237 1556649478.571988896 1556649479.598069708
P2 29237 [Project1] 29243 1556649479.619851997 1556649480.902264283
P3 29243 [Project1] 29249 1556649480.915859671 1556649482.205404618
P4 29249 [Project1] 29236 1556649477.330405097 1556649486.122667740
```

PSJF_4

```
P1 29269 [Project1] 29271 1556649535.165834700 1556649537.382798958
P2 29270 [Project1] 29270 1556649534.852229241 1556649541.448887006
P3 29271 [Project1] 29272 1556649535.451899534 1556649550.359041075
P4 29272 [Project1] 29269 1556649534.852167590 1556649565.924293543
```

PSJF_5

```
P1 29303 [Project1] 29303 1556649591.777742960 1556649592.063791281
P2 29304 [Project1] 29311 1556649592.079887377 1556649592.600824448
P3 29311 [Project1] 29304 1556649591.777774509 1556649601.847541205
P4 29312 [Project1] 29312 1556649592.079925241 1556649610.765504587
P5 29313 [Project1] 29313 1556649592.079965445 1556649626.638345252
```

3. Discussion

I. When we are testing the average time unit of our machine, the number each time actually varies probably due to the cpu usage of other processes on the server. Hence, we have to take average to reduce the bias.

II. Test data RR_2.txt is applied with RR policy. We can see that theoretically it goes P1(500) → P2(400) → P1(100). In our experiment, the end time for P2 is 968.52 (time unit), and the end time for P1 is 1088.39 (time unit), which is very close to the theory.

```
RR
2
P1 0 600
P2 0 400
```

III. We can see that in SJF_3.txt the order of process termination is 1→4→5→7→6→2→3→8, which is the same as theory. And termination time of 1, 4, 5 is almost the same because the execution time of 4, 5 is just 10 time unit.

IV. In PSJF_3.txt, P1 would be preempted in 500 time unit, and it will wait until all the process terminates and then finish. The difference of the ending time of each two consecutive processes is approximately in ratio 1:1:3.

V. FIFO policy is the easiest one but the most fundamental to implement. We can use this as base to extend to other policies. It is really a good ice-breaking stuff to make this project.

4. Work division

R07922133 陳則彣：RR (v.1, v.2)

R07922108 陳鎰龍：kernel、FIFO、PSJF (v.2)

R07922098 廖經亞：Report、SJF (v.2)

B00902039 羅時炘：PSJF (v.1)

T07902135 唐宇新：SJF (v.1)

5. Reference

Linux kernel:

http://linux.vbird.org/linux_basic/0540kernel.php?fbclid=IwAR2aixb2Ogqw2XC4oflfOw1rnVc0ht57uCwtWXSYVzsbixgh7kPHrPybuC4

Linux system call:

https://linux.die.net/man/2/sched_setscheduler