

Design

FIFO : compare process ready time

```
for (int i = 0; i < nproc; i++)
{
    if (proc[i].pid == -1 || proc[i].t_exec == 0)
        continue;
    if (ret == -1 || proc[i].t_ready < proc[ret].t_ready)
        ret = i;
}
```

SJF & PSJF : compare execution time

```
for (int i = 0; i < nproc; i++)
{
    if (proc[i].pid == -1 || proc[i].t_exec == 0)
        continue;
    if (ret == -1 || proc[i].t_exec < proc[ret].t_exec)
        ret = i;
}
```

RR : giving each job a time slot or quantum (its allowance of CPU time), and interrupting the job if it is not completed by then.

```

if (running == -1)
{
    for (int i = 0; i < nproc; i++)
    {
        if (proc[i].pid != -1 && proc[i].t_exec > 0)
        {
            ret = i;
            break;
        }
    }
}
else if ((ntime - t_last) % 500 == 0)
{
    ret = (running + 1) % nproc;
    while (proc[ret].pid == -1 || proc[ret].t_exec == 0)
        ret = (ret + 1) % nproc;
}
else
    ret = running;

```

Test Data

FIFO_1 :

```

P1 29104
P2 29105
P3 29106
P4 29107
P5 29108

```

```

[708890.278340] [Project 1]29104 1558014848.312840341 1558014848.970134348
[708890.905401] [Project 1]29105 1558014848.313195724 1558014849.596881842
[708891.527383] [Project 1]29106 1558014848.313699002 1558014850.218553072
[708892.149265] [Project 1]29107 1558014848.313930018 1558014850.840123937
[708892.733616] [Project 1]29108 1558014848.316445912 1558014851.424182681

```

FIFO_2 :

```
$ sudo ./main <OS PJ1 Test/FIFO 2.txt
P1 29601
P2 29602
P3 29603
P4 29604
```

```
[714331.843279] [Project 1]29601 1558020191.279380447 1558020290.321140302
[714337.750774] [Project 1]29602 1558020195.584176660 1558020296.228634923
[714338.771194] [Project 1]29603 1558020195.688545443 1558020297.249054646
[714339.590543] [Project 1]29604 1558020195.812480363 1558020298.68404144
```

FIFO_3 :

```
$ sudo ./main <OS PJ1 Test/FIFO 3.txt
P1 29626
P2 29627
P3 29628
P4 29629
P5 29630
P6 29631
P7 29632
```

```
[714394.843994] [Project 1]29626 1558020343.376550245 1558020353.321854748
[714401.011532] [Project 1]29627 1558020347.756420847 1558020359.489393222
[714404.683420] [Project 1]29628 1558020347.868271696 1558020363.161280915
[714405.860036] [Project 1]29629 1558020347.992384095 1558020364.337897330
[714407.068500] [Project 1]29630 1558020348.119789427 1558020365.546360762
[714408.243241] [Project 1]29631 1558020348.147924250 1558020366.721101850
[714413.015644] [Project 1]29632 1558020348.251919898 1558020371.493504427
```

FIFO_4 :

```
$ sudo ./main <OS PJ1 Test/FIFO 4.txt
P1 29657
P2 29658
P3 29659
P4 29660
```

```
[714517.539213] [Project 1]29657 1558020473.528869531 1558020476.17071697
[714518.171860] [Project 1]29658 1558020476.17253757 1558020476.649720998
[714518.411923] [Project 1]29659 1558020476.19895112 1558020476.889784495
[714519.012454] [Project 1]29660 1558020476.30419908 1558020477.490314662
```

FIFO_5 :


```
$ sudo ./main <OS PJ1 Test/FIFO 5.txt
P1 29690
P2 29691
P3 29692
P4 29693
P5 29694
P6 29695
P7 29696
```

```
[714615.282266] [Project 1]29690 1558020563.819049114 1558020573.760126887
[714621.456779] [Project 1]29691 1558020568.174714851 1558020579.934640671
[714625.089467] [Project 1]29692 1558020568.175945805 1558020583.567327898
[714626.285641] [Project 1]29693 1558020568.420282796 1558020584.763501487
[714627.464456] [Project 1]29694 1558020568.464681941 1558020585.942317537
[714628.648030] [Project 1]29695 1558020568.699846229 1558020587.125890926
[714633.402926] [Project 1]29696 1558020568.703917937 1558020591.880787448
```

PSJF_1 :

```
$ sudo ./main <OS PJ1 Test/PSJF 1.txt
P4 29728
P3 29727
P2 29726
P1 29725
```

```
[714763.828930] [Project 1]29728 1558020718.612034009 1558020722.306790376
[714768.777540] [Project 1]29727 1558020717.363819915 1558020727.255400187
[714776.113759] [Project 1]29726 1558020716.147848340 1558020734.591620882
[714787.023565] [Project 1]29725 1558020714.904711762 1558020745.501426364
```

PSJF_2 :

```
$ sudo ./main <OS PJ1 Test/PSJF 2.txt
P2 29857
P1 29856
P4 29859
P5 29860
P3 29858
```

```
[714822.901616] [Project 1]29857 1558020780.152308326 1558020781.379477438
[714825.316054] [Project 1]29856 1558020778.912714819 1558020783.793914992
[714829.037492] [Project 1]29859 1558020785.68509115 1558020787.515352730
[714830.276216] [Project 1]29860 1558020787.528204952 1558020788.754076997
[714833.877767] [Project 1]29858 1558020783.794021648 1558020792.355628000
```

PSJF_3 :

```
$ sudo ./main <OS_PJ1_Test/PSJF_3.txt
P2 29881
P3 29882
P4 29883
P1 29880
```

```
[714907.097434] [Project 1]29881 1558020864.959777112 1558020865.575294107
[714907.723640] [Project 1]29882 1558020865.587820632 1558020866.201500853
[714908.346429] [Project 1]29883 1558020866.215771266 1558020866.824290754
[714910.150900] [Project 1]29880 1558020864.313357871 1558020868.628761324
```

PSJF_4 :

```
$ sudo ./main <OS_PJ1_Test/PSJF_4.txt
P3 29905
P2 29904
P4 29906
P1 29903
```

```
[714976.543921] [Project 1]29905 1558020933.791891982 1558020935.21782352
[714978.893938] [Project 1]29904 1558020933.627854447 1558020937.371798341
[714983.804308] [Project 1]29906 1558020937.371916316 1558020942.282169183
[714992.353655] [Project 1]29903 1558020933.623845643 1558020950.831515330
```

PSJF_5 :

```
$ sudo ./main <OS_PJ1_Test/PSJF_5.txt
P1 29929
P3 29931
P2 29930
P4 29932
P5 29933
```

```
[715057.211258] [Project 1]29929 1558021015.565232780 1558021015.689118840
[715057.500762] [Project 1]29931 1558021015.705372328 1558021015.978622775
[715062.475266] [Project 1]29930 1558021015.575756881 1558021020.953127381
[715067.365964] [Project 1]29932 1558021015.729813497 1558021025.843825988
[715075.926708] [Project 1]29933 1558021015.729867747 1558021034.404568954
```

RR_1 :


```
$ sudo ./main <OS PJ1 Test/RR 1.txt
P1 29954
P2 29955
P3 29956
P4 29957
P5 29958
```

```
[715137.569983] [Project 1]29954 1558021095.388726696 1558021096.47843832
[715138.194263] [Project 1]29955 1558021095.395929988 1558021096.672123336
[715138.815433] [Project 1]29956 1558021095.398191035 1558021097.293294369
[715139.424016] [Project 1]29957 1558021095.418930149 1558021097.901876780
[715140.030329] [Project 1]29958 1558021095.396227135 1558021098.508190099
```

RR_2 :

```
$ sudo ./main <OS PJ1 Test/RR 2.txt
P1 29982
P2 29983
```

```
[715242.993812] [Project 1]29982 1558021192.264357960 1558021201.471672571
[715244.873864] [Project 1]29983 1558021192.888502679 1558021203.351724968
```

RR_3 :

```
$ sudo ./main <OS PJ1 Test/RR 3.txt
P3 30006
P1 30004
P2 30005
P6 30009
P5 30008
P4 30007
```

```
[715354.011831] [Project 1]30006 1558021295.288264105 1558021312.489692862
[715354.600845] [Project 1]30004 1558021291.572268879 1558021313.78706351
[715355.212242] [Project 1]30005 1558021293.435795422 1558021313.690102996
[715366.253668] [Project 1]30009 1558021298.635832130 1558021324.731529218
[715368.696282] [Project 1]30008 1558021298.243906978 1558021327.174143419
[715369.808681] [Project 1]30007 1558021297.743781663 1558021328.286542118
```

RR_4 :

```
$ sudo ./main <OS PJ1 Test/RR 4.txt
P4 30035
P5 30036
P6 30037
P3 30034
P2 30033
P7 30038
P1 30032
```

```
[715417.054004] [Project 1]30035 1558021369.603791181 1558021375.531864129
[715419.498808] [Project 1]30036 1558021369.743854611 1558021377.976669352
[715421.938310] [Project 1]30037 1558021369.748472079 1558021380.416170833
[715426.289817] [Project 1]30034 1558021369.487021856 1558021384.767677725
[715433.024264] [Project 1]30033 1558021369.356467302 1558021391.502125749
[715436.555985] [Project 1]30038 1558021370.595849010 1558021395.33846415
[715438.445734] [Project 1]30032 1558021368.719515378 1558021396.923595300
```

RR_5 :

```
$ sudo ./main <OS PJ1 Test/RR 5.txt
P4 30062
P5 30063
P6 30064
P3 30061
P2 30060
P7 30065
P1 30059
```

```
[715481.600570] [Project 1]30062 1558021434.159835080 1558021440.78431350
[715484.031274] [Project 1]30063 1558021434.191846283 1558021442.509134818
[715486.481140] [Project 1]30064 1558021436.376230476 1558021444.959001159
[715490.770784] [Project 1]30061 1558021433.936302373 1558021449.248645397
[715497.484041] [Project 1]30060 1558021433.912285304 1558021455.961902006
[715501.077527] [Project 1]30065 1558021436.401468161 1558021459.555387235
[715502.856614] [Project 1]30059 1558021433.275921600 1558021461.334474237
```

SJF_1 :

```
$ sudo ./main <OS PJ1 Test/SJF 1.txt
P2 30086
P3 30087
P4 30088
P1 30085
```



```
[715552.082063] [Project 1]30086 1558021508.60469096 1558021510.559924486  
[715553.360405] [Project 1]30087 1558021510.564770976 1558021511.838266890  
[715558.285708] [Project 1]30088 1558021510.692025298 1558021516.763569297  
[715566.808716] [Project 1]30085 1558021508.60076905 1558021525.286577106
```

SJF_2 :

```
$ sudo ./main <OS_PJ1_Test/SJF_2.txt  
P1 30110  
P3 30112  
P2 30111  
P4 30113  
P5 30114
```

```
[715622.835689] [Project 1]30110 1558021581.186547945 1558021581.313549960  
[715623.107954] [Project 1]30112 1558021581.328090708 1558021581.585814842  
[715628.052039] [Project 1]30111 1558021581.211855452 1558021586.529900369  
[715632.978218] [Project 1]30113 1558021581.357961599 1558021591.456078661  
[715641.562719] [Project 1]30114 1558021581.355566874 1558021600.40579904
```

SJF_3 :

```
$ sudo ./main <OS_PJ1_Test/SJF_3.txt  
P1 30136  
P4 30139  
P5 30140  
P6 30141  
P7 30142  
P2 30137  
P3 30138  
P8 30143
```

```
[715694.347107] [Project 1]30136 1558021649.80840435 1558021652.824968145  
[715694.359835] [Project 1]30139 1558021652.825235291 1558021652.837695984  
[715694.372593] [Project 1]30140 1558021652.837814841 1558021652.850454022  
[715699.310020] [Project 1]30141 1558021652.850563981 1558021657.787880371  
[715704.241344] [Project 1]30142 1558021652.855816694 1558021662.719205360  
[715710.290708] [Project 1]30137 1558021649.75131208 1558021668.768569387  
[715718.773701] [Project 1]30138 1558021649.76173259 1558021677.251561923  
[715729.648165] [Project 1]30143 1558021652.860273256 1558021688.126026560
```

SJF_4 :


```
$ sudo ./main <OS PJ1 Test/SJF 4.txt
P1 30164
P2 30165
P3 30166
P5 30168
P4 30167
```

```
[715747.502316] [Project 1]30164 1558021702.258001277 1558021705.980176293
[715748.732979] [Project 1]30165 1558021705.980291846 1558021707.210840552
[715753.635496] [Project 1]30166 1558021705.984261291 1558021712.113356935
[715754.875700] [Project 1]30168 1558021712.123795508 1558021713.353561019
[715757.309277] [Project 1]30167 1558021712.113476532 1558021715.787138914
```

SJF_5 :

```
$ sudo ./main <OS PJ1 Test/SJF 5.txt
P1 30190
P2 30191
P3 30192
P4 30193
```

```
[715804.929240] [Project 1]30190 1558021760.922503995 1558021763.407099820
[715805.574809] [Project 1]30191 1558021763.407216370 1558021764.52670030
[715806.185661] [Project 1]30192 1558021763.412036533 1558021764.663522510
[715806.777778] [Project 1]30193 1558021763.424343312 1558021765.255638470
```

Conclusion

FIFO 輸出有可能會未按照順序，但 execution time、pid 是正確的，因為 qsort is unstable

CPU 有時會在特定情況下開啟 turbo boost，所以實際執行時間會有些許誤差

Contribution

R07922110 李洋漢：all