This process scheduler is capable of running on a specific Ubuntu virtual machine.

Example of using FCFS with 2 cpu processor:

```
vagrant@ubuntu-bionic:/vagrant$ ./os-sim 2
Time  Ru Re Wa      CPU 0     CPU 1        < I/O Queue <
===== == == ==    ======== ========    ==============
0.0   0  0  0      (IDLE)   (IDLE)       < <
0.1   0  1  0      (IDLE)   (IDLE)       < <
0.2   0  1  0      (IDLE)   (IDLE)       < <
0.3   0  1  0      (IDLE)   (IDLE)       < <
0.4   0  1  0      (IDLE)   (IDLE)       < <
0.5   0  1  0      (IDLE)   (IDLE)       < <
0.6   0  1  0      (IDLE)   (IDLE)       < <
0.7   0  1  0      (IDLE)   (IDLE)       < <
0.8   0  1  0      (IDLE)   (IDLE)       < <
0.9   0  1  0      (IDLE)   (IDLE)       < <
1.0   0  1  0      (IDLE)   (IDLE)       < <
1.1   0  2  0      (IDLE)   (IDLE)       < <
1.2   0  2  0      (IDLE)   (IDLE)       < <
1.3   0  2  0      (IDLE)   (IDLE)       < <
1.4   0  2  0      (IDLE)   (IDLE)       < <
1.5   0  2  0      (IDLE)   (IDLE)       < <
1.6   0  2  0      (IDLE)   (IDLE)       < <
1.7   0  2  0      (IDLE)   (IDLE)       < <
1.8   0  2  0      (IDLE)   (IDLE)       < <
1.9   1  1  0      (IDLE)   (IDLE)       < <
2.0   1  1  0      (IDLE)   (IDLE)       < <
2.1   1  2  0      (IDLE)   (IDLE)       < <
2.2   1  2  0      (IDLE)   (IDLE)       < <
2.3   1  2  0      (IDLE)   (IDLE)       < <
2.4   1  2  0      (IDLE)   (IDLE)       < <
2.5   1  2  0      (IDLE)   (IDLE)       < <
2.6   1  2  0      (IDLE)   (IDLE)       < <
2.7   1  2  0      Iapache  (IDLE)       < <
2.8   1  2  0      Iapache  (IDLE)       < <
2.9   1  2  0      Iapache  (IDLE)       < <
3.0   1  1  1      Ibash    (IDLE)       < Iapache <
3.1   1  2  1      Ibash    (IDLE)       < Iapache <
3.2   1  3  0      Ibash    (IDLE)       < <
3.3   1  3  0      Ibash    (IDLE)       < <
3.4   1  2  1      Imozilla (IDLE)       < Ibash <
3.5   1  2  1      Imozilla (IDLE)       < Ibash <
3.6   1  2  1      Imozilla (IDLE)       < Ibash <
3.7   1  2  1      Imozilla (IDLE)       < Ibash <
3.8   1  3  0      Imozilla (IDLE)       < <
3.9   1  3  0      Imozilla (IDLE)       < <
4.0   1  3  0      Imozilla (IDLE)       < <
4.1   1  3  1      Ccpu     (IDLE)       < Imozilla <
4.2   1  3  1      Ccpu     (IDLE)       < Imozilla <
4.3   1  3  1      Ccpu     (IDLE)       < Imozilla <
4.4   1  3  1      Ccpu     (IDLE)       < Imozilla <
4.5   1  3  1      Ccpu     (IDLE)       < Imozilla <
4.6   1  3  1      Ccpu     (IDLE)       < Imozilla <
4.7   1  3  1      Ccpu     (IDLE)       < Imozilla <
4.8   1  3  1      Ccpu     (IDLE)       < Imozilla <
```

```
05.1  1  3  1      Cspice   (IDLE)     < Csim <
65.2  1  3  1      Cspice   (IDLE)     < Csim <
65.3  1  3  1      Cspice   (IDLE)     < Csim <
65.4  1  3  1      Cspice   (IDLE)     < Csim <
65.5  1  4  0      Cspice   (IDLE)     < <
65.6  1  4  0      Cspice   (IDLE)     < <
65.7  1  4  0      Cspice   (IDLE)     < <
65.8  1  4  0      Cspice   (IDLE)     < <
65.9  1  3  0      Iapache  (IDLE)     < <
66.0  1  3  0      Iapache  (IDLE)     < <
66.1  1  3  0      Iapache  (IDLE)     < <
66.2  1  2  1      Cmysql   (IDLE)     < Iapache <
66.3  1  2  1      Cmysql   (IDLE)     < Iapache <
66.4  1  3  0      Cmysql   (IDLE)     < <
66.5  1  3  0      Cmysql   (IDLE)     < <
66.6  1  3  0      Cmysql   (IDLE)     < <
66.7  1  3  0      Cmysql   (IDLE)     < <
66.8  1  3  0      Cmysql   (IDLE)     < <
66.9  1  3  0      Cmysql   (IDLE)     < <
67.0  1  3  0      Cmysql   (IDLE)     < <
67.1  1  3  0      Cmysql   (IDLE)     < <
67.2  1  3  0      Cmysql   (IDLE)     < <
67.3  1  3  0      Cmysql   (IDLE)     < <
67.4  1  2  0      Ibash    (IDLE)     < <
67.5  1  2  0      Ibash    (IDLE)     < <
67.6  1  2  0      Ibash    (IDLE)     < <
67.7  1  1  1      Csim     (IDLE)     < Ibash <
67.8  1  1  1      Csim     (IDLE)     < Ibash <
67.9  1  1  1      Csim     (IDLE)     < Ibash <
68.0  1  1  1      Csim     (IDLE)     < Ibash <
68.1  1  1  1      Csim     (IDLE)     < Ibash <
68.2  1  1  1      Csim     (IDLE)     < Ibash <
68.3  2  0  0      Iapache  Ibash      < <
68.4  2  0  0      Iapache  Ibash      < <
68.5  1  0  1      Iapache  (IDLE)     < Ibash <
68.6  1  0  1      Iapache  (IDLE)     < Ibash <
68.7  0  0  2      (IDLE)   (IDLE)     < Ibash Iapache <
68.8  1  0  1      (IDLE)   Ibash      < Iapache <
68.9  1  0  1      (IDLE)   Ibash      < Iapache <
69.0  1  0  1      (IDLE)   Ibash      < Iapache <
69.1  1  0  1      (IDLE)   Ibash      < Iapache <
69.2  1  0  1      (IDLE)   Ibash      < Iapache <
69.3  0  0  1      (IDLE)   (IDLE)     < Iapache <
69.4  1  0  0      Iapache  (IDLE)     < <
69.5  1  0  0      Iapache  (IDLE)     < <
69.6  0  0  1      (IDLE)   (IDLE)     < Iapache <
69.7  0  0  1      (IDLE)   (IDLE)     < Iapache <
69.8  0  0  1      (IDLE)   (IDLE)     < Iapache <
69.9  0  0  1      (IDLE)   (IDLE)     < Iapache <
70.0  1  0  0      (IDLE)   Iapache    < <
70.1  1  0  0      (IDLE)   Iapache    < <
70.2  1  0  0      (IDLE)   Iapache    < <


Total Context Switches: 94
Total execution time: 70.3 s
Total time spent in READY state: 393.7 s
vagrant@ubuntu-bionic:/vagrant$
```

After all processes have finished running, the scheduler displays the statistics above so that programmers can compare the efficiency of different scheduling strategies and the effect of using more CPUs.

Example of using Round Robin with 8 CPUs with a 400ms timeslice:

```
vagrant@ubuntu-bionic:/vagrant$ ./os-sim 8 -r 4
Time Ru Re Wa   CPU 0    CPU 1    CPU 2    CPU 3    CPU 4    CPU 5    CPU 6    CPU 7    < I/O Queue <
===== == == ==  ======== ======== ======== ======== ======== ======== ======== ========  ==============
0.0  0 0 0      (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < <
0.1  1 0 0      (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   Iapache   < <
0.2  1 0 0      (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   Iapache   < <
0.3  1 0 0      (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   Iapache   < <
0.4  0 0 1      (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < Iapache <
0.5  0 0 1      (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < Iapache <
0.6  1 0 0      (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   Iapache  (IDLE)    < <
0.7  1 0 0      (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   Iapache  (IDLE)    < <
0.8  1 0 0      (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   Iapache  (IDLE)    < <
0.9  1 0 0      (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   Iapache  (IDLE)    < <
1.0  0 0 1      (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < Iapache <
1.1  1 0 1      (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   Ibash    (IDLE)   (IDLE)    < Iapache <
1.2  1 0 1      (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   Ibash    (IDLE)   (IDLE)    < Iapache <
1.3  1 0 1      (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   Ibash    (IDLE)   (IDLE)    < Iapache <
1.4  1 0 1      (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   Ibash    (IDLE)   (IDLE)    < Iapache <
1.5  1 0 1      (IDLE)   Iapache  (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < Ibash <
1.6  1 0 1      (IDLE)   Iapache  (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < Ibash <
1.7  0 0 2      (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < Ibash Iapache <
1.8  0 0 2      (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < Ibash Iapache <
1.9  0 0 2      (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < Ibash Iapache <
2.0  0 1 1      (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < Iapache <
2.1  0 2 1      (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < Iapache <
2.2  1 1 1      (IDLE)   (IDLE)   Ibash    (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < Iapache <
2.3  1 1 1      (IDLE)   (IDLE)   Ibash    (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < Iapache <
2.4  1 1 1      (IDLE)   (IDLE)   Ibash    (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < Iapache <
2.5  1 1 1      (IDLE)   (IDLE)   Imozilla (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < Ibash <
2.6  1 1 1      (IDLE)   (IDLE)   Imozilla (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < Ibash <
2.7  2 0 1      (IDLE)   (IDLE)   Imozilla Iapache (IDLE)   (IDLE)   (IDLE)   (IDLE)    < Ibash <
2.8  2 0 1      (IDLE)   (IDLE)   Imozilla Iapache (IDLE)   (IDLE)   (IDLE)   (IDLE)    < Ibash <
2.9  2 0 1      (IDLE)   (IDLE)   Imozilla Iapache (IDLE)   (IDLE)   (IDLE)   (IDLE)    < Ibash <
3.0  1 0 2      (IDLE)   (IDLE)   Imozilla (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < Ibash Iapache <
3.1  2 0 2      Ccpu     (IDLE)   Imozilla (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < Ibash Iapache <
3.2  2 0 2      Ccpu     (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   Ibash     < Iapache Imozilla <
3.3  2 0 2      Ccpu     (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   Ibash     < Iapache Imozilla <
3.4  1 0 3      Ccpu     (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < Iapache Imozilla Ibash <
3.5  2 0 2      (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   Iapache  Ccpu     (IDLE)    < Imozilla Ibash <
3.6  2 0 2      (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   Iapache  Ccpu     (IDLE)    < Imozilla Ibash <
3.7  2 0 2      (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   Iapache  Ccpu     (IDLE)    < Imozilla Ibash <
3.8  2 0 2      (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   Iapache  Ccpu     (IDLE)    < Imozilla Ibash <
3.9  1 0 3      (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   Ccpu     (IDLE)    < Imozilla Ibash Iapache <
4.0  0 0 4      (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < Imozilla Ibash Iapache Ccpu <
4.1  1 0 4      (IDLE)   (IDLE)   (IDLE)   (IDLE)   Cgcc     (IDLE)   (IDLE)   (IDLE)    < Imozilla Ibash Iapache Ccpu <
```

```
58.6  1 2 0      (IDLE)   (IDLE)   (IDLE)   Cspice   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < <
58.7  1 2 0      (IDLE)   (IDLE)   (IDLE)   Cspice   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < <
58.8  1 2 0      (IDLE)   (IDLE)   (IDLE)   Cspice   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < <
58.9  1 1 1      (IDLE)   (IDLE)   (IDLE)   Cmysql   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < Cspice <
59.0  1 2 0      (IDLE)   (IDLE)   (IDLE)   Cmysql   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < <
59.1  1 2 0      (IDLE)   (IDLE)   (IDLE)   Cmysql   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < <
59.2  1 2 0      (IDLE)   (IDLE)   (IDLE)   Cmysql   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < <
59.3  1 2 0      (IDLE)   (IDLE)   (IDLE)   Csim     (IDLE)   (IDLE)   (IDLE)   (IDLE)    < <
59.4  1 2 0      (IDLE)   (IDLE)   (IDLE)   Csim     (IDLE)   (IDLE)   (IDLE)   (IDLE)    < <
59.5  1 1 1      (IDLE)   (IDLE)   (IDLE)   Cspice   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < Csim <
59.6  1 1 1      (IDLE)   (IDLE)   (IDLE)   Cspice   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < Csim <
59.7  1 1 1      (IDLE)   (IDLE)   (IDLE)   Cspice   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < Csim <
59.8  1 1 1      (IDLE)   (IDLE)   (IDLE)   Cspice   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < Csim <
59.9  1 1 1      (IDLE)   (IDLE)   (IDLE)   Cmysql   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < Csim <
60.0  1 2 0      (IDLE)   (IDLE)   (IDLE)   Cmysql   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < <
60.1  1 2 0      (IDLE)   (IDLE)   (IDLE)   Cmysql   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < <
60.2  1 1 1      (IDLE)   (IDLE)   (IDLE)   Cspice   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < Cmysql <
60.3  1 2 0      (IDLE)   (IDLE)   (IDLE)   Cspice   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < <
60.4  1 2 0      (IDLE)   (IDLE)   (IDLE)   Cspice   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < <
60.5  1 2 0      (IDLE)   (IDLE)   (IDLE)   Cspice   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < <
60.6  1 2 0      (IDLE)   (IDLE)   (IDLE)   Csim     (IDLE)   (IDLE)   (IDLE)   (IDLE)    < <
60.7  1 2 0      (IDLE)   (IDLE)   (IDLE)   Csim     (IDLE)   (IDLE)   (IDLE)   (IDLE)    < <
60.8  1 2 0      (IDLE)   (IDLE)   (IDLE)   Csim     (IDLE)   (IDLE)   (IDLE)   (IDLE)    < <
60.9  1 2 0      (IDLE)   (IDLE)   (IDLE)   Csim     (IDLE)   (IDLE)   (IDLE)   (IDLE)    < <
61.0  1 2 0      (IDLE)   (IDLE)   (IDLE)   Cmysql   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < <
61.1  1 2 0      (IDLE)   (IDLE)   (IDLE)   Cmysql   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < <
61.2  1 2 0      (IDLE)   (IDLE)   (IDLE)   Cmysql   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < <
61.3  1 2 0      (IDLE)   (IDLE)   (IDLE)   Cmysql   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < <
61.4  1 2 0      (IDLE)   (IDLE)   (IDLE)   Cspice   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < <
61.5  1 1 0      (IDLE)   (IDLE)   (IDLE)   Csim     (IDLE)   (IDLE)   (IDLE)   (IDLE)    < <
61.6  1 1 0      (IDLE)   (IDLE)   (IDLE)   Csim     (IDLE)   (IDLE)   (IDLE)   (IDLE)    < <
61.7  1 0 0      (IDLE)   (IDLE)   (IDLE)   Cmysql   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < <
61.8  1 0 0      (IDLE)   (IDLE)   (IDLE)   Cmysql   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < <
61.9  1 0 0      (IDLE)   (IDLE)   (IDLE)   Cmysql   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < <
62.0  1 0 0      (IDLE)   (IDLE)   (IDLE)   Cmysql   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < <
62.1  1 0 0      (IDLE)   (IDLE)   (IDLE)   Cmysql   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < <
62.2  1 0 0      (IDLE)   (IDLE)   (IDLE)   Cmysql   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < <
62.3  1 0 0      (IDLE)   (IDLE)   (IDLE)   Cmysql   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < <
62.4  1 0 0      (IDLE)   (IDLE)   (IDLE)   Cmysql   (IDLE)   (IDLE)   (IDLE)   (IDLE)    < <


Total Context Switches: 226
Total execution time: 62.5 s
Total time spent in READY state: 228.1 s
vagrant@ubuntu-bionic:/vagrant$
```

The scheduler can use 2, 4, or 8 CPUs and can currently use FCFS or Round Robin scheduling strategies