

Exercise 2:

```
cpus: 1, uptime: 8000 load(x100): 189
1 sleep  init run: 1 wait: 12 sleep: 7987
2 sleep  init run: 1 wait: 1 sleep: 7986
3 sleep  init run: 0 wait: 1 sleep: 7986
5 sleep  sh run: 1 wait: 14 sleep: 7972
6 sleep  sh run: 1 wait: 0 sleep: 7985
7 sleep  sh run: 1 wait: 1 sleep: 7984
10 run    loop run: 4188 wait: 3384 sleep: 0
13 runble loop run: 3380 wait: 3381 sleep: 0
```

```
cpus: 1, uptime: 9000 load(x100): 192
1 sleep  init run: 1 wait: 12 sleep: 8987
2 sleep  init run: 1 wait: 1 sleep: 8986
3 sleep  init run: 0 wait: 1 sleep: 8986
5 sleep  sh run: 1 wait: 14 sleep: 8972
6 sleep  sh run: 1 wait: 0 sleep: 8985
7 sleep  sh run: 1 wait: 1 sleep: 8984
10 run    loop run: 4688 wait: 3884 sleep: 0
13 runble loop run: 3880 wait: 3881 sleep: 0
```

```
$ kill 13
zombie!
$
```

```
5 sleep  sh run: 2 wait: 17 sleep: 9968
6 sleep  sh run: 1 wait: 0 sleep: 9985
7 sleep  sh run: 1 wait: 1 sleep: 9984
10 run    loop run: 5492 wait: 4080 sleep: 0
```

```
cpus: 1, uptime: 11000 load(x100): 146
1 sleep  init run: 1 wait: 12 sleep: 10987
2 sleep  init run: 1 wait: 1 sleep: 10986
3 sleep  init run: 0 wait: 1 sleep: 10986
5 sleep  sh run: 2 wait: 17 sleep: 10968
6 sleep  sh run: 1 wait: 0 sleep: 10985
7 sleep  sh run: 1 wait: 1 sleep: 10984
10 run    loop run: 6492 wait: 4080 sleep: 0
```

```
cpus: 1, uptime: 12000 load(x100): 131
1 sleep  init run: 1 wait: 12 sleep: 11987
2 sleep  init run: 1 wait: 1 sleep: 11986
3 sleep  init run: 0 wait: 1 sleep: 11986
5 sleep  sh run: 2 wait: 17 sleep: 11968
6 sleep  sh run: 1 wait: 0 sleep: 11985
7 sleep  sh run: 1 wait: 1 sleep: 11984
10 run    loop run: 7492 wait: 4080 sleep: 0
```

Uptime 9000 corresponds to 11000 in hw3 doc

11000 corresponds to 13000 in hw3 doc

Exercise 3:

```

QEMU
Machine View
cpu0: starting 0
sh: size 1000 nblocks 941 minodes 200 nlog 30 logstart 2 isodestart 32 bmap star
t 50
init: starting sh
$ part3test
cpu0: 1, uptime: 1000 load(x100): 0
1 sleep  init run: 0 wait: 13 sleep: 987 cpux: 0
2 sleep  init run: 2 wait: 0 sleep: 986 cpux: 0
3 sleep  sh run: 0 wait: 12 sleep: 975 cpux: 0
4 sleep  init run: 0 wait: 1 sleep: 986 cpux: 0
0 sleep  part3test run: 306 wait: 6 sleep: 305 cpux: 17
6 sleep  sh run: 1 wait: 0 sleep: 985 cpux: 0
7 sleep  sh run: 2 wait: 1 sleep: 983 cpux: 0

cpu0: 1, uptime: 2000 load(x100): 0
1 sleep  init run: 0 wait: 13 sleep: 1987 cpux: 0
2 sleep  init run: 2 wait: 0 sleep: 1986 cpux: 0
3 sleep  sh run: 0 wait: 12 sleep: 1975 cpux: 0
4 sleep  init run: 0 wait: 1 sleep: 1986 cpux: 0
0 sleep  part3test run: 806 wait: 6 sleep: 805 cpux: 34
6 sleep  sh run: 1 wait: 0 sleep: 1985 cpux: 0
7 sleep  sh run: 2 wait: 1 sleep: 1983 cpux: 0

```

```

QEMU
Machine View
1 sleep  init run: 0 wait: 1 sleep: 1986 cpux: 0
0 sleep  part3test run: 806 wait: 6 sleep: 805 cpux: 34
6 sleep  sh run: 1 wait: 0 sleep: 1985 cpux: 0
7 sleep  sh run: 2 wait: 1 sleep: 1983 cpux: 0

cpu0: 1, uptime: 3000 load(x100): 0
1 sleep  init run: 0 wait: 13 sleep: 2987 cpux: 0
2 sleep  init run: 2 wait: 0 sleep: 2986 cpux: 0
3 sleep  sh run: 0 wait: 12 sleep: 2975 cpux: 0
4 sleep  init run: 0 wait: 1 sleep: 2986 cpux: 0
0 sleep  part3test run: 1306 wait: 6 sleep: 1305 cpux: 42
6 sleep  sh run: 1 wait: 0 sleep: 2985 cpux: 0
7 sleep  sh run: 2 wait: 1 sleep: 2983 cpux: 0

cpu0: 1, uptime: 4000 load(x100): 0
1 sleep  init run: 0 wait: 13 sleep: 3987 cpux: 0
2 sleep  init run: 2 wait: 0 sleep: 3986 cpux: 0
3 sleep  sh run: 0 wait: 12 sleep: 3975 cpux: 0
4 sleep  init run: 0 wait: 1 sleep: 3986 cpux: 0
0 sleep  part3test run: 1806 wait: 6 sleep: 1805 cpux: 46
6 sleep  sh run: 1 wait: 0 sleep: 3985 cpux: 0
7 sleep  sh run: 2 wait: 1 sleep: 3983 cpux: 0

```

```

QEMU
Machine View
1 sleep  init run: 0 wait: 1 sleep: 3986 cpux: 0
0 sleep  part3test run: 1806 wait: 6 sleep: 1805 cpux: 46
6 sleep  sh run: 1 wait: 0 sleep: 3985 cpux: 0
7 sleep  sh run: 2 wait: 1 sleep: 3983 cpux: 0

cpu0: 1, uptime: 5000 load(x100): 0
1 sleep  init run: 0 wait: 13 sleep: 4987 cpux: 0
2 sleep  init run: 2 wait: 0 sleep: 4986 cpux: 0
3 sleep  sh run: 0 wait: 12 sleep: 4975 cpux: 0
4 sleep  init run: 0 wait: 1 sleep: 4986 cpux: 0
0 sleep  part3test run: 2306 wait: 6 sleep: 2305 cpux: 48
6 sleep  sh run: 1 wait: 0 sleep: 4985 cpux: 0
7 sleep  sh run: 2 wait: 1 sleep: 4983 cpux: 0

cpu0: 1, uptime: 6000 load(x100): 0
1 sleep  init run: 0 wait: 13 sleep: 5987 cpux: 0
2 sleep  init run: 2 wait: 0 sleep: 5986 cpux: 0
3 sleep  sh run: 0 wait: 12 sleep: 5975 cpux: 0
4 sleep  init run: 0 wait: 1 sleep: 5986 cpux: 0
0 sleep  part3test run: 2806 wait: 6 sleep: 2805 cpux: 49
6 sleep  sh run: 1 wait: 0 sleep: 5985 cpux: 0
7 sleep  sh run: 2 wait: 1 sleep: 5983 cpux: 0

```

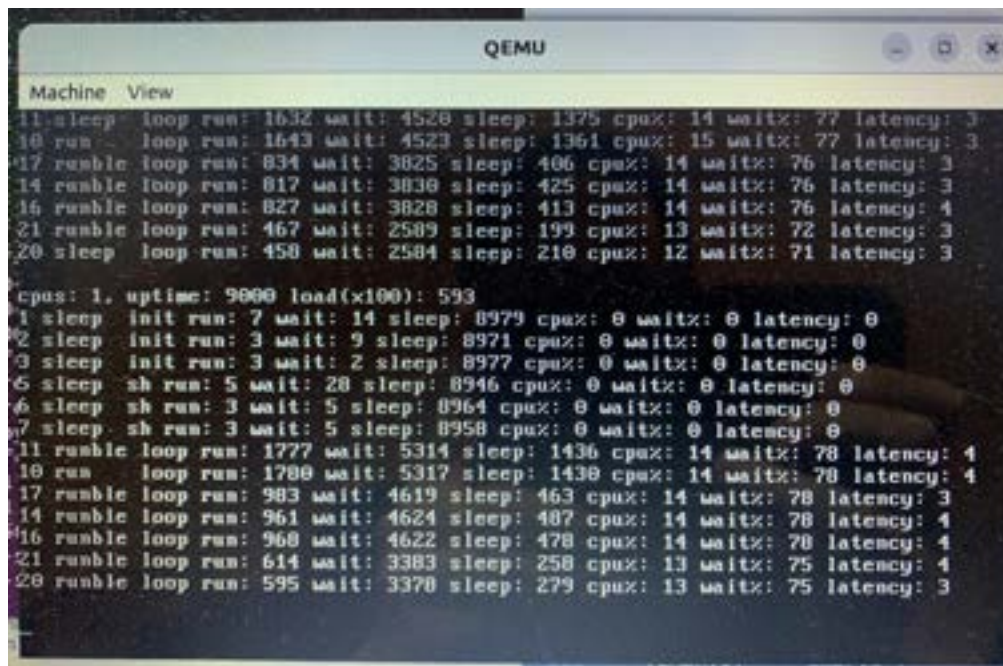
Exercise4:

```

cpus: 1, uptime: 14000, load(x100): 107, scheduler: roundrobin
1 sleep  init run: 1 wait: 12 sleep: 13987 cpux: 0 waitx: 0 latency: 0
2 sleep  init run: 1 wait: 1 sleep: 13986 cpux: 0 waitx: 0 latency: 0
3 sleep  init run: 0 wait: 3 sleep: 13984 cpux: 0 waitx: 0 latency: 0
8 sleep  part3test run: 6517 wait: 1786 sleep: 4853 cpux: 49 waitx: 13 latency: 0
5 sleep  sh run: 0 wait: 14 sleep: 13973 cpux: 0 waitx: 0 latency: 0
6 sleep  sh run: 1 wait: 0 sleep: 13985 cpux: 0 waitx: 0 latency: 0
7 sleep  sh run: 1 wait: 1 sleep: 13984 cpux: 0 waitx: 0 latency: 0
10 run    part3test run: 6536 wait: 1772 sleep: 4847 cpux: 50 waitx: 13 latency: 0

```

Exercise5:

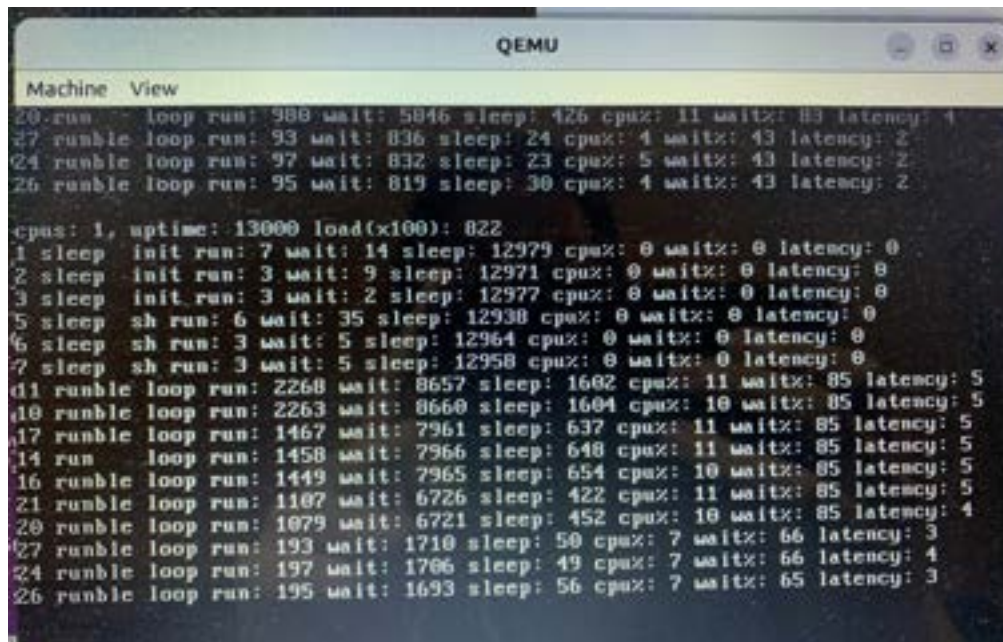


```

Machine View
11 sleep  loop run: 1632 wait: 4528 sleep: 1375 cpux: 14 waitx: 77 latency: 3
10 run    loop run: 1643 wait: 4523 sleep: 1361 cpux: 15 waitx: 77 latency: 3
17 runble loop run: 834 wait: 3825 sleep: 406 cpux: 14 waitx: 76 latency: 3
14 runble loop run: 817 wait: 3838 sleep: 425 cpux: 14 waitx: 76 latency: 3
16 runble loop run: 827 wait: 3828 sleep: 413 cpux: 14 waitx: 76 latency: 4
21 runble loop run: 467 wait: 2589 sleep: 199 cpux: 13 waitx: 72 latency: 3
20 sleep  loop run: 458 wait: 2584 sleep: 218 cpux: 12 waitx: 71 latency: 3

cpus: 1, uptime: 9600 load(x100): 593
1 sleep  init run: 7 wait: 14 sleep: 8979 cpux: 0 waitx: 0 latency: 0
2 sleep  init run: 3 wait: 9 sleep: 8971 cpux: 0 waitx: 0 latency: 0
3 sleep  init run: 3 wait: 2 sleep: 8977 cpux: 0 waitx: 0 latency: 0
5 sleep  sh run: 5 wait: 28 sleep: 8946 cpux: 0 waitx: 0 latency: 0
6 sleep  sh run: 3 wait: 5 sleep: 8964 cpux: 0 waitx: 0 latency: 0
7 sleep  sh run: 3 wait: 5 sleep: 8958 cpux: 0 waitx: 0 latency: 0
11 runble loop run: 1777 wait: 5314 sleep: 1436 cpux: 14 waitx: 78 latency: 4
10 run    loop run: 1788 wait: 5317 sleep: 1438 cpux: 14 waitx: 78 latency: 4
17 runble loop run: 983 wait: 4619 sleep: 463 cpux: 14 waitx: 78 latency: 3
14 runble loop run: 961 wait: 4624 sleep: 487 cpux: 14 waitx: 78 latency: 4
16 runble loop run: 968 wait: 4622 sleep: 478 cpux: 14 waitx: 78 latency: 4
21 runble loop run: 614 wait: 3383 sleep: 258 cpux: 13 waitx: 75 latency: 4
20 runble loop run: 595 wait: 3378 sleep: 279 cpux: 13 waitx: 75 latency: 3

```



```

Machine View
20 run    loop run: 988 wait: 5846 sleep: 426 cpux: 11 waitx: 83 latency: 4
17 runble loop run: 93 wait: 836 sleep: 24 cpux: 4 waitx: 43 latency: 2
24 runble loop run: 97 wait: 832 sleep: 23 cpux: 5 waitx: 43 latency: 2
26 runble loop run: 95 wait: 819 sleep: 30 cpux: 4 waitx: 43 latency: 2

cpus: 1, uptime: 13000 load(x100): 822
1 sleep  init run: 7 wait: 14 sleep: 12979 cpux: 0 waitx: 0 latency: 0
2 sleep  init run: 3 wait: 9 sleep: 12971 cpux: 0 waitx: 0 latency: 0
3 sleep  init run: 3 wait: 2 sleep: 12977 cpux: 0 waitx: 0 latency: 0
5 sleep  sh run: 6 wait: 35 sleep: 12938 cpux: 0 waitx: 0 latency: 0
6 sleep  sh run: 3 wait: 5 sleep: 12964 cpux: 0 waitx: 0 latency: 0
7 sleep  sh run: 3 wait: 5 sleep: 12958 cpux: 0 waitx: 0 latency: 0
11 runble loop run: 2268 wait: 8657 sleep: 1682 cpux: 11 waitx: 85 latency: 5
10 runble loop run: 2263 wait: 8660 sleep: 1604 cpux: 10 waitx: 85 latency: 5
17 runble loop run: 1467 wait: 7961 sleep: 637 cpux: 11 waitx: 85 latency: 5
14 run    loop run: 1458 wait: 7966 sleep: 648 cpux: 11 waitx: 85 latency: 5
16 runble loop run: 1449 wait: 7965 sleep: 654 cpux: 10 waitx: 85 latency: 5
21 runble loop run: 1187 wait: 6726 sleep: 422 cpux: 11 waitx: 85 latency: 5
20 runble loop run: 1079 wait: 6721 sleep: 452 cpux: 10 waitx: 85 latency: 4
27 runble loop run: 193 wait: 1718 sleep: 50 cpux: 7 waitx: 66 latency: 3
24 runble loop run: 197 wait: 1786 sleep: 49 cpux: 7 waitx: 66 latency: 4
26 runble loop run: 195 wait: 1693 sleep: 56 cpux: 7 waitx: 65 latency: 3

```

Exercise 6:

Changed quantum to 100:

```
part3test
cpus: 1, uptime: 4000, load(x100): 80, scheduler: roundrobin
1 sleep  init run: 2 wait: 1200 sleep: 2798 cpu%: 0 wait%: 7 latency: 0
2 sleep  init run: 0 wait: 1 sleep: 2798 cpu%: 0 wait%: 0 latency: 0
3 sleep  init run: 0 wait: 4 sleep: 2795 cpu%: 0 wait%: 0 latency: 0
8 runble part3test run: 11 wait: 1579 sleep: 10 cpu%: 0 wait%: 67 latency: 68
5 sleep  sh run: 1 wait: 1198 sleep: 1599 cpu%: 0 wait%: 18 latency: 28
6 sleep  sh run: 1 wait: 1 sleep: 2796 cpu%: 0 wait%: 0 latency: 0
7 sleep  sh run: 1 wait: 2 sleep: 2795 cpu%: 0 wait%: 0 latency: 0
```

Added check for idle cpu:

```
cpus: 1, uptime: 7000, load(x100): 0, scheduler: roundrobin
1 sleep  init run: 1 wait: 12 sleep: 6987 cpu%: 0 wait%: 0 latency: 0
2 sleep  init run: 1 wait: 1 sleep: 6986 cpu%: 0 wait%: 0 latency: 0
3 sleep  init run: 0 wait: 3 sleep: 6984 cpu%: 0 wait%: 0 latency: 0
5 sleep  sh run: 0 wait: 14 sleep: 6973 cpu%: 0 wait%: 0 latency: 0
6 sleep  sh run: 1 wait: 0 sleep: 6985 cpu%: 0 wait%: 0 latency: 0
7 sleep  sh run: 1 wait: 1 sleep: 6984 cpu%: 0 wait%: 0 latency: 0
10 sleep part3test run: 3244 wait: 6 sleep: 3243 cpu%: 49 wait%: 0 latency: 0
```

Running 2 processes:

```
cpus: 1, uptime: 14000, load(x100): 107, scheduler: roundrobin
1 sleep  init run: 1 wait: 12 sleep: 13987 cpu%: 0 wait%: 0 latency: 0
2 sleep  init run: 1 wait: 1 sleep: 13986 cpu%: 0 wait%: 0 latency: 0
3 sleep  init run: 0 wait: 3 sleep: 13984 cpu%: 0 wait%: 0 latency: 0
8 sleep  part3test run: 6517 wait: 1786 sleep: 4853 cpu%: 49 wait%: 13 latency: 0
0
5 sleep  sh run: 0 wait: 14 sleep: 13973 cpu%: 0 wait%: 0 latency: 0
6 sleep  sh run: 1 wait: 0 sleep: 13985 cpu%: 0 wait%: 0 latency: 0
7 sleep  sh run: 1 wait: 1 sleep: 13984 cpu%: 0 wait%: 0 latency: 0
10 run   part3test run: 6536 wait: 1772 sleep: 4847 cpu%: 50 wait%: 13 latency: 0
0
```

Exercise 7:

```
$ cpus: 1, uptime: 20000, load(x100): 215, scheduler: roundrobin
1 sleep  init run: 1 wait: 12 sleep: 19987 cpu%: 0 wait%: 0 latency: 0
2 sleep  init run: 1 wait: 1 sleep: 19986 cpu%: 0 wait%: 0 latency: 0
3 sleep  init run: 0 wait: 3 sleep: 19984 cpu%: 0 wait%: 0 latency: 0
5 sleep  sh run: 7 wait: 741 sleep: 19239 cpu%: 0 wait%: 0 latency: 0
6 sleep  sh run: 1 wait: 0 sleep: 19985 cpu%: 0 wait%: 0 latency: 0
7 sleep  sh run: 1 wait: 1 sleep: 19984 cpu%: 0 wait%: 0 latency: 0
10 run    infloop run: 9485 wait: 9724 sleep: 0 cpu%: 50 wait%: 49 latency: 0
12 runble infloop run: 9600 wait: 9603 sleep: 5 cpu%: 48 wait%: 51 latency: 0
```

```
$ cpus: 1, uptime: 20000, load(x100): 264, scheduler: highest wait% first
1 sleep  init run: 1 wait: 112 sleep: 19887 cpu%: 0 wait%: 0 latency: 0
2 sleep  init run: 0 wait: 89 sleep: 19800 cpu%: 0 wait%: 0 latency: 0
3 sleep  sh run: 1 wait: 7255 sleep: 12631 cpu%: 0 wait%: 35 latency: 0
4 sleep  init run: 0 wait: 101 sleep: 19699 cpu%: 0 wait%: 0 latency: 0
5 sleep  sh run: 1 wait: 100 sleep: 19699 cpu%: 0 wait%: 0 latency: 0
7 sleep  sh run: 1 wait: 100 sleep: 19599 cpu%: 0 wait%: 0 latency: 0
13 run    infloop run: 9331 wait: 9466 sleep: 0 cpu%: 51 wait%: 48 latency: 0
15 runble infloop run: 9266 wait: 9525 sleep: 5 cpu%: 48 wait%: 51 latency: 0
```

```
cpus: 1, uptime: 21000, load(x100): 200, scheduler: lowest CPU% first
1 sleep  init run: 1 wait: 12 sleep: 20987 cpu%: 0 wait%: 0 latency: 0
2 sleep  init run: 0 wait: 1 sleep: 20987 cpu%: 0 wait%: 0 latency: 0
3 sleep  init run: 1 wait: 0 sleep: 20986 cpu%: 0 wait%: 0 latency: 0
4 sleep  sh run: 4 wait: 548 sleep: 20435 cpu%: 0 wait%: 0 latency: 0
5 sleep  sh run: 1 wait: 1 sleep: 20985 cpu%: 0 wait%: 0 latency: 0
7 sleep  sh run: 2 wait: 1 sleep: 20983 cpu%: 0 wait%: 0 latency: 0
10 runble infloop run: 10115 wait: 10278 sleep: 0 cpu%: 48 wait%: 51 latency: 0
12 run    infloop run: 10149 wait: 10238 sleep: 5 cpu%: 51 wait%: 48 latency: 0
```