Mario Palacios
CSC 139 – Section 06
Homework #4

Test #1 (quantum = 2)

```
Script started on Thu 15 Apr 2021 12:47:49 AM PDT
[palacim@sp2:21]> a.out
Enter triples: Process id, Time in ms, and Priority. Enter 'end' when done
For example:
1 12 0
3 9 1
2 99 9
end
process 1 needs 12 ms and has priority 0 (highest)
process 3 needs 9 ms and has priority 1
process 2 needs 99 ms and has priority 9
1 2 3 □ □
2 1 2 □ □
6 9 10
end

Process list in FCFS order entered:
1 2 3
2 1 2
6 9 10
End of List
FCFS Wait of p1 = 0
FCFS Wait of p2 = 2
FCFS Wait of p6 = 3
Average Wait Time for 3 procs = 1.7
FCFS Turn-Around time for p1 = 2
FCFS Turn-Around time for p2 = 3
FCFS Turn-Around time for p6 = 12
Acerage Turn-Around for p3 procs = 5.7
FCFS throughput for 3 procs = 0.250000 proc/ms
<><> end FCFS Schedule <><>


Process list in HPF order:
2 1 2
1 2 3
6 9 10
End of Lsit.

HPF wait of p2 = 0
HPF wait of p1 = 1
HPF wait of p6 = 3
Average Wait Time for 3 procs = 1.333
HPF Turn-Around time for p2 = 1
HPF Turn-Around time for p1 = 3
HPF Turn-Around time for p6 = 12
Average Turn-Around for 3 procs = 5.3
HPF throughput for 3 procs = 0.250000 proc/ms
<><> End HPF Schedule <><>


Process list for Round Robin in order entered:
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```
1 2 3
2 1 2
6 9 10
End of List.

Preemptive RR schedule, quantum = 1 overhead = 0
RR TA for finished p1 = 2, needed: 2 ms, and 1 time slices.
RR TA for finished p2 = 2, needed: 1 ms, and 1 time slices.
RR TA for finished p6 = 11, needed: 9 ms, and 1 time slices.
Round Robin throughput, 3 procs, with q: 1, o: 0, is 0.272727 p/ms, or
272.727 p/us
Average Round Robin Turn-Around, 3 procs, with q: 1, o: 0, is 5.0

Preemptive RR schedule, quantum = 1 overhead = 1
RR TA for finished p1 = 3, needed: 2 ms, and 2 time slices.
RR TA for finished p2 = 2, needed: 1 ms, and 1 time slices.
RR TA for finished p6 = 14, needed: 9 ms, and 2 time slices.
Round Robin throughput, 3 procs, with q: 1, o: 1, is 0.214286 p/ms, or
214.286 p/us
Average Round Robin Turn-Around, 3 procs, with q: 1, o: 1, is 11.3

Preemptive RR schedule, quantum = 2 overhead = 0
RR TA for finished p1 = 3, needed: 2 ms, and 2 time slices.
RR TA for finished p2 = 2, needed: 1 ms, and 1 time slices.
RR TA for finished p6 = 17, needed: 9 ms, and 3 time slices.
Round Robin throughput, 3 procs, with q: 2, o: 0, is 0.176471 p/ms, or
176.471 p/us
Average Round Robin Turn-Around, 3 procs, with q: 2, o: 0, is 18.7

Preemptive RR schedule, quantum = 2 overhead = 1
RR TA for finished p1 = 3, needed: 2 ms, and 2 time slices.
RR TA for finished p2 = 2, needed: 1 ms, and 1 time slices.
RR TA for finished p6 = 20, needed: 9 ms, and 4 time slices.
Round Robin throughput, 3 procs, with q: 2, o: 1, is 0.150000 p/ms, or
150.000 p/us
Average Round Robin Turn-Around, 3 procs, with q: 2, o: 1, is 27.0

Preemptive RR schedule, quantum = 2 overhead = 2
RR TA for finished p1 = 3, needed: 2 ms, and 2 time slices.
RR TA for finished p2 = 2, needed: 1 ms, and 1 time slices.
RR TA for finished p6 = 24, needed: 9 ms, and 5 time slices.
Round Robin throughput, 3 procs, with q: 2, o: 2, is 0.125000 p/ms, or
125.000 p/us
Average Round Robin Turn-Around, 3 procs, with q: 2, o: 2, is 36.7
<><> End Preeptive Round Robin Schedule <><>

[palacim@sp2:22]> exit
exit

Script done on Thu 15 Apr 2021 12:48:17 AM PDT
```

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Test #2 (quantum = 1)

```
Script started on Thu 15 Apr 2021 01:01:30 AM PDT
[palacim@sp2:21]> gcc sched□□[Kduler.c
□[01m□[Kscheduler.c:18:16:□[m□[K □[01;35m□[Kwarning: □[m□[Karray
,Äò□[01m□[KrawInput□[m□[K,Äô assumed to have one element [enabled by
default]
 struct process rawInput[];
□[01;32m□[K                ^□[m□[K
[palacim@sp2:22]> a.out
Enter triples: Process id, Time in ms, and Priority. Enter 'end' when done
For example:
1 12 0
3 9 1
2 99 9
end
process 1 needs 12 ms and has priority 0 (highest)
process 3 needs 9 ms and has priority 1
process 2 needs 99 ms and has priority 9
5 9 2
10 1 7
1 2 3
eend□ □□ □□ □nd

Process list in FCFS order entered:
5 9 2
10 1 7
1 2 3
End of List
FCFS Wait of p5 = 0
FCFS Wait of p10 = 9
FCFS Wait of p1 = 10
Average Wait Time for 3 procs = 6.3
FCFS Turn-Around time for p5 = 9
FCFS Turn-Around time for p10 = 10
FCFS Turn-Around time for p1 = 12
Acerage Turn-Around for p3 procs = 10.3
FCFS throughput for 3 procs = 0.250000 proc/ms
<><> end FCFS Schedule <><>


Process list in HPF order:
5 9 2
1 2 3
10 1 7
End of Lsit.

HPF wait of p5 = 0
HPF wait of p1 = 9
HPF wait of p10 = 11
Average Wait Time for 3 procs = 6.667
HPF Turn-Around time for p5 = 9
HPF Turn-Around time for p1 = 11
HPF Turn-Around time for p10 = 12
```

```
Average Turn-Around for 3 procs = 10.7
HPF throughput for 3 procs = 0.250000 proc/ms
<><> End HPF Schedule <><>


Process list for Round Robin in order entered:
5 9 2
10 1 7
1 2 3
End of List.

Preemptive RR schedule, quantum = 1 overhead = 0
RR TA for finished p5 = 9, needed: 9 ms, and 1 time slices.
RR TA for finished p10 = 2, needed: 1 ms, and 1 time slices.
RR TA for finished p1 = 4, needed: 2 ms, and 1 time slices.
Round Robin throughput, 3 procs, with q: 1, o: 0, is 0.333333 p/ms, or
333.333 p/us
Average Round Robin Turn-Around, 3 procs, with q: 1, o: 0, is 5.0

Preemptive RR schedule, quantum = 1 overhead = 1
RR TA for finished p5 = 11, needed: 9 ms, and 2 time slices.
RR TA for finished p10 = 2, needed: 1 ms, and 1 time slices.
RR TA for finished p1 = 8, needed: 2 ms, and 2 time slices.
Round Robin throughput, 3 procs, with q: 1, o: 1, is 0.272727 p/ms, or
272.727 p/us
Average Round Robin Turn-Around, 3 procs, with q: 1, o: 1, is 12.0
<><> End Preeptive Round Robin Schedule <><>

[palacim@sp2:23]> exit
exit

Script done on Thu 15 Apr 2021 01:02:10 AM PDT
```

Test #3 (quantum = 5)

```
Script started on Thu 15 Apr 2021 12:56:38 AM PDT
[palacim@sp2:21]> gcc scheduler.c
□[01m□[Kscheduler.c:18:16:□[m□[K □[01;35m□[Kwarning: □[m□[Karray
,Äò□[01m□[KrawInput□[m□[K,Äô assumed to have one element [enabled by
default]
 struct process rawInput[];
□[01;32m□[K                ^□[m□[K
[palacim@sp2:22]> a.out
Enter triples: Process id, Time in ms, and Priority. Enter 'end' when done
For example:
1 12 0
3 9 1
2 99 9
end
process 1 needs 12 ms and has priority 0 (highest)
process 3 needs 9 ms and has priority 1
process 2 needs 99 ms and has priority 9
1 10 5
2 8 1
```

```
3 12 7
end

Process list in FCFS order entered:
1 10 5
2 8 1
3 12 7
End of List
FCFS Wait of p1 = 0
FCFS Wait of p2 = 10
FCFS Wait of p3 = 18
Average Wait Time for 3 procs = 9.3
FCFS Turn-Around time for p1 = 10
FCFS Turn-Around time for p2 = 18
FCFS Turn-Around time for p3 = 30
Acerage Turn-Around for p3 procs = 19.3
FCFS throughput for 3 procs = 0.100000 proc/ms
<><> end FCFS Schedule <><>


Process list in HPF order:
2 8 1
1 10 5
3 12 7
End of Lsit.

HPF wait of p2 = 0
HPF wait of p1 = 8
HPF wait of p3 = 18
Average Wait Time for 3 procs = 8.667
HPF Turn-Around time for p2 = 8
HPF Turn-Around time for p1 = 18
HPF Turn-Around time for p3 = 30
Average Turn-Around for 3 procs = 18.7
HPF throughput for 3 procs = 0.100000 proc/ms
<><> End HPF Schedule <><>


Process list for Round Robin in order entered:
1 10 5
2 8 1
3 12 7
End of List.

Preemptive RR schedule, quantum = 1 overhead = 0
RR TA for finished p1 = 10, needed: 10 ms, and 1 time slices.
RR TA for finished p2 = 9, needed: 8 ms, and 1 time slices.
RR TA for finished p3 = 14, needed: 12 ms, and 1 time slices.
Round Robin throughput, 3 procs, with q: 1, o: 0, is 0.214286 p/ms, or
214.286 p/us
Average Round Robin Turn-Around, 3 procs, with q: 1, o: 0, is 11.0

Preemptive RR schedule, quantum = 1 overhead = 1
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```
RR TA for finished p1 = 8, needed: 10 ms, and 2 time slices.
RR TA for finished p2 = 9, needed: 8 ms, and 2 time slices.
RR TA for finished p3 = 16, needed: 12 ms, and 2 time slices.
Round Robin throughput, 3 procs, with q: 1, o: 1, is 0.187500 p/ms, or
187.500 p/us
Average Round Robin Turn-Around, 3 procs, with q: 1, o: 1, is 22.0

Preemptive RR schedule, quantum = 2 overhead = 0
RR TA for finished p1 = 7, needed: 10 ms, and 3 time slices.
RR TA for finished p2 = 10, needed: 8 ms, and 3 time slices.
RR TA for finished p3 = 19, needed: 12 ms, and 3 time slices.
Round Robin throughput, 3 procs, with q: 2, o: 0, is 0.157895 p/ms, or
157.895 p/us
Average Round Robin Turn-Around, 3 procs, with q: 2, o: 0, is 34.0

Preemptive RR schedule, quantum = 2 overhead = 1
RR TA for finished p1 = 7, needed: 10 ms, and 4 time slices.
RR TA for finished p2 = 13, needed: 8 ms, and 4 time slices.
RR TA for finished p3 = 25, needed: 12 ms, and 4 time slices.
Round Robin throughput, 3 procs, with q: 2, o: 1, is 0.120000 p/ms, or
120.000 p/us
Average Round Robin Turn-Around, 3 procs, with q: 2, o: 1, is 49.0

Preemptive RR schedule, quantum = 2 overhead = 2
RR TA for finished p1 = 11, needed: 10 ms, and 5 time slices.
RR TA for finished p2 = 21, needed: 8 ms, and 5 time slices.
RR TA for finished p3 = 37, needed: 12 ms, and 5 time slices.
Round Robin throughput, 3 procs, with q: 2, o: 2, is 0.081081 p/ms, or
81.081 p/us
Average Round Robin Turn-Around, 3 procs, with q: 2, o: 2, is 72.0

Preemptive RR schedule, quantum = 3 overhead = 0
RR TA for finished p1 = 22, needed: 10 ms, and 6 time slices.
RR TA for finished p2 = 21, needed: 8 ms, and 5 time slices.
RR TA for finished p3 = 51, needed: 12 ms, and 6 time slices.
Round Robin throughput, 3 procs, with q: 3, o: 0, is 0.058824 p/ms, or
58.824 p/us
Average Round Robin Turn-Around, 3 procs, with q: 3, o: 0, is 103.3

Preemptive RR schedule, quantum = 3 overhead = 1
RR TA for finished p1 = 22, needed: 10 ms, and 6 time slices.
RR TA for finished p2 = 21, needed: 8 ms, and 5 time slices.
RR TA for finished p3 = 63, needed: 12 ms, and 7 time slices.
Round Robin throughput, 3 procs, with q: 3, o: 1, is 0.047619 p/ms, or
47.619 p/us
Average Round Robin Turn-Around, 3 procs, with q: 3, o: 1, is 138.7

Preemptive RR schedule, quantum = 3 overhead = 2
RR TA for finished p1 = 22, needed: 10 ms, and 6 time slices.
RR TA for finished p2 = 21, needed: 8 ms, and 5 time slices.
RR TA for finished p3 = 63, needed: 12 ms, and 7 time slices.
Round Robin throughput, 3 procs, with q: 3, o: 2, is 0.047619 p/ms, or
47.619 p/us
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Average Round Robin Turn-Around, 3 procs, with q: 3, o: 2, is 174.0

Preemptive RR schedule, quantum = 3 overhead = 3
RR TA for finished p1 = 22, needed: 10 ms, and 6 time slices.
RR TA for finished p2 = 21, needed: 8 ms, and 5 time slices.
RR TA for finished p3 = 63, needed: 12 ms, and 7 time slices.
Round Robin throughput, 3 procs, with q: 3, o: 3, is 0.047619 p/ms, or
47.619 p/us
Average Round Robin Turn-Around, 3 procs, with q: 3, o: 3, is 209.3

Preemptive RR schedule, quantum = 4 overhead = 0
RR TA for finished p1 = 22, needed: 10 ms, and 6 time slices.
RR TA for finished p2 = 21, needed: 8 ms, and 5 time slices.
RR TA for finished p3 = 63, needed: 12 ms, and 7 time slices.
Round Robin throughput, 3 procs, with q: 4, o: 0, is 0.047619 p/ms, or
47.619 p/us
Average Round Robin Turn-Around, 3 procs, with q: 4, o: 0, is 244.7

Preemptive RR schedule, quantum = 4 overhead = 1
RR TA for finished p1 = 22, needed: 10 ms, and 6 time slices.
RR TA for finished p2 = 21, needed: 8 ms, and 5 time slices.
RR TA for finished p3 = 63, needed: 12 ms, and 7 time slices.
Round Robin throughput, 3 procs, with q: 4, o: 1, is 0.047619 p/ms, or
47.619 p/us
Average Round Robin Turn-Around, 3 procs, with q: 4, o: 1, is 280.0

Preemptive RR schedule, quantum = 4 overhead = 2
RR TA for finished p1 = 22, needed: 10 ms, and 6 time slices.
RR TA for finished p2 = 21, needed: 8 ms, and 5 time slices.
RR TA for finished p3 = 63, needed: 12 ms, and 7 time slices.
Round Robin throughput, 3 procs, with q: 4, o: 2, is 0.047619 p/ms, or
47.619 p/us
Average Round Robin Turn-Around, 3 procs, with q: 4, o: 2, is 315.3

Preemptive RR schedule, quantum = 4 overhead = 3
RR TA for finished p1 = 22, needed: 10 ms, and 6 time slices.
RR TA for finished p2 = 21, needed: 8 ms, and 5 time slices.
RR TA for finished p3 = 63, needed: 12 ms, and 7 time slices.
Round Robin throughput, 3 procs, with q: 4, o: 3, is 0.047619 p/ms, or
47.619 p/us
Average Round Robin Turn-Around, 3 procs, with q: 4, o: 3, is 350.7

Preemptive RR schedule, quantum = 4 overhead = 4
RR TA for finished p1 = 22, needed: 10 ms, and 6 time slices.
RR TA for finished p2 = 21, needed: 8 ms, and 5 time slices.
RR TA for finished p3 = 63, needed: 12 ms, and 7 time slices.
Round Robin throughput, 3 procs, with q: 4, o: 4, is 0.047619 p/ms, or
47.619 p/us
Average Round Robin Turn-Around, 3 procs, with q: 4, o: 4, is 386.0

Preemptive RR schedule, quantum = 5 overhead = 0
RR TA for finished p1 = 22, needed: 10 ms, and 6 time slices.
RR TA for finished p2 = 21, needed: 8 ms, and 5 time slices.
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RR TA for finished p3 = 63, needed: 12 ms, and 7 time slices.
Round Robin throughput, 3 procs, with q: 5, o: 0, is 0.047619 p/ms, or
47.619 p/us
Average Round Robin Turn-Around, 3 procs, with q: 5, o: 0, is 421.3

Preemptive RR schedule, quantum = 5 overhead = 1
RR TA for finished p1 = 22, needed: 10 ms, and 6 time slices.
RR TA for finished p2 = 21, needed: 8 ms, and 5 time slices.
RR TA for finished p3 = 63, needed: 12 ms, and 7 time slices.
Round Robin throughput, 3 procs, with q: 5, o: 1, is 0.047619 p/ms, or
47.619 p/us
Average Round Robin Turn-Around, 3 procs, with q: 5, o: 1, is 456.7

Preemptive RR schedule, quantum = 5 overhead = 2
RR TA for finished p1 = 22, needed: 10 ms, and 6 time slices.
RR TA for finished p2 = 21, needed: 8 ms, and 5 time slices.
RR TA for finished p3 = 63, needed: 12 ms, and 7 time slices.
Round Robin throughput, 3 procs, with q: 5, o: 2, is 0.047619 p/ms, or
47.619 p/us
Average Round Robin Turn-Around, 3 procs, with q: 5, o: 2, is 492.0

Preemptive RR schedule, quantum = 5 overhead = 3
RR TA for finished p1 = 22, needed: 10 ms, and 6 time slices.
RR TA for finished p2 = 21, needed: 8 ms, and 5 time slices.
RR TA for finished p3 = 63, needed: 12 ms, and 7 time slices.
Round Robin throughput, 3 procs, with q: 5, o: 3, is 0.047619 p/ms, or
47.619 p/us
Average Round Robin Turn-Around, 3 procs, with q: 5, o: 3, is 527.3

Preemptive RR schedule, quantum = 5 overhead = 4
RR TA for finished p1 = 22, needed: 10 ms, and 6 time slices.
RR TA for finished p2 = 21, needed: 8 ms, and 5 time slices.
RR TA for finished p3 = 63, needed: 12 ms, and 7 time slices.
Round Robin throughput, 3 procs, with q: 5, o: 4, is 0.047619 p/ms, or
47.619 p/us
Average Round Robin Turn-Around, 3 procs, with q: 5, o: 4, is 562.7

Preemptive RR schedule, quantum = 5 overhead = 5
RR TA for finished p1 = 22, needed: 10 ms, and 6 time slices.
RR TA for finished p2 = 21, needed: 8 ms, and 5 time slices.
RR TA for finished p3 = 63, needed: 12 ms, and 7 time slices.
Round Robin throughput, 3 procs, with q: 5, o: 5, is 0.047619 p/ms, or
47.619 p/us
Average Round Robin Turn-Around, 3 procs, with q: 5, o: 5, is 598.0
<><> End Preeptive Round Robin Schedule <><>

[palacim@sp2:23]> exit
exit

Script done on Thu 15 Apr 2021 12:57:04 AM PDT
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Discussion:
Output show that with more burst time in the RR the higher the turnaround becomes. Turn around is the time it takes for submission to completion. Also for non-preemptive the average turn around was the same for both hpf and fcfs, but for RR it would increase for higher quantums.