



سیستم‌های عامل تمرین‌های سری دوم

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۱۲ اردیبهشت ۱۳۹۸

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۱ زمان‌بندی

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زمان پاسخ‌دهی (response time) و زمان چرخش (turnaround time) را هنگام اجرای ۳ کار با طول ۲۰۰ با الگوریتم‌های زمان‌بندی SJF و FIFO محاسبه کنید.

پاسخ.

```
ali@DESKTOP:~$ python2.7 scheduler.py -p FIFO -l 200,200,200
ARG policy FIFO
ARG jlist 200,200,200
```

Here is the job list, with the run time of each job:

```
Job 0 ( length = 200.0 )
Job 1 ( length = 200.0 )
```

```
Job 2 ( length = 200.0 )
```

Compute the turnaround time, response time, and wait time for each job. When you are done, run this program again, with the same arguments, but with -c, which will thus provide you with the answers. You can use -s <somenumber> or your own job list (-l 10,15,20 for example) to generate different problems for yourself.

الگوریتم FIFO:

```
response time: 200
turnaround time: 400
```

```
ali@DESKTOP:~$ python2.7 scheduler.py -p SJF -l 200,200,200
ARG policy SJF
ARG jlist 200,200,200
```

Here is the job list, with the run time of each job:

```
Job 0 ( length = 200.0 )
Job 1 ( length = 200.0 )
Job 2 ( length = 200.0 )
```

Compute the turnaround time, response time, and wait time for each job. When you are done, run this program again, with the same arguments, but with -c, which will thus provide you with the answers. You can use -s <somenumber> or your own job list (-l 10,15,20 for example) to generate different problems for yourself.

الگوریتم SJF:

```
response time: 200
turnaround time: 400
```

```
ali@DESKTOP:~$ python2.7 scheduler.py -c -p FIFO -l 200,200,200
ARG policy FIFO
ARG jlist 200,200,200
```

Here is the job list, with the run time of each job:

```
Job 0 ( length = 200.0 )
Job 1 ( length = 200.0 )
Job 2 ( length = 200.0 )
```

**** Solutions ****

Execution trace:

```
[ time 0 ] Run job 0 for 200.00 secs ( DONE at 200.00 )
[ time 200 ] Run job 1 for 200.00 secs ( DONE at 400.00 )
[ time 400 ] Run job 2 for 200.00 secs ( DONE at 600.00 )
```

Final statistics:

```
Job 0 -- Response: 0.00 Turnaround 200.00 Wait 0.00
Job 1 -- Response: 200.00 Turnaround 400.00 Wait 200.00
Job 2 -- Response: 400.00 Turnaround 600.00 Wait 400.00

Average -- Response: 200.00 Turnaround 400.00 Wait 200.00
```

```
ali@DESKTOP:~$ python2.7 scheduler.py -c -p SJF -l 200,200,200
ARG policy SJF
ARG jlist 200,200,200
```

Here is the job list, with the run time of each job:

```

Job 0 ( length = 200.0 )
Job 1 ( length = 200.0 )
Job 2 ( length = 200.0 )

** Solutions **

Execution trace:
[ time 0 ] Run job 0 for 200.00 secs ( DONE at 200.00 )
[ time 200 ] Run job 1 for 200.00 secs ( DONE at 400.00 )
[ time 400 ] Run job 2 for 200.00 secs ( DONE at 600.00 )

Final statistics:
Job 0 -- Response: 0.00 Turnaround 200.00 Wait 0.00
Job 1 -- Response: 200.00 Turnaround 400.00 Wait 200.00
Job 2 -- Response: 400.00 Turnaround 600.00 Wait 400.00

Average -- Response: 200.00 Turnaround 400.00 Wait 200.00

```

۲.۱

حال کار مشابهی را انجام دهید اما با کارهایی با طول‌های: ۱۰۰، ۲۰۰ و ۳۰۰.

پاسخ.

```

ali@DESKTOP:~$ python2.7 scheduler.py -p FIFO -l 100,200,300
ARG policy FIFO
ARG jlist 100,200,300

Here is the job list, with the run time of each job:
Job 0 ( length = 100.0 )
Job 1 ( length = 200.0 )
Job 2 ( length = 300.0 )

Compute the turnaround time, response time, and wait time for each job.
When you are done, run this program again, with the same arguments,
but with -c, which will thus provide you with the answers. You can use
-s <somenumber> or your own job list (-l 10,15,20 for example)
to generate different problems for yourself.

```

الگوریتم FIFO:

response time: 166.6
turnaround time: 366.6

```

ali@DESKTOP:~$ python2.7 scheduler.py -p SJF -l 100,200,300
ARG policy SJF
ARG jlist 100,200,300

Here is the job list, with the run time of each job:
Job 0 ( length = 100.0 )
Job 1 ( length = 200.0 )
Job 2 ( length = 300.0 )

Compute the turnaround time, response time, and wait time for each job.
When you are done, run this program again, with the same arguments,
but with -c, which will thus provide you with the answers. You can use

```

```
-s <somenumber> or your own job list (-l 10,15,20 for example)
to generate different problems for yourself.
```

الگوریتم SJF:

response time: 133.3
turnaround time: 333.3

```
ali@DESKTOP:~$ python2.7 scheduler.py -c -p FIFO -l 100,200,300
ARG policy FIFO
ARG jlist 100,200,300
```

Here is the job list, with the run time of each job:

```
Job 0 ( length = 100.0 )
Job 1 ( length = 200.0 )
Job 2 ( length = 300.0 )
```

**** Solutions ****

Execution trace:

```
[ time 0 ] Run job 0 for 100.00 secs ( DONE at 100.00 )
[ time 100 ] Run job 1 for 200.00 secs ( DONE at 300.00 )
[ time 300 ] Run job 2 for 300.00 secs ( DONE at 600.00 )
```

Final statistics:

```
Job 0 -- Response: 0.00 Turnaround 100.00 Wait 0.00
Job 1 -- Response: 100.00 Turnaround 300.00 Wait 100.00
Job 2 -- Response: 300.00 Turnaround 600.00 Wait 300.00

Average -- Response: 133.33 Turnaround 333.33 Wait 133.33
```

```
ali@DESKTOP:~$ python2.7 scheduler.py -c -p SJF -l 100,200,300
ARG policy SJF
ARG jlist 100,200,300
```

Here is the job list, with the run time of each job:

```
Job 0 ( length = 100.0 )
Job 1 ( length = 200.0 )
Job 2 ( length = 300.0 )
```

**** Solutions ****

Execution trace:

```
[ time 0 ] Run job 0 for 100.00 secs ( DONE at 100.00 )
[ time 100 ] Run job 1 for 200.00 secs ( DONE at 300.00 )
[ time 300 ] Run job 2 for 300.00 secs ( DONE at 600.00 )
```

Final statistics:

```
Job 0 -- Response: 0.00 Turnaround 100.00 Wait 0.00
Job 1 -- Response: 100.00 Turnaround 300.00 Wait 100.00
Job 2 -- Response: 300.00 Turnaround 600.00 Wait 300.00

Average -- Response: 133.33 Turnaround 333.33 Wait 133.33
```

۳.۱

حال کار مشابهی را با استفاده از الگوریتم زمان‌بندی RR و قطعه-زمانی ۱

پاسخ.

```
ali@DESKTOP:~$ python2.7 scheduler.py -p RR --quantum 1 -l 100,200,300
ARG policy RR
ARG jlist 100,200,300
```

Here is the job list, with the run time of each job:

```
Job 0 ( length = 100.0 )
Job 1 ( length = 200.0 )
Job 2 ( length = 300.0 )
```

Compute the turnaround time, response time, and wait time for each job. When you are done, run this program again, with the same arguments, but with -c, which will thus provide you with the answers. You can use -s <somenumber> or your own job list (-l 10,15,20 for example) to generate different problems for yourself.

الگوریتم RR:

response time: $\frac{0+1+2}{3} = 1$
turnaround time: 466.6

```
ali@DESKTOP:~$ python2.7 scheduler.py -c -p RR --quantum 1 -l 100,200,300
ARG policy RR
ARG jlist 100,200,300
```

Here is the job list, with the run time of each job:

```
Job 0 ( length = 100.0 )
Job 1 ( length = 200.0 )
Job 2 ( length = 300.0 )
```

**** Solutions ****

Execution trace:

```
[ time 0 ] Run job 0 for 1.00 secs
[ time 1 ] Run job 1 for 1.00 secs
[ time 2 ] Run job 2 for 1.00 secs
[ time 3 ] Run job 0 for 1.00 secs
[ time 4 ] Run job 1 for 1.00 secs
[ time 5 ] Run job 2 for 1.00 secs
[ time 6 ] Run job 0 for 1.00 secs
[ time 7 ] Run job 1 for 1.00 secs
[ time 8 ] Run job 2 for 1.00 secs
[ time 9 ] Run job 0 for 1.00 secs
[ time 10 ] Run job 1 for 1.00 secs
[ time 11 ] Run job 2 for 1.00 secs
[ time 12 ] Run job 0 for 1.00 secs
[ time 13 ] Run job 1 for 1.00 secs
[ time 14 ] Run job 2 for 1.00 secs
[ time 15 ] Run job 0 for 1.00 secs
[ time 16 ] Run job 1 for 1.00 secs
[ time 17 ] Run job 2 for 1.00 secs
[ time 18 ] Run job 0 for 1.00 secs
[ time 19 ] Run job 1 for 1.00 secs
[ time 20 ] Run job 2 for 1.00 secs
[ time 21 ] Run job 0 for 1.00 secs
[ time 22 ] Run job 1 for 1.00 secs
[ time 23 ] Run job 2 for 1.00 secs
[ time 24 ] Run job 0 for 1.00 secs
[ time 25 ] Run job 1 for 1.00 secs
[ time 26 ] Run job 2 for 1.00 secs
```

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[ time 27 ] Run job 0 for 1.00 secs
[ time 28 ] Run job 1 for 1.00 secs
[ time 29 ] Run job 2 for 1.00 secs
[ time 30 ] Run job 0 for 1.00 secs
[ time 31 ] Run job 1 for 1.00 secs
[ time 32 ] Run job 2 for 1.00 secs
[ time 33 ] Run job 0 for 1.00 secs
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[ time 35 ] Run job 2 for 1.00 secs
[ time 36 ] Run job 0 for 1.00 secs
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[ time 38 ] Run job 2 for 1.00 secs
[ time 39 ] Run job 0 for 1.00 secs
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[ time 44 ] Run job 2 for 1.00 secs
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[ time 59 ] Run job 2 for 1.00 secs
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[ time 65 ] Run job 2 for 1.00 secs
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[ time 69 ] Run job 0 for 1.00 secs
[ time 70 ] Run job 1 for 1.00 secs
[ time 71 ] Run job 2 for 1.00 secs
[ time 72 ] Run job 0 for 1.00 secs
[ time 73 ] Run job 1 for 1.00 secs
[ time 74 ] Run job 2 for 1.00 secs
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[ time 84 ] Run job 0 for 1.00 secs
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[ time 86 ] Run job 2 for 1.00 secs
[ time 87 ] Run job 0 for 1.00 secs

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[ time 88 ] Run job 1 for 1.00 secs
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[ time 96 ] Run job 0 for 1.00 secs
[ time 97 ] Run job 1 for 1.00 secs
[ time 98 ] Run job 2 for 1.00 secs
[ time 99 ] Run job 0 for 1.00 secs
[ time 100 ] Run job 1 for 1.00 secs
[ time 101 ] Run job 2 for 1.00 secs
[ time 102 ] Run job 0 for 1.00 secs
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[ time 109 ] Run job 1 for 1.00 secs
[ time 110 ] Run job 2 for 1.00 secs
[ time 111 ] Run job 0 for 1.00 secs
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[ time 149 ] Run job 2 for 1.00 secs
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[ time 210 ] Run job 0 for 1.00 secs
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[ time 256 ] Run job 1 for 1.00 secs
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[ time 260 ] Run job 2 for 1.00 secs
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[ time 296 ] Run job 2 for 1.00 secs
[ time 297 ] Run job 0 for 1.00 secs ( DONE at 298.00 )
[ time 298 ] Run job 1 for 1.00 secs
[ time 299 ] Run job 2 for 1.00 secs
[ time 300 ] Run job 1 for 1.00 secs
[ time 301 ] Run job 2 for 1.00 secs
[ time 302 ] Run job 1 for 1.00 secs
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[ time 316 ] Run job 1 for 1.00 secs
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[ time 332 ] Run job 1 for 1.00 secs
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[ time 339 ] Run job 2 for 1.00 secs
[ time 340 ] Run job 1 for 1.00 secs
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[ time 342 ] Run job 1 for 1.00 secs
[ time 343 ] Run job 2 for 1.00 secs
[ time 344 ] Run job 1 for 1.00 secs
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[ time 353 ] Run job 2 for 1.00 secs
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[ time 596 ] Run job 2 for 1.00 secs
[ time 597 ] Run job 2 for 1.00 secs
[ time 598 ] Run job 2 for 1.00 secs
[ time 599 ] Run job 2 for 1.00 secs ( DONE at 600.00 )
```

Final statistics:

```
Job 0 -- Response: 0.00 Turnaround 298.00 Wait 198.00
Job 1 -- Response: 1.00 Turnaround 499.00 Wait 299.00
Job 2 -- Response: 2.00 Turnaround 600.00 Wait 300.00

Average -- Response: 1.00 Turnaround 465.67 Wait 265.67
```

۴.۱

برای کدام نوع از بارهای کاری الگوریتم SJF زمان چرخش مشابهی با الگوریتم FIFO تحویل می‌دهد؟

پاسخ. برای بارهای کاری‌ای که طول کارها با هم برابر است یا زمانی که کارها دقیقاً زمانی می‌رسند که context switching لازم است. بنابراین الگوریتم زمان‌بندی نمی‌تواند مقایسه کند طول کارها را.

۵.۱

برای کدام نوع از بارهای کاری و طول کوانتومی الگوریتم SJF زمان پاسخ‌دهی یکسانی با الگوریتم RR ارائه می‌دهد؟

پاسخ. زمانی که طول کوانتومی برای الگوریتم RR برابر با طول هر کدام از کارها باشد.

۶.۱

در الگوریتم SJF با افزایش طول کار چه اتفاقی برای زمان پاسخ‌دهی می‌افتد؟ آیا می‌توانید با استفاده از شبیه‌ساز روند را نشان دهید؟

پاسخ. زمان پاسخ‌دهی افزایش می‌یابد.

```
ali@DESKTOP:~$ python2.7 scheduler.py -c -p SJF -l 10,10,10
ARG policy SJF
ARG jlist 10,10,10

Here is the job list, with the run time of each job:
Job 0 ( length = 10.0 )
Job 1 ( length = 10.0 )
Job 2 ( length = 10.0 )

** Solutions **

Execution trace:
[ time  0 ] Run job 0 for 10.00 secs ( DONE at 10.00 )
[ time 10 ] Run job 1 for 10.00 secs ( DONE at 20.00 )
[ time 20 ] Run job 2 for 10.00 secs ( DONE at 30.00 )

Final statistics:
Job  0 -- Response: 0.00  Turnaround 10.00  Wait 0.00
Job  1 -- Response: 10.00  Turnaround 20.00  Wait 10.00
Job  2 -- Response: 20.00  Turnaround 30.00  Wait 20.00

Average -- Response: 10.00  Turnaround 20.00  Wait 10.00
```

```
ali@DESKTOP:~$ python2.7 scheduler.py -c -p SJF -l 11,11,11
ARG policy SJF
ARG jlist 11,11,11

Here is the job list, with the run time of each job:
Job 0 ( length = 11.0 )
Job 1 ( length = 11.0 )
Job 2 ( length = 11.0 )

** Solutions **

Execution trace:
[ time  0 ] Run job 0 for 11.00 secs ( DONE at 11.00 )
[ time 11 ] Run job 1 for 11.00 secs ( DONE at 22.00 )
[ time 22 ] Run job 2 for 11.00 secs ( DONE at 33.00 )

Final statistics:
Job  0 -- Response: 0.00  Turnaround 11.00  Wait 0.00
Job  1 -- Response: 11.00  Turnaround 22.00  Wait 11.00
Job  2 -- Response: 22.00  Turnaround 33.00  Wait 22.00

Average -- Response: 11.00  Turnaround 22.00  Wait 11.00
```

۷.۱

در الگوریتم RR با افزایش زمان کوانتومی چه اتفاقی برای زمان پاسخدهی می‌افتد؟ آیا می‌توانید معادله‌ای برای بدترین حالت زمان پاسخدهی برای n کار بنویسید؟

پاسخ. زمان پاسخدهی افزایش می‌یابد.

$$worse_case_response = \frac{\sum_{i=0}^n i \times quantum_length}{n}$$

