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## Part D:

**How long does it take to process a single post (performance)?**

**Does the size of the data submitted to the server impact the performance?**

I printed to the console the current dates (utilizing the Date objects) twice. The first time is when a request is sent and the second is when a response is sent. The result shows the processing time of a post depends on the how long the inputs are.

e.g With Topic == 'Trang' and Data == 'Trang', the processing time is around 15ms – 20ms.

With the same Topic value but Data being a 400-word paragraph, the processing time is around 120ms-160ms.

**How does the number of requests impact the performance of the server?**

As I increased the number of requests, all the measures of the performance increase (i.e. total time, mean latency and percentage of the requests served within a certain time).

```
npm run loadtest -n 100 --data '{"topic": "test", "data": "test"}' -T 'application/x-www-form-urlencoded' -m POST http://localhost:8080/sayHello
```

```
[Fri Nov 05 2021 15:40:05 GMT+0000 (Coordinated Universal Time)] INFO Completed requests: 100
[Fri Nov 05 2021 15:40:05 GMT+0000 (Coordinated Universal Time)] INFO Total errors: 0
[Fri Nov 05 2021 15:40:05 GMT+0000 (Coordinated Universal Time)] INFO Total time: 2.1014228 s
[Fri Nov 05 2021 15:40:05 GMT+0000 (Coordinated Universal Time)] INFO Requests per second: 48
[Fri Nov 05 2021 15:40:05 GMT+0000 (Coordinated Universal Time)] INFO Mean latency: 20.8 ms
[Fri Nov 05 2021 15:40:05 GMT+0000 (Coordinated Universal Time)] INFO
[Fri Nov 05 2021 15:40:05 GMT+0000 (Coordinated Universal Time)] INFO Percentage of the requests served within a certain time
[Fri Nov 05 2021 15:40:05 GMT+0000 (Coordinated Universal Time)] INFO 50% 14 ms
[Fri Nov 05 2021 15:40:05 GMT+0000 (Coordinated Universal Time)] INFO 90% 20 ms
[Fri Nov 05 2021 15:40:05 GMT+0000 (Coordinated Universal Time)] INFO 95% 49 ms
```

[Fri Nov 05 2021 15:40:05 GMT+0000 (Coordinated Universal Time)] INFO 99% 384 ms  
[Fri Nov 05 2021 15:40:05 GMT+0000 (Coordinated Universal Time)] INFO 100% 384 ms (longest request)

```
npx loadtest -n 1000 --data '{"topic": "test", "data": "test"}' -T 'application/x-www-form-urlencoded' -m POST http://localhost:8080/sayHello
```

[Fri Nov 05 2021 15:41:32 GMT+0000 (Coordinated Universal Time)] INFO Completed requests: 1000  
[Fri Nov 05 2021 15:41:32 GMT+0000 (Coordinated Universal Time)] INFO Total errors: 0  
[Fri Nov 05 2021 15:41:32 GMT+0000 (Coordinated Universal Time)] INFO Total time: 29.3778815 s  
[Fri Nov 05 2021 15:41:32 GMT+0000 (Coordinated Universal Time)] INFO Requests per second: 34  
[Fri Nov 05 2021 15:41:32 GMT+0000 (Coordinated Universal Time)] INFO Mean latency: 29.2 ms  
[Fri Nov 05 2021 15:41:32 GMT+0000 (Coordinated Universal Time)] INFO  
[Fri Nov 05 2021 15:41:32 GMT+0000 (Coordinated Universal Time)] INFO Percentage of the requests served within a certain time  
[Fri Nov 05 2021 15:41:32 GMT+0000 (Coordinated Universal Time)] INFO 50% 19 ms  
[Fri Nov 05 2021 15:41:32 GMT+0000 (Coordinated Universal Time)] INFO 90% 50 ms  
[Fri Nov 05 2021 15:41:32 GMT+0000 (Coordinated Universal Time)] INFO 95% 77 ms  
[Fri Nov 05 2021 15:41:32 GMT+0000 (Coordinated Universal Time)] INFO 99% 173 ms  
[Fri Nov 05 2021 15:41:32 GMT+0000 (Coordinated Universal Time)] INFO 100% 308 ms (longest request)

```
npx loadtest -n 1000 --data '{"topic": "test", "data": "test"}' -T 'application/x-www-form-urlencoded' -m POST http://localhost:8080/sayHello
```

[Fri Nov 05 2021 15:53:18 GMT+0000 (Coordinated Universal Time)] INFO Completed requests: 10000  
[Fri Nov 05 2021 15:53:18 GMT+0000 (Coordinated Universal Time)] INFO Total errors: 0  
[Fri Nov 05 2021 15:53:18 GMT+0000 (Coordinated Universal Time)] INFO Total time: 569.5551184000001 s  
[Fri Nov 05 2021 15:53:18 GMT+0000 (Coordinated Universal Time)] INFO Requests per second: 18  
[Fri Nov 05 2021 15:53:18 GMT+0000 (Coordinated Universal Time)] INFO Mean latency: 56.8 ms  
[Fri Nov 05 2021 15:53:18 GMT+0000 (Coordinated Universal Time)] INFO  
[Fri Nov 05 2021 15:53:18 GMT+0000 (Coordinated Universal Time)] INFO Percentage of the requests served within a certain time  
[Fri Nov 05 2021 15:53:18 GMT+0000 (Coordinated Universal Time)] INFO 50% 49 ms  
[Fri Nov 05 2021 15:53:18 GMT+0000 (Coordinated Universal Time)] INFO 90% 80 ms  
[Fri Nov 05 2021 15:53:18 GMT+0000 (Coordinated Universal Time)] INFO 95% 109 ms

```
[Fri Nov 05 2021 15:53:18 GMT+0000 (Coordinated Universal Time)] INFO 99% 221 ms
[Fri Nov 05 2021 15:53:18 GMT+0000 (Coordinated Universal Time)] INFO 100% 957 ms (longest request)
```

### How does the level of concurrency impact the performance of the server?

As I increase the level of concurrency, the percentage of the requests served within a certain time and mean latency are getting significantly worse. However, the total time is relatively stable.

```
npx loadtest -n 100 -c 1 --data '{"topic": "test", "data": "test"}' -T 'application/x-www-form-urlencoded' -m POST
http://localhost:8080/sayHello
```

```
[Fri Nov 05 2021 16:07:16 GMT+0000 (Coordinated Universal Time)] INFO Completed requests: 100
[Fri Nov 05 2021 16:07:16 GMT+0000 (Coordinated Universal Time)] INFO Total errors: 0
[Fri Nov 05 2021 16:07:16 GMT+0000 (Coordinated Universal Time)] INFO Total time: 9.351832700000001 s
[Fri Nov 05 2021 16:07:16 GMT+0000 (Coordinated Universal Time)] INFO Requests per second: 11
[Fri Nov 05 2021 16:07:16 GMT+0000 (Coordinated Universal Time)] INFO Mean latency: 93.3 ms
[Fri Nov 05 2021 16:07:16 GMT+0000 (Coordinated Universal Time)] INFO
[Fri Nov 05 2021 16:07:16 GMT+0000 (Coordinated Universal Time)] INFO Percentage of the requests served within a certain time
[Fri Nov 05 2021 16:07:16 GMT+0000 (Coordinated Universal Time)] INFO 50% 84 ms
[Fri Nov 05 2021 16:07:16 GMT+0000 (Coordinated Universal Time)] INFO 90% 115 ms
[Fri Nov 05 2021 16:07:16 GMT+0000 (Coordinated Universal Time)] INFO 95% 126 ms
[Fri Nov 05 2021 16:07:16 GMT+0000 (Coordinated Universal Time)] INFO 99% 245 ms
[Fri Nov 05 2021 16:07:16 GMT+0000 (Coordinated Universal Time)] INFO 100% 245 ms (longest request)
```

```
npx loadtest -n 100 -c 10 --data '{"topic": "test", "data": "test"}' -T 'application/x-www-form-urlencoded' -m POST
http://localhost:8080/sayHello
```

```
[Fri Nov 05 2021 16:08:39 GMT+0000 (Coordinated Universal Time)] INFO Max requests: 100
[Fri Nov 05 2021 16:08:39 GMT+0000 (Coordinated Universal Time)] INFO Concurrency level: 10
[Fri Nov 05 2021 16:08:39 GMT+0000 (Coordinated Universal Time)] INFO Agent: none
[Fri Nov 05 2021 16:08:39 GMT+0000 (Coordinated Universal Time)] INFO
[Fri Nov 05 2021 16:08:39 GMT+0000 (Coordinated Universal Time)] INFO Completed requests: 100
```

[Fri Nov 05 2021 16:08:39 GMT+0000 (Coordinated Universal Time)] INFO Total errors: 0  
[Fri Nov 05 2021 16:08:39 GMT+0000 (Coordinated Universal Time)] INFO Total time: 12.985605900000001 s  
[Fri Nov 05 2021 16:08:39 GMT+0000 (Coordinated Universal Time)] INFO Requests per second: 8  
[Fri Nov 05 2021 16:08:39 GMT+0000 (Coordinated Universal Time)] INFO Mean latency: 1246.6 ms  
[Fri Nov 05 2021 16:08:39 GMT+0000 (Coordinated Universal Time)] INFO  
[Fri Nov 05 2021 16:08:39 GMT+0000 (Coordinated Universal Time)] INFO Percentage of the requests served within a certain time  
[Fri Nov 05 2021 16:08:39 GMT+0000 (Coordinated Universal Time)] INFO 50% 863 ms  
[Fri Nov 05 2021 16:08:39 GMT+0000 (Coordinated Universal Time)] INFO 90% 2707 ms  
[Fri Nov 05 2021 16:08:39 GMT+0000 (Coordinated Universal Time)] INFO 95% 3476 ms  
[Fri Nov 05 2021 16:08:39 GMT+0000 (Coordinated Universal Time)] INFO 99% 3730 ms  
[Fri Nov 05 2021 16:08:39 GMT+0000 (Coordinated Universal Time)] INFO 100% 3730 ms (longest request)

```
npx loadtest -n 100 -c 100 --data '{"topic": "test", "data": "test"}' -T 'application/x-www-form-urlencoded' -m POST  
http://localhost:8080/sayHello
```

[Fri Nov 05 2021 16:36:51 GMT+0000 (Coordinated Universal Time)] INFO Max requests: 100  
[Fri Nov 05 2021 16:36:51 GMT+0000 (Coordinated Universal Time)] INFO Concurrency level: 100  
[Fri Nov 05 2021 16:36:51 GMT+0000 (Coordinated Universal Time)] INFO Agent: none  
[Fri Nov 05 2021 16:36:51 GMT+0000 (Coordinated Universal Time)] INFO  
[Fri Nov 05 2021 16:36:51 GMT+0000 (Coordinated Universal Time)] INFO Completed requests: 100  
[Fri Nov 05 2021 16:36:51 GMT+0000 (Coordinated Universal Time)] INFO Total errors: 0  
[Fri Nov 05 2021 16:36:51 GMT+0000 (Coordinated Universal Time)] INFO Total time: 12.1002657 s  
[Fri Nov 05 2021 16:36:51 GMT+0000 (Coordinated Universal Time)] INFO Requests per second: 8  
[Fri Nov 05 2021 16:36:51 GMT+0000 (Coordinated Universal Time)] INFO Mean latency: 6540.2 ms  
[Fri Nov 05 2021 16:36:51 GMT+0000 (Coordinated Universal Time)] INFO  
[Fri Nov 05 2021 16:36:51 GMT+0000 (Coordinated Universal Time)] INFO Percentage of the requests served within a certain time  
[Fri Nov 05 2021 16:36:51 GMT+0000 (Coordinated Universal Time)] INFO 50% 7518 ms  
[Fri Nov 05 2021 16:36:51 GMT+0000 (Coordinated Universal Time)] INFO 90% 11126 ms  
[Fri Nov 05 2021 16:36:51 GMT+0000 (Coordinated Universal Time)] INFO 95% 11593 ms  
[Fri Nov 05 2021 16:36:51 GMT+0000 (Coordinated Universal Time)] INFO 99% 11941 ms  
[Fri Nov 05 2021 16:36:51 GMT+0000 (Coordinated Universal Time)] INFO 100% 11941 ms (longest request)