Homework 4 Report

April 4, 2020

1 core numbers

1.1 per request, 1 core, big delay

```
45.3
42.15
44
47.5
43

avg: 44.39
```

1.2 per request, 2 core, big delay

```
66.15
59.9
63.2
66.5
64

avg: 63.95
```

1.3 per request, 4 core, big delay

```
89.5
99.3
100.05
102.2
99

avg: 98.01
```

We can see that cpu cores have impact on performance, more cores means more throughput, more ability to handle incoming request.

2 using thread pool, check for delay

2.1 pre created, 1 core, big delay

9.05
10.1
9.5
9.8
10.2

avg: 9.73

2.2 pre created, 2 core, big delay

8.7
9.8
9.3
9.6
8.9

avg: 9.26

2.3 pre created, 4 core, big delay

9.9
8.9
8.6
10.2
9.5

avg: 9.42

We can see that the thread pool now is the bottle neck. If the thread pool is too small, server cannot perform best.

3 no thread pool, checking delay

3.1 per request, 4 core, small delay

```
234.6
225.65
251
226
229

avg: 233.25
```

3.2 per request, 4 core, large delay

```
99.1
98.45
101.15
100.2
99.5

avg: 99.68
```

We can see that server performance performance worse when there is large delay(i.e. heavy compute work)

4 thread pool, checking delay

4.1 pre created, 4 core, small delay

```
44.5
47.3
47.1
46.5
45

avg: 46.08
```

4.2 pre created, 4 core, large delay

```
9.2
8.9
8.5
10
9.6

avg: 9.24
```

We can see that thread pool is the bottle neck. Most of the time is wasted on waiting avaliable thread, we can improve this by making larger thread pool.

5 bucket size

5.1 pre created, 4 core, small delay, bucket size 32

47.8
47.05
48
45.6
43.2

avg: 46.33

5.2 pre created, 4 core, small delay, bucket size 128

46.25
46
47.5
44.9
45.6

avg: 46.05

5.3 pre created, 4 core, small delay, bucket size 512

48
47.1
46.1
45.9
43.3

avg: 46.08

5.4 pre created, 4 core, small delay, bucket size 2048

47.25
45.4
45
46
46.6

avg: 46.05

Since we lock the whole bucket vector with mutex when read/write happens, bucket size doesn't matter.

5.5 per request, 4 core, small delay, bucket size 32

234.6
223.95
250.2
219.95
235.8

avg: 232.9

5.6 per request, 4 core, small delay, bucket size 128

215.3
220.2
251.2
233
225

avg: 228.94

5.7 per request, 4 core, small delay, bucket size 512

227.4
216.95
229.5
225.2
226.1

avg: 225.03

5.8 per request, 4 core, small delay, bucket size 2048

239.7
230.55
229.55
226
225.15

avg: 230.19

Since we lock the whole bucket vector with mutex when read/write happens, bucket size doesn't matter.