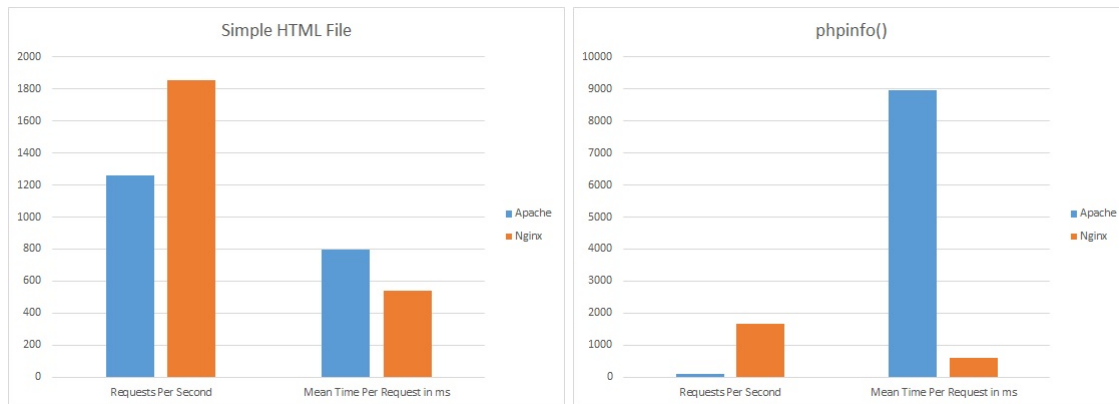


I. Apache and Nginx comparison on the same AWS instance type

In this experiment, we are going to take a look at the performance under different web servers. From this semester, we normally used apache to serve normal html and php files. For a comparison, I downloaded a free trial of Nginx to compare the speeds in which we could serve up a simple html file and a php file called the function phpinfo().



For each server, I ran an Apache Benchmark that would send 10 requests 1000 at a time. Here are more statistics directly from the Apache Benchmark command:

```
Document Path:      /PES/test.html
Document Length:    207 bytes

Concurrency Level:   1000
Time taken for tests: 7.945 seconds
Complete requests:   10000
Failed requests:     0
Write errors:        0
Keep-Alive requests: 0
Total transferred:   4761875 bytes
HTML transferred:    2075175 bytes
Requests per second: 1258.58 [#/sec] (mean)
Time per request:    794.545 [ms] (mean)
Time per request:    0.795 [ms] (mean, across all concurrent requests)
Transfer rate:       585.27 [Kbytes/sec] received
```

```
Connection Times (ms)
              min  mean[+/-sd] median  max
Connect:      6   177 426.4      21   3045
Processing:    1   316 994.7     101   7777
Waiting:      1   316 994.7     101   7777
Total:       81   493 1074.9    129   7939
```

```
Percentage of the requests served within a certain time (ms)
 50%    129
```

```

66%    155
75%    334
80%    404
90%   1122
95%   1550
98%   4573
99%   7104
100%  7939 (longest request)

```

```

Server Software:      Apache/2.2.31
Server Hostname:      54.200.100.56
Server Port:          80

```

```

Document Path:        /PES/test.php
Document Length:       127414 bytes

```

```

Concurrency Level:     1000
Time taken for tests:   89.628 seconds
Complete requests:     10000
Failed requests:       0
Write errors:          0
Keep-Alive requests:   0
Total transferred:     1277817560 bytes
HTML transferred:      1276084273 bytes
Requests per second:   111.57 [#/sec] (mean)
Time per request:      8962.769 [ms] (mean)
Time per request:      8.963 [ms] (mean, across all concurrent requests)
Transfer rate:         13922.80 [Kbytes/sec] received

```

```

Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:     12 1026 3014.7    161   63176
Processing:    9 5230 9389.1    3137   89444
Waiting:      2 3291 9316.3    1234   89333
Total:       1003 6257 9704.2    3792   89620

```

```

Percentage of the requests served within a certain time (ms)
50%    3792
66%    4646
75%    5578
80%    6226
90%   10132
95%   16288
98%   33152
99%   55558
100%  89620 (longest request)

```

```

Server Software:      nginx/1.9.13
Server Hostname:      54.200.100.56
Server Port:          80

```

Document Path: /test.html
Document Length: 207 bytes

Concurrency Level: 1000
Time taken for tests: 5.385 seconds
Complete requests: 10000
Failed requests: 0
Write errors: 0
Keep-Alive requests: 10000
Total transferred: 4470540 bytes
HTML transferred: 2071863 bytes
Requests per second: 1857.11 [#/sec] (mean)
Time per request: 538.472 [ms] (mean)
Time per request: 0.538 [ms] (mean, across all concurrent requests)
Transfer rate: 810.77 [Kbytes/sec] received

Connection Times (ms)

	min	mean[+/-sd]	median	max
Connect:	0	9 32.5	0	182
Processing:	66	381 865.2	220	4844
Waiting:	43	336 873.2	146	4844
Total:	66	390 893.4	222	5005

Percentage of the requests served within a certain time (ms)

50%	222
66%	247
75%	259
80%	267
90%	374
95%	2528
98%	4906
99%	4946
100%	5005 (longest request)

Server Software: nginx/1.9.13
Server Hostname: 54.200.100.56
Server Port: 80

Document Path: /test.php
Document Length: 208 bytes

Concurrency Level: 1000
Time taken for tests: 5.964 seconds
Complete requests: 10000
Failed requests: 0
Write errors: 0
Keep-Alive requests: 10000
Total transferred: 4706996 bytes
HTML transferred: 2086448 bytes
Requests per second: 1676.83 [#/sec] (mean)
Time per request: 596.365 [ms] (mean)

Time per request: 0.596 [ms] (mean, across all concurrent requests)
Transfer rate: 770.78 [Kbytes/sec] received

Connection Times (ms)

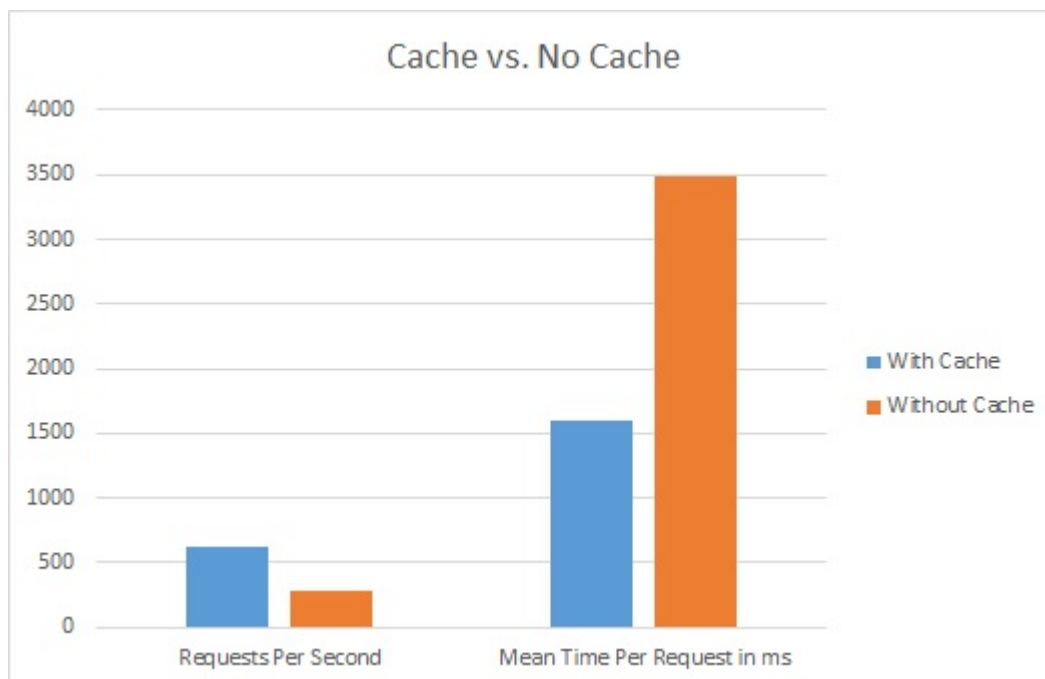
	min	mean[+/-sd]	median	max
Connect:	0	13 43.8	0	210
Processing:	81	475 933.3	305	4857
Waiting:	50	417 944.4	212	4857
Total:	81	488 971.0	309	5047

Percentage of the requests served within a certain time (ms)

50%	309
66%	325
75%	347
80%	399
90%	445
95%	2745
98%	4971
99%	5033
100%	5047 (longest request)

II. Apache Web Server performance with and without optimizations and tuning

This experiment is going to have a similar setup to the first one. We're going to compare the speeds of Apache with and with caching. We'll call an Apache Benchmark for a simple html file that included some references to an image, style sheet, and some Javascript. Here are the results:



Here are the rest of the statistics from the Apache Benchmark (without cache is first):

Server Software: Apache/2.2.31
Server Hostname: 54.200.100.56

```

Server Port:          80

Document Path:        /PES/sample.html
Document Length:      901 bytes

Concurrency Level:     1000
Time taken for tests:  34.880 seconds
Complete requests:     10000
Failed requests:       0
Write errors:          0
Keep-Alive requests:   0
Total transferred:     11875500 bytes
HTML transferred:      9145150 bytes
Requests per second:   286.70 [#/sec] (mean)
Time per request:      3488.014 [ms] (mean)
Time per request:      3.488 [ms] (mean, across all concurrent requests)
Transfer rate:         332.49 [Kbytes/sec] received

```

```

Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:      1  129 232.7      64   3092
Processing:   104 1193 3895.8     178  34729
Waiting:      83 1161 3894.5     161  34703
Total:       130 1322 3909.8     245  34875

```

```

Percentage of the requests served within a certain time (ms)
 50%    245
 66%    447
 75%    538
 80%    581
 90%   1174
 95%   9164
 98%  17612
 99%  17675
100% 34875 (longest request)

```

```

Server Software:      Apache/2.2.31
Server Hostname:      54.200.100.56
Server Port:         80

Document Path:        /PES/sample.html
Document Length:      877 bytes

Concurrency Level:     1000
Time taken for tests:  16.017 seconds
Complete requests:     10000
Failed requests:       10003
    (Connect: 0, Receive: 0, Length: 10003, Exceptions: 0)
Write errors:          0
Keep-Alive requests:   0
Total transferred:     13074998 bytes
HTML transferred:      10273880 bytes

```

Requests per second: 624.35 [#/sec] (mean)
Time per request: 1601.664 [ms] (mean)
Time per request: 1.602 [ms] (mean, across all concurrent requests)
Transfer rate: 797.21 [Kbytes/sec] received

Connection Times (ms)

	min	mean[+/-sd]	median	max
Connect:	1	337 644.9	159	7206
Processing:	71	751 2036.8	270	15647
Waiting:	70	750 2036.8	270	15647
Total:	164	1087 2113.6	492	15806

Percentage of the requests served within a certain time (ms)

50%	492
66%	675
75%	1127
80%	1292
90%	1652
95%	3620
98%	9088
99%	15805
100%	15806 (longest request)

III. Discussion

As seen from the results in the first experiment, Nginx outperforms Apache tremendously, especially when it comes to serving a php file. In second experiment, Apache performed more than twice as well with caching compared to without caching. These are things to keep in mind when designing a high trafficking web application. If I were to recommend a configuration of a server, Nginx would be the way to go.