

Results of a stress test between DAS servers.

We prepared a stress test using the Apache HTTP Server Benchmarking Tool (<http://httpd.apache.org/docs/2.0/programs/ab.html>) to compare the loading performance of DAS servers.

Three servers were installed on the same machine: MyDas, ProServer and Dazzle.

The requests were triggered on the same machine, with the purpose of avoiding any bias due to network conditions and computer specs.

The test was designed to repeat the same query 1000 times with 10 concurrent connections. Three queries were used in the test, one to return a document of approximately 1500 bytes(small), a second one with 200000 bytes(medium), and one returning the whole file, which in DAS format is approximately 7200000 bytes(large).

Specifications of the machine used for the test

- Brand: Apple
- Model: Macbook pro a1211
- Processor: 2.16 GHz intel Core 2 Duo
- Memory: 3 GB 667MHz DDR2 SDRAM
- Operative System: Mac OS X 10.6.8 Snow Leopard

Data

The data set used for the tests corresponds with the annotations for the mitochondrial DNA of the organism *C. Elegans* freely available at the URL:

ftp://ftp.sanger.ac.uk/pub/wormbase/releases/WS220/genomes/c_elegans/genome_feature_tables/GFF2/CHROMOSOME_MtDNA.gff

The file contains 18510 annotations and is 3.4 MB in size. It is a text file whose format follows the GFF2 standard.

Software Installation

MyDas and Dazzle are Java servlet applications. The servlet container used for both was Apache Tomcat 7.0.11 and the Java Runtime Environment running on the machine is version 1.6.0_33.

ProServer requires perl and the version installed on the test machine is version v5.12.3.

The installation instructions of the software and its corresponding data sources can be found on the relevant server web sites:

- MyDas:
<http://code.google.com/p/mydas/wiki/MyDASTutorial>
- ProServer:
http://proserver.svn.sourceforge.net/viewvc/proserver/trunk/doc/proserver_guide.html#install
- Dazzle:
http://biojava.org/wiki/Dazzle#Getting_Dazzle

Test execution and result files:

The results returned by the apache benchmarking tool during testing are shown below

- **Small test (~1500bytes):**

- MyDas

Server Software: Apache-Coyote/1.1
Server Hostname: localhost

```

Server Port:                8080

Document Path:              /MyDasTemplate/das/examplegff/features?segment=CHROMOSOME_MtDNA:1,50
Document Length:           1554 bytes

Concurrency Level:          10
Time taken for tests:       1.352 seconds
Complete requests:          1000
Failed requests:            0
Write errors:               0
Total transferred:         2124000 bytes
HTML transferred:          1554000 bytes
Requests per second:       739.88 [#/sec] (mean)
Time per request:          13.516 [ms] (mean)
Time per request:          1.352 [ms] (mean, across all concurrent requests)
Transfer rate:              1534.68 [Kbytes/sec] received

```

```

Connection Times (ms)
      min  mean[+/-sd] median   max
Connect:    0      1   1.1      0    13
Processing:  2     13  11.2     10   112
Waiting:    0     12  11.1      9   112
Total:      2     13  11.3     10   112

```

```

Percentage of the requests served within a certain time (ms)
 50%    10
 66%    14
 75%    18
 80%    20
 90%    27
 95%    36
 98%    47
 99%    53
100%   112 (longest request)

```

o ProServer

```

Server Software:            ProServer/756
Server Hostname:            localhost
Server Port:                9000

Document Path:              /das/mygff/features?segment=CHROMOSOME_MtDNA:1,50
Document Length:           1421 bytes

Concurrency Level:          10
Time taken for tests:       649.298 seconds
Complete requests:          1000
Failed requests:            0
Write errors:               0
Total transferred:         1865000 bytes
HTML transferred:          1421000 bytes
Requests per second:       1.54 [#/sec] (mean)
Time per request:          6492.978 [ms] (mean)
Time per request:          649.298 [ms] (mean, across all concurrent requests)
Transfer rate:              2.81 [Kbytes/sec] received

```

```

Connection Times (ms)
      min  mean[+/-sd] median   max
Connect:    0      0   5.9      0   186
Processing: 4256 6481 403.0   6453 11716
Waiting:    4255 6478 403.1   6447 11715
Total:      4256 6481 403.1   6453 11716

```

```

Percentage of the requests served within a certain time (ms)
 50%    6453
 66%    6621
 75%    6726
 80%    6782
 90%    6947
 95%    7064
 98%    7244

```

99% 7353
100% 11716 (longest request)

○ Dazzle

Server Software: Apache-Coyote/1.1
Server Hostname: localhost
Server Port: 8080

Document Path: /dazzle-webapp/tss/features?segment=CHROMOSOME_MtDNA:1,50
Document Length: 1605 bytes

Concurrency Level: 10
Time taken for tests: 2.355 seconds
Complete requests: 1000
Failed requests: 0
Write errors: 0
Total transferred: 2074000 bytes
HTML transferred: 1605000 bytes
Requests per second: 424.56 [#/sec] (mean)
Time per request: 23.554 [ms] (mean)
Time per request: 2.355 [ms] (mean, across all concurrent requests)
Transfer rate: 859.91 [Kbytes/sec] received

Connection Times (ms)

	min	mean[+/-sd]	median	max
Connect:	0	1 1.7	0	22
Processing:	3	23 26.4	14	196
Waiting:	0	21 25.4	13	196
Total:	3	23 26.4	14	197

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

50%	14
66%	21
75%	27
80%	32
90%	52
95%	80
98%	115
99%	135
100%	197 (longest request)

● Medium test (~20000bytes):

○ MyDas

Server Software: Apache-Coyote/1.1
Server Hostname: localhost
Server Port: 8080

Document Path: /MyDasTemplate/das/examplegff/features?segment=CHROMOSOME_MtDNA:1,200
Document Length: 216986 bytes

Concurrency Level: 10
Time taken for tests: 19.411 seconds
Complete requests: 1000
Failed requests: 0
Write errors: 0
Total transferred: 217556000 bytes
HTML transferred: 216986000 bytes
Requests per second: 51.52 [#/sec] (mean)
Time per request: 194.114 [ms] (mean)
Time per request: 19.411 [ms] (mean, across all concurrent requests)
Transfer rate: 10944.96 [Kbytes/sec] received

Connection Times (ms)

	min	mean[+/-sd]	median	max
Connect:	0	0 1.1	0	19
Processing:	19	193 159.6	155	1305
Waiting:	11	180 161.5	138	1265
Total:	19	194 159.6	156	1305

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

50%	156
66%	203
75%	242
80%	268
90%	350
95%	482
98%	795
99%	876
100%	1305 (longest request)

o ProServer

Server Software: ProServer/756
Server Hostname: localhost
Server Port: 9000

Document Path: /das/mygff/features?segment=CHROMOSOME_MtDNA:1,200
Document Length: 209768 bytes

Concurrency Level: 10
Time taken for tests: 712.340 seconds
Complete requests: 1000
Failed requests: 0
Write errors: 0
Total transferred: 210214000 bytes
HTML transferred: 209768000 bytes
Requests per second: 1.40 [#/sec] (mean)
Time per request: 7123.396 [ms] (mean)
Time per request: 712.340 [ms] (mean, across all concurrent requests)
Transfer rate: 288.19 [Kbytes/sec] received

Connection Times (ms)

	min	mean	mean[+/-sd]	median	max
Connect:	0	0	0.4	0	10
Processing:	5646	7116	220.2	7129	7836
Waiting:	5645	7112	220.5	7125	7835
Total:	5646	7116	220.2	7129	7836

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

50%	7129
66%	7191
75%	7228
80%	7254
90%	7336
95%	7423
98%	7612
99%	7689
100%	7836 (longest request)

o Dazzle

Server Software: Apache-Coyote/1.1
Server Hostname: localhost
Server Port: 8080

Document Path: /dazzle-webapp/tss/features?segment=CHROMOSOME_MtDNA:1,200
Document Length: 209656 bytes

Concurrency Level: 10
Time taken for tests: 29.322 seconds
Complete requests: 1000
Failed requests: 0
Write errors: 0
Total transferred: 210103000 bytes
HTML transferred: 209656000 bytes
Requests per second: 34.10 [#/sec] (mean)
Time per request: 293.216 [ms] (mean)
Time per request: 29.322 [ms] (mean, across all concurrent requests)
Transfer rate: 6997.52 [Kbytes/sec] received

Connection Times (ms)					
	min	mean[+/-sd]	median	max	
Connect:	0	0	1.1	0	11
Processing:	48	292	103.7	285	1023
Waiting:	6	35	47.9	15	441
Total:	48	293	103.6	285	1024

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

50%	285
66%	319
75%	348
80%	368
90%	409
95%	461
98%	541
99%	612
100%	1024 (longest request)

- **Large test (~7000000bytes):**

- **MyDas**

Server Software: Apache-Coyote/1.1
 Server Hostname: localhost
 Server Port: 8080

Document Path: /MyDasTemplate/das/examplegff/features?segment=CHROMOSOME_MtDNA:1,14000
 Document Length: 7490285 bytes

Concurrency Level: 10
 Time taken for tests: 558.915 seconds
 Complete requests: 1000
 Failed requests: 0
 Write errors: 0
 Total transferred: 7490855000 bytes
 HTML transferred: 7490285000 bytes
 Requests per second: 1.79 [#/sec] (mean)
 Time per request: 5589.148 [ms] (mean)
 Time per request: 558.915 [ms] (mean, across all concurrent requests)
 Transfer rate: 13088.38 [Kbytes/sec] received

Connection Times (ms)					
	min	mean[+/-sd]	median	max	
Connect:	0	0	1.4	0	15
Processing:	1786	5576	1905.6	5189	13877
Waiting:	1244	4856	1914.2	4446	13302
Total:	1786	5577	1905.7	5189	13877

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

50%	5189
66%	6013
75%	6452
80%	6804
90%	7900
95%	9087
98%	11267
99%	12661
100%	13877 (longest request)

- **ProServer**

Server Software: ProServer/756
 Server Hostname: localhost
 Server Port: 9000

Document Path: /das/mygff/features?segment=CHROMOSOME_MtDNA:1,14000
 Document Length: 7233398 bytes

Concurrency Level: 2
 Time taken for tests: 4541.578 seconds
 Complete requests: 1000

```
Failed requests:      0
Write errors:         0
Total transferred:    7233845000 bytes
HTML transferred:     7233398000 bytes
Requests per second:  0.22 [#/sec] (mean)
Time per request:     9083.157 [ms] (mean)
Time per request:     4541.578 [ms] (mean, across all concurrent requests)
Transfer rate:        1555.47 [Kbytes/sec] received
```

```
Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:      0    0    0.4      0      8
Processing:   7358 9079 602.1    9066   12428
Waiting:      7346 9065 601.1    9050   12403
Total:        7358 9079 602.1    9066   12428
```

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

```
50%    9066
66%    9247
75%    9421
80%    9521
90%    9774
95%    9994
98%   10452
99%   10815
100%  12428 (longest request)
```

o Dazzle

```
Server Software:      Apache-Coyote/1.1
Server Hostname:      localhost
Server Port:          8080
```

```
Document Path:        /dazzle-webapp/tss/features?segment=CHROMOSOME_MtDNA:1,14000
Document Length:      7248407 bytes
```

```
Concurrency Level:    10
Time taken for tests:  911.029 seconds
Complete requests:    1000
Failed requests:      0
Write errors:         0
Total transferred:    7248854000 bytes
HTML transferred:     7248407000 bytes
Requests per second:  1.10 [#/sec] (mean)
Time per request:     9110.292 [ms] (mean)
Time per request:     911.029 [ms] (mean, across all concurrent requests)
Transfer rate:        7770.29 [Kbytes/sec] received
```

```
Connection Times (ms)
              min  mean[+/-sd] median   max
Connect:      0    1    1.4      0    10
Processing:   5132 9094 444.3    9105  10426
Waiting:      0    16   21.2      8    200
Total:        5132 9094 444.3    9105  10427
```

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

```
50%    9105
66%    9253
75%    9358
80%    9439
90%    9599
95%    9770
98%    9935
99%   10029
100%  10427 (longest request)
```

Unfortunately because of a local issue, the execution of the large test with ProServer was limited to 2 concurrent queries, When more queries were used, the following error was shown:

```
apr_poll: The timeout specified has expired (70007)
```

We then decided to run the test on a different machine and it successfully ran the 10 concurrent connections giving the following results:

```
Server Software:      ProServer/756
Server Hostname:      localhost
Server Port:          9000

Document Path:        /das/mygff/features?segment=CHROMOSOME_MtDNA:1,10000000000
Document Length:      7233404 bytes

Concurrency Level:     10
Time taken for tests:  3094.259 seconds
Complete requests:     1000
Failed requests:       0
Write errors:          0
Total transferred:     7233851000 bytes
HTML transferred:     7233404000 bytes
Requests per second:   0.32 [#/sec] (mean)
Time per request:      30942.590 [ms] (mean)
Time per request:      3094.259 [ms] (mean, across all concurrent requests)
Transfer rate:         2283.04 [Kbytes/sec] received
```

```
Connection Times (ms)
      min  mean[+/-sd] median   max
Connect:    0     1   2.1      0    45
Processing: 5761 30889 5567.1 30507 116246
Waiting:    5745 30456 3662.3 30473  55656
Total:      5761 30890 5567.3 30511 116247
```

The machine used in this case has slightly better specifications, but the response time of ProServer was still longer than both Dazzle and MyDas. This leads us to conclude that even if the issues on the first machine are solved, the outcome of the comparison would have remained the same.