6D global

WHITEPAPER

Expert Insight in the Key Areas That Matter Most to Digital Marketers

Boost Your Website Performance with AEM 6.1

SUMMARY

AEM 6 is based on the new Apache Jackrabbit Oak Repository implementation. This new repository technology promises to provide significantly better performance than the original Apache Jackrabbit repository. By evaluating AEM instances performance in a controlled environment, 6D Global was able to determine out-of-the-box AEM 6.1 and 6.0 instances performed approximately 2x better than a comparable 5.6 instance.

METHOD

The tests were conducted on an AWS m4.xLarge instance with the following configuration:

- CPU: 4 Intel Xeon E5-2670 v2
- Memory: 15 GB
- HD Type: General Purpose SSD
- OS: Amazon Linux AMI 2015.03 (HVM)
- JVM: OpenJDK 1.7: OpenJDK Runtime Environment (amzn-2.5.5.1.59.amzn1-x86_64 u79-b14)

Each AEM instance was unpacked and configured to start with a 3GB heap and 512MB Permanent Generation in publish mode. Once started, the test ran twice with 20 concurrent users for 60 seconds to ensure the instance was fully up and had a populated cache before running the performance tests.

The tests were performed by calling the command:

ab -c [CONCURRENT] -t [TIME] -r http://localhost:4503/content/geometrixx-outdoors/en.html

This used Apache Benchmark to create the number of concurrent requests against the publish instance. In the case of load and duration tests, the test was scripted to call the above command repeatedly.

AUTHOR

Dan Klco, Director, Center of Excellence for 6D Global and Director of 6D Labs

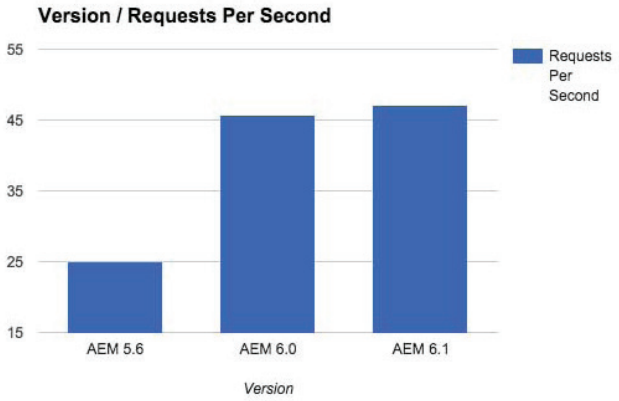
For more information visit labs.6Dglobal.com.

COMPARISON RESULTS

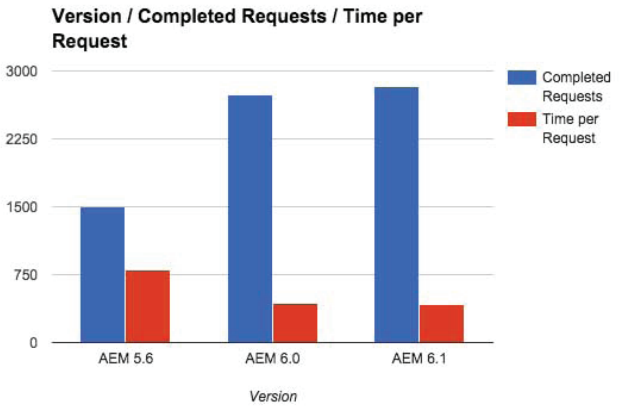
The results consistently found elevated performance increase in AEM 6.0 and 6.1 of approximately 2x versus AEM 5.6. This was reflected in the response times, number of requests processed, and failure rate. Additionally, AEM 6.0 and 6.1 were able to handle significantly more concurrent connections than AEM 5.6 without significant errors.

As AEM 6.0 and 6.1 have very similar performance characteristics, we will discuss 6.1 primarily as it is the most current release.

In a direct comparison with 20 concurrent requests, AEM 6.1 was able to handle 47.06 requests per second versus AEM 5.6, which was able to handle 24.95 requests per second. This is a 188.6% increase in the number of requests processed per second in AEM 6.1 over AEM 5.6.

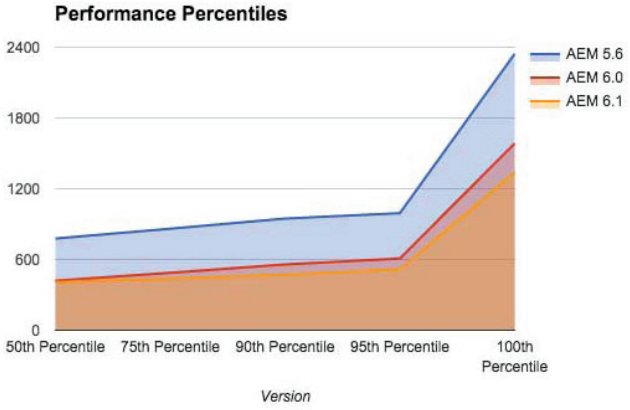


This increase in throughput allowed AEM 6.1 to complete significantly more requests during the test and take far less time per request.



During the test, AEM 6.1 was able to respond to 2,826 requests with an average response time of 424.987ms, whereas AEM 5.6 responded to only 1,498 requests with an average response time of 801.459ms. This represents a 188.5% increase in throughput and a 53% decrease in response times by AEM 6.1 over AEM 5.6.

The difference becomes even more apparent when comparing the outliers. With AEM 6.1, 95% of the requests took 516ms or less, whereas in AEM 5.6, 50% of the requests took 778ms or longer. Considering that Google recommends a page to be generated and rendered in 400ms for mobile-enabled websites, this performance metric is very problematic.

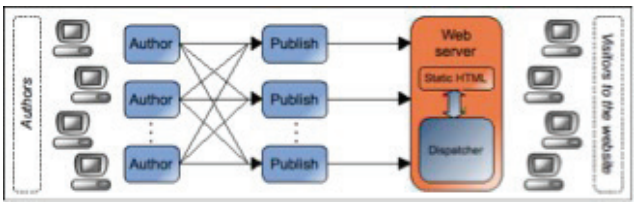


Does Publisher Speed Matter?

Most AEM installations use extensive caching for improving performance, including CDNs and the Dispatcher, which may beg the question: does publisher performance matter?

There are two main scenarios where publisher performance will directly impact the performance of your site: building cached content and dynamic content. Depending on update rates and how dynamic a website is, this can have a heavy impact on overall website performance.

The Dispatcher works by caching rendered content on the filesystem as files. When an update is made in the AEM publisher this causes the cache to be invalidated and re-fetched from the publisher with the subsequent request.



This invalidation is a course operation and usually affects an entire site, depending on the stats level configuration. Therefore, when a site is updated, nearly all of the site's content will be regenerated and re-cached. During the invalidation process, the publisher's speed will affect users. This is due to the publisher's need to rebuild every cached page before it can be served. This can even have a potential impact on the stability of the website if traffic exceeds the performance of the publisher.

Many sites also include dynamic components or services. Dynamic features either cannot be cached at all or will frequently access the publisher due to generating a significant number of variants, as in the case of personalization. If a site either has dynamic features or uses personalization, the speed of the publisher will impact the perceived performance and user experience.

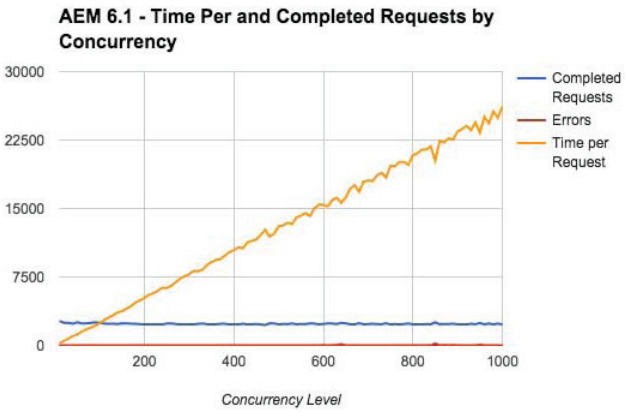
As nearly every site will be updated and most contain some sort of dynamic features, performance of the publisher services has a significant impact on a website user's experience.

LOAD TESTING RESULTS

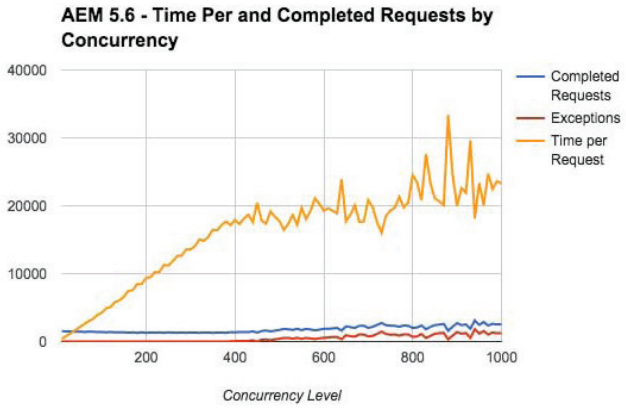
The results get even more dramatic as the load on the server increases. To test this, we repeatedly tested the server with an increasing number of concurrent requests, giving the server a 10-minute pause after each test, to finish all of the requests and run garbage collection.

Overall Performance

AEM 6.1 was able to scale up to 1000 concurrent requests with a negligible error rate. However, as the requests increased, the response times increased drastically, eventually reaching an average request time of 26.178 seconds.

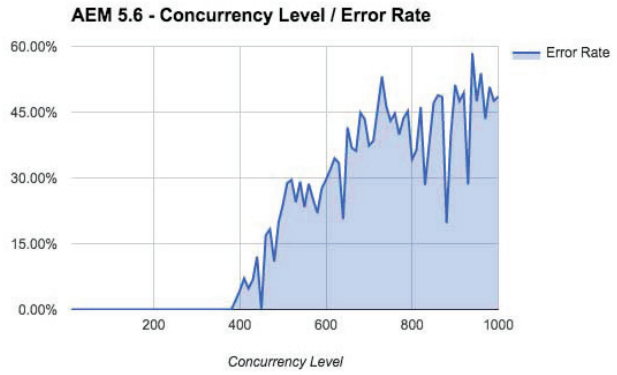


Interestingly enough, AEM 5.6 did not have the same linear increase of time per request. Unlike AEM 6.1, AEM 5.6 encounters stability issues at higher concurrency levels, and although performance seems to be better, it is a factor of the server throwing errors rather than responding to requests.

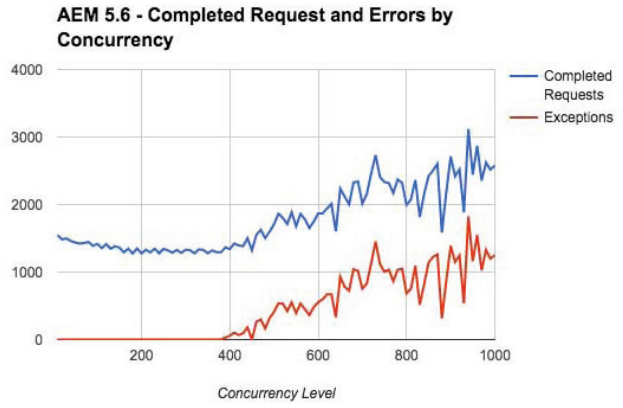


AEM 5.6 Errors Under Load

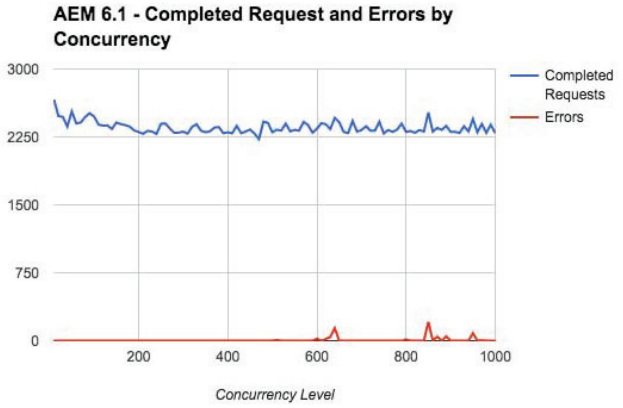
AEM 5.6 started having serious stability issues at 400 concurrent requests. This resulted in an average of 18.73% error rate for 400-600 concurrent requests, 39.27% for 600-800 concurrent requests, and an average of 43.52% error rate for 800-1000 concurrent requests.



The correlation between the error rate and concurrency is even more clear when comparing the number of completed requests and errors. As the number of requests increases over the 400 request threshold, the error rate increases drastically, eventually reaching nearly 50% error rate.

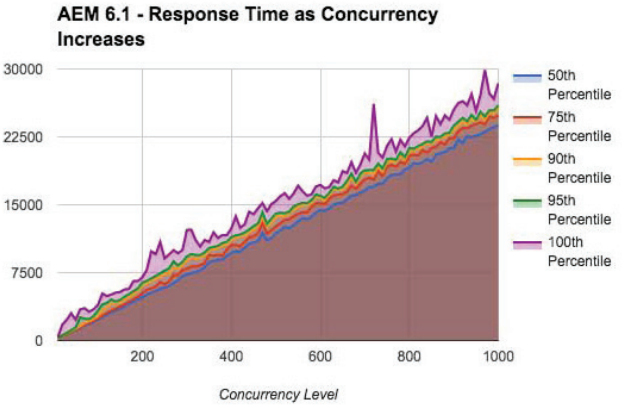


AEM 6.1 was not affected by this, and it had a negligible error rate up to 1000 concurrent requests.

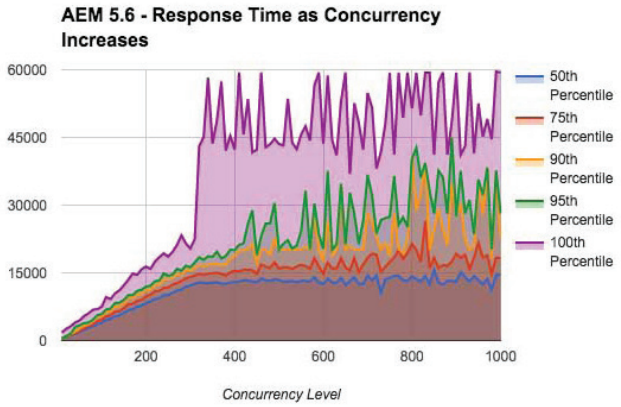


Performance Percentiles

The stability of AEM 6.1 is also reflected in the performance percentiles. In AEM 6.1 the performance percentiles increase along with the average response time at an average of 105.34% at the 50th percentile and 107.01% at the 100th percentile.



The increase in AEM 5.6 was more erratic, again due to the error rate, but increased at an average of 104.58% in the 50th percentile and 105.74% at the 100th percentile.



Based on these results, AEM 6.1 scales far better and is more stable under load than AEM 5.6. This is especially important for websites that are highly dynamic or personalized, as the performance of the publisher will have a direct impact on the user's perceived performance.

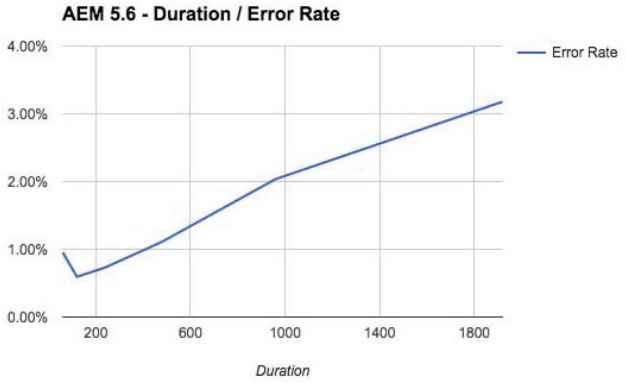
EXTENDED LOAD TESTING

Aside from testing AEM 5.6 and 6.1 under relatively short bursts of traffic, we also tested both AEM instances under longer durations. This was to determine if performance characteristic change when under extended load or if there were outliers not being captured by our shorter tests.

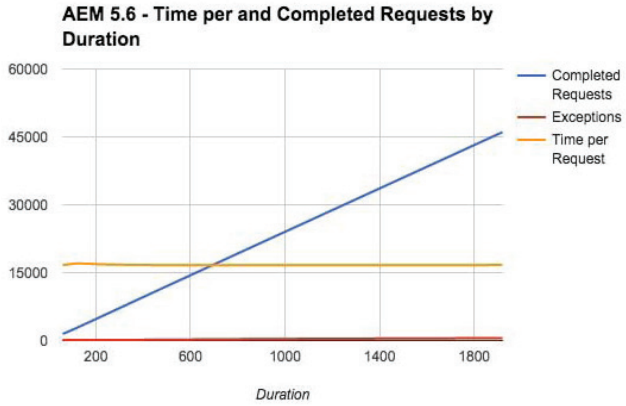
To do this, we ran tests with 400 concurrent requests where the test's duration doubled every subsequent run, reaching 30 minutes. Unfortunately, a hard limit of 50,000 requests per test in Apache Benchmark prevented longer running tests.

AEM 5.6

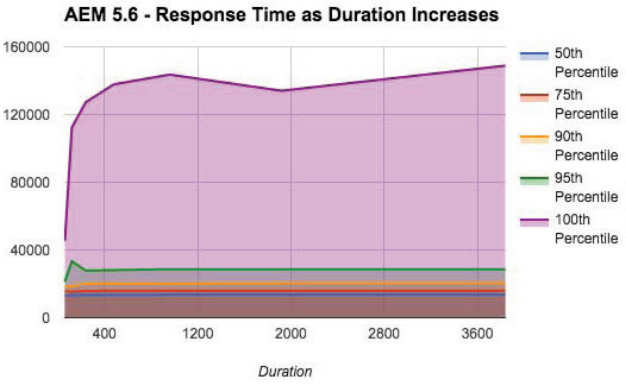
In AEM 5.6, the error rate did increase as the test duration increased, however not by a statistically significant amount, climbing from approximately 1% to 3%.



Performance testing confirmed that in AEM 5.6, the duration of the load doesn't seem to matter, with the time per requests remaining essentially flat and the number of completed requests increasing linearly.

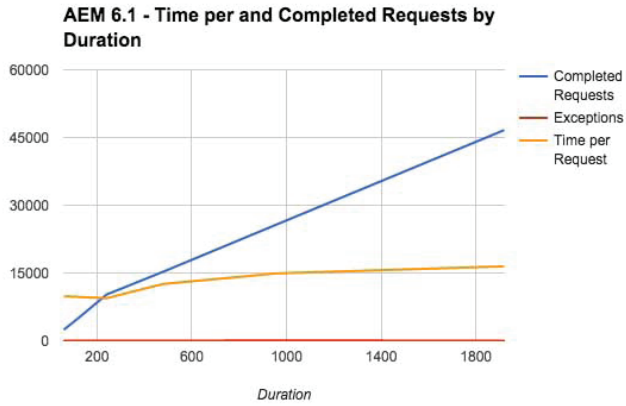


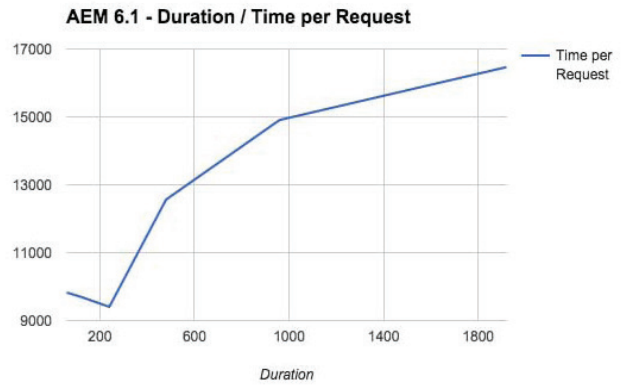
One very interesting finding is that AEM 5.6 has extreme outliers on long running tests. In longer running tests, the longest request is five times longer than the 95th percentile of time per request.



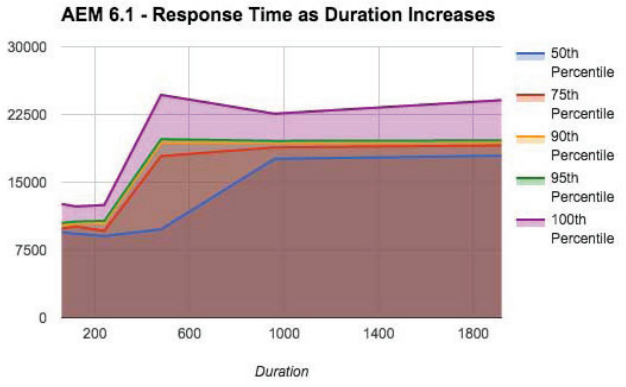
AEM 6.1

In AEM 6.1, the error rate remained insignificant, however when under load for a longer duration, the time per request increased dramatically, nearly doubling from 9.8s at a duration of one minute to 16.5s at a duration of 30 minutes.





Unlike AEM 5.6, AEM 6.1 did not experience the drastic outliers on the longest requests. Instead, the request percentiles remained relatively consistent, though increasing as the test duration increased.



CONCLUSION

AEM 6.1 offers significant performance advantages over AEM 5.6, which will be especially important for websites that utilize personalization or are highly dynamic.

From a raw performance perspective, AEM 6.1 is approximately two times as performant as AEM 5.6. Also, AEM 6.1 is far more stable, performant, and error-resistant than AEM 5.6 under load. This is especially true for responding to bursts of traffic; however, when under extended loads, the performance gap narrows.

AEM users can expect a significant increase of performance and stability when upgrading from AEM 5.6 to AEM 6.1—especially in response to unpredictable increases of traffic. One caveat, however, is AEM 6.1 users must be careful to properly size their environment to ensure the publish instances have excess capacity and are not consistently under heavy load.

Contact 6D for a Complimentary Digital Assessment or Solution Demo:

info@6Dglobal.com
(646) 681-2345

6D GLOBAL

6D Global is a premier digital experience solutions provider. Our services and products allow our customers to create remarkable digital experiences across marketing channels and devices, optimize and measure it, and achieve greater performance, return, and success. We help our customers stay relevant in the digital world and offer services in web experience, mobile, analytics, creative and marketing management.