

Performance of WMS Services as a Means of Serving NAIP Imagery

Two WMS services were setup:

1. ESRI ArcGIS Server- Image Server (henceforth referred to as Image Server)
2. LizardTech Express Server (henceforth referred to as Express Server)

Both services were implemented on the same server:

Processor: 2- Intel Xeon Dual Processor, X5260 3.33 Ghz each 6 MB Cache, 1333 MHz FSB

Hard Drive: Six 300 GB Serial Attached SCSI, 15,000 RPM

Memory: Two 4 GB DDR2, 667 Mhz (8GB total)

Both services served the same number of DOQQ's (approximately 5000) collected in 2008 as part of the Washington state NAIP acquisition.

- The file format used for the Image Server service was Y-compressed GeoTIFF with files stored on the server's D:\WA_Test folder. An Image service definition file was created by cataloging this folder. Default optimization was used (i.e., an overview was produced as well as a spatial footprint layer). Note, Y-compressed GeoTIFF is considered by ESRI to be the optimal file format to use with Image Server.
- The file format used for the Express Server service was Mr SID (15:1 compression) with files stored on the server's D:\WANAIP folder. Default optimization was used (i.e., an overview and spatial index update was performed).

Performance testing was conducted on 16, 17, and 22 June 2009 using Pylot Open Source Web Performance tools. During these tests the server was monitored as was the network.

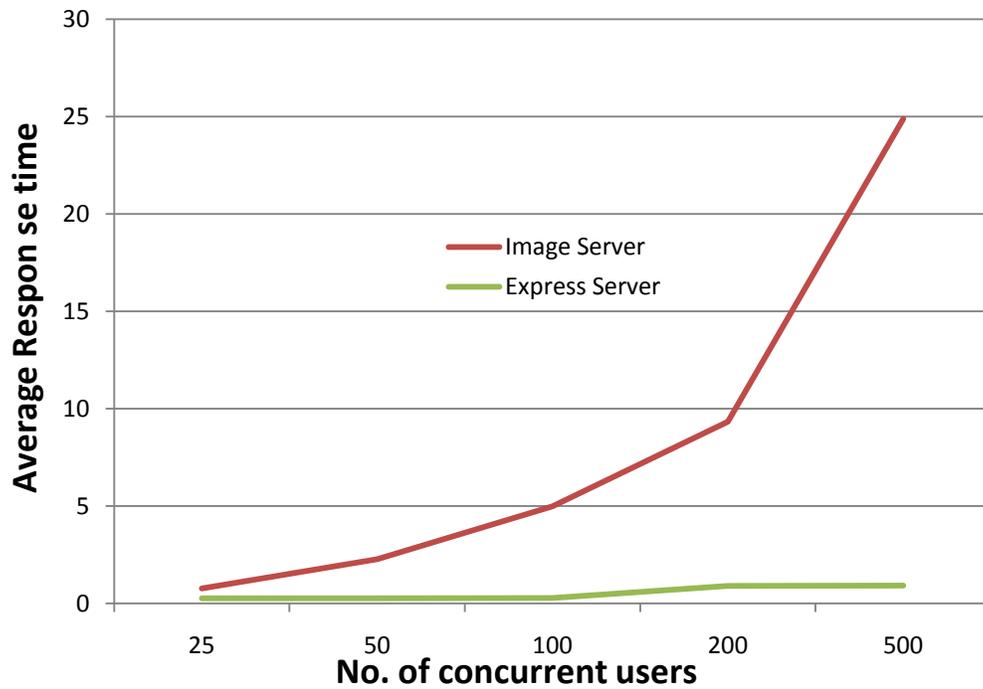
This test applied 25, 50, 100, 200, and 500 simultaneous user agents to each WMS service sequentially. For instance, the test began with 25 concurrent users visiting, zooming, and panning the Image Server WMS and then leaving the service after a period of 10 minutes. Next, 25 concurrent user agents visited (etc) the Express Server WMS for 10 minutes and then left. This routine continued until all iterations were completed. Express server tests were repeated on the 17th and 22nd to validate results.

Detailed results from Pylot performance tool testing can be viewed by visiting

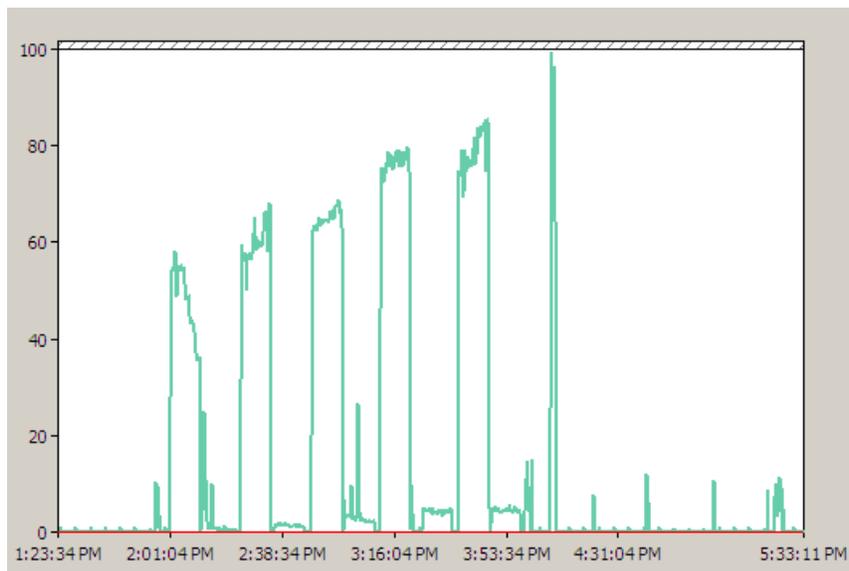
<http://geoinfo1.lib.uidaho.edu/loadtest/>

Performance Test Summary

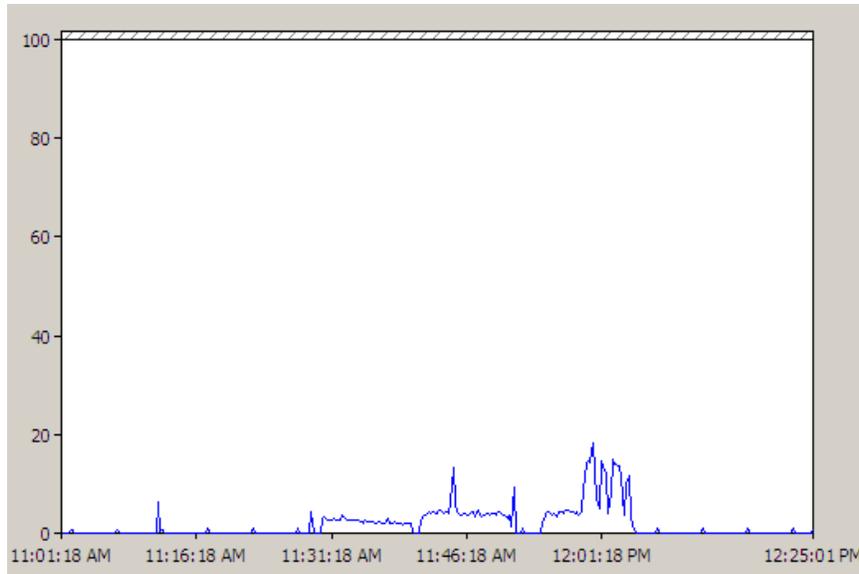
Pylot web performance



Server performance



Percent processor time. Note the large spike, followed by a smaller spike and recall the order of testing (Image server --- Express Server)

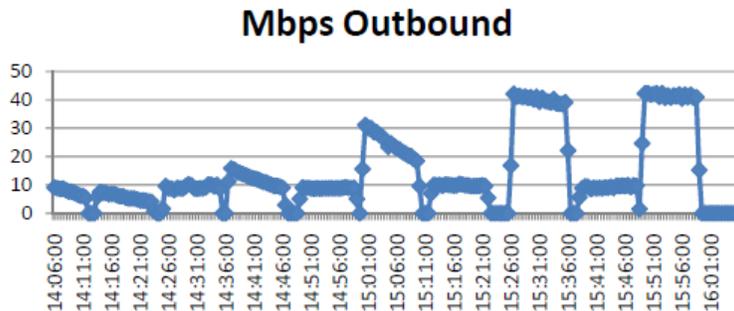


Percent processor time from 17-June-2009 (only Express Server was tested)

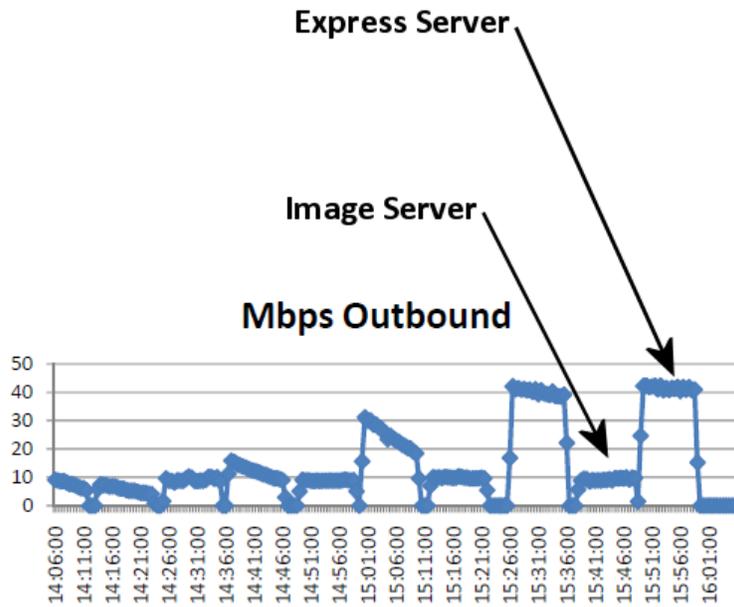
Note: Image server with 500 concurrent users consumed over 80% of server CPU resources whereas Express Server never required more than 20%.

Network Monitoring Results

During both the June 16th and 17th performance tests the ISU network was monitored for traffic between the requesting server running Pylot software and the WMS server. At no time did the network usage exceed 45% capacity. This was based upon a 100Mbps network using Internet 2.



However, nearly 45% usage was achieved during the 500 concurrent user tests and this was effectively consumed by the WMS services alone. The network therefore appears to be the primary bottleneck.



There are ten distinct spikes of activity shown in the above graph. These represent 10 tests, or rather five distinct user agent tests on two separate WMS services. The first in each series represents Image server results and the second represents Express server results. The most distinct series is shown on the far right of the graph and represents 500 concurrent users. These results may appear in contrast to results reported above however this graph displays megabits per second. Since Image server required nearly 25 seconds to respond to each user request the *rate* of data transmission was much less per second compared to Express server which required < 1 second to respond to the same request. Consequently its rate of data transmission was much higher per second.

The result however is a real network traffic difference and while Express server offers the best performance for the end-user, the network used to facilitate this service will experience a large traffic flow when concurrent user numbers exceed 100.