Empirical Analysis

- Gary Miller
- Andre Bryan

LLSocket vs LSSocket

Several analysis tests were conducted on both the LLSocket and LSSocket client-servers to determine the efficiency of either structure. This tets was done by using a doubling experiment in which the size of the "long" message was made increasingly larger and the time it took to transmit the data was measured. The input sizes used were arrays of integers that were of lengths 10,000, 20,000, 40,000, 80,000, 160,000, and 320,000. Overall, the strucutres were similar in time with no clear pattern of whihc structure was faster. Each input size was ran five times, then from this sample a mean and standard deviation was calculated. This is shown in figure 1 below:

LL				LS		
input size	mean	std dev		input size	mean	std dev
10000	0.5308	0.7821		10000	0.1854	0.0124
20000	0.629	0.0108		20000	0.6482	0.0172
40000	1.8116	0.0158		40000	1.8252	0.0035
80000	5.1996	0.0483		80000	5.1642	1.8023
160000	19.453	0.3890		160000	19.161	0.3741
320000	87.957	0.5089		320000	88.483	0.7782

Due to the fact there was no consistent data showing one strucutre was faster than the other the difference in mean runtime was analyzed for each input size. The last column in figure two shows the mean runtime of LLSocket minus the mean runtime of the LSSocket.

input size	LL	Ls	Time Difference	
10000	0.5308	0.1854	0.3454	
20000	0.629	0.6482	-0.0192	
40000	1.8116	1.8252	-0.0136	
80000	5.1996	5.1642	0.0354	
160000	19.4532	19.1618	0.2914	
320000	87.9576	88.483	-0.5254	
		Average Difference	0.019	

By looking at the mean runtime of each strucutre at the different input sizes the final result was the the LSSocket was on average .019 seconds faster. This was done by finding the average of the difference in runtime for each input size. While this result may seem like a rather small differce, it can be hypothesized that this difference in runtime will continue to grow as input sizes because exceptinally large.

SLSocket vs SSSocket

An analysis was also ran to compare the SLSocket versus the SSSocket. One important thing to note is that due to the nature os the SSSocket structure, there is no change in input size, as it is a constant single value. Whereas the SLSocket will have an increasingly large input size for the response, similar to the doubling experiment conducted for the LL verus LS experiment. Figure 3 shows the increase in time needed to conduct the request and reply between the client and server as well as the constant time it take for the SSSocket strucutre needs to conduct the experiment. The overall conclusion from this experiment was that the SSSocket strucutre is faster due to the much smaller amount of data that will be needed to transfer over the connection.

SL Input Size	time	std dev		SS	
10000	0.0768	0.02381596 1		Average Time	0.0124
20000	0.123	0.01380217 37		Std Dev	0.00433589 67
40000	0.3178	0.02606146 58			
80000	0.9114	0.05010289 41			
160000	2.7098	0			
320000	10.3086	0.05984396 38			