Performance Analysis

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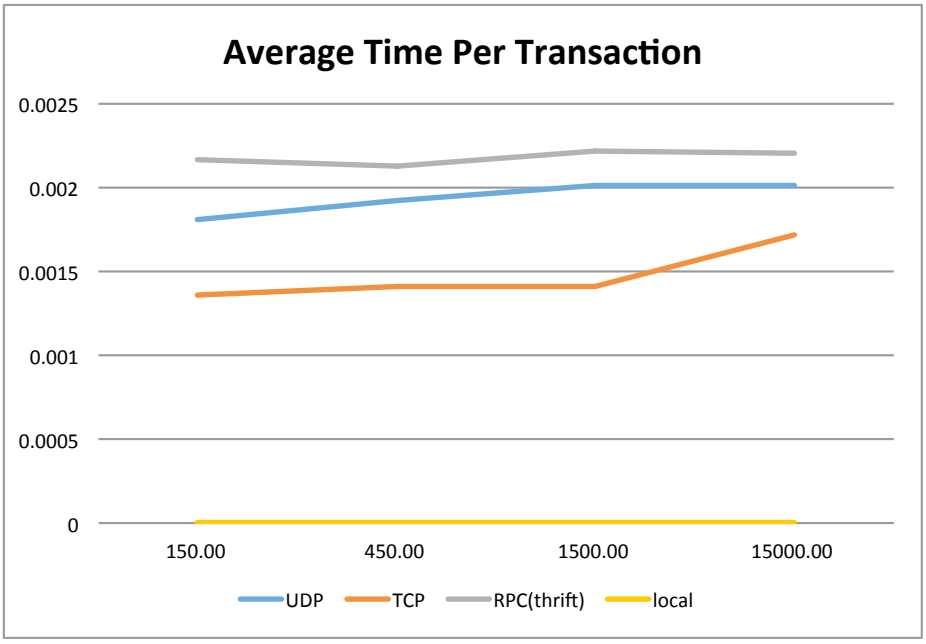
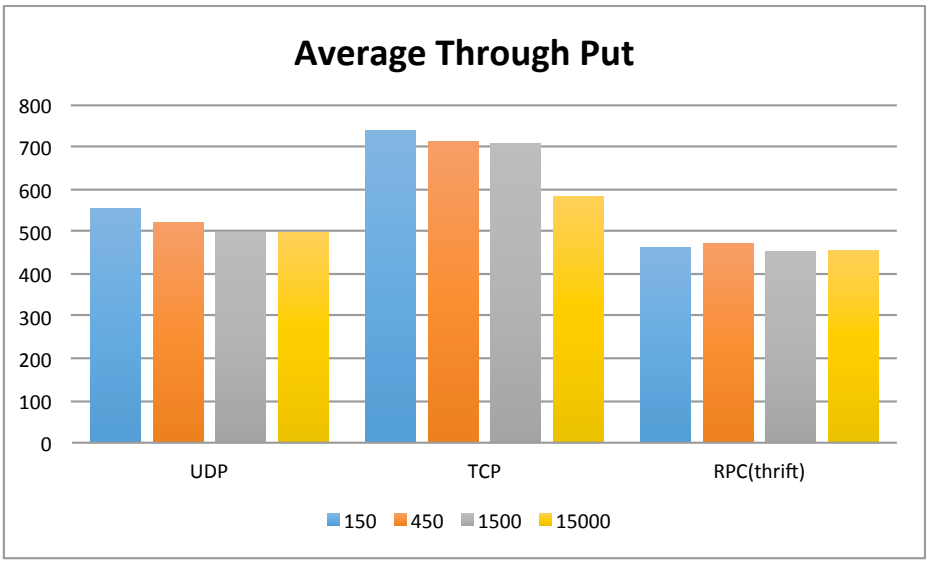
Result Summary

In our experiments, TCP always has the best performance, UDP the second and RPC the worst. It is kind of anti-intuitive since we're expecting UDP to have the best performance since it's much simpler than TCP. This is what we called TCP/UDP mystery. Almost identical codes are used to send messages, handle messages and count elapsed time. We used different nodes and different instances of k-v databases and still ended in the same way. We have checked our data, network conditions, codes and results to make sure everything works correctly, but still no idea why UDP is outperformed. Later, more experiments revealed a big variance in the performance both regarding TCP and UDP but also confirmed the mystery at the same time. I (Jiacheng Liu) have feeling that it python multithread mechanism or the way we use multithreads in UDP server may have something to do with the phenomena.



We can see from the chart above, as the data scales up, the cost of TCP and UDP gradually growing, while RPC remains around the same. In all cases, local k-v performance is way better than others, which means, the time cost variance is mostly depended on network communications.



It will make much more sense if the label ‘UDP’ and ‘TCP’ are switched. But the fact is , we didn’t record the number in the wrong place nor did we mess up with ’s.recv()’ and ‘s.recvform()’.

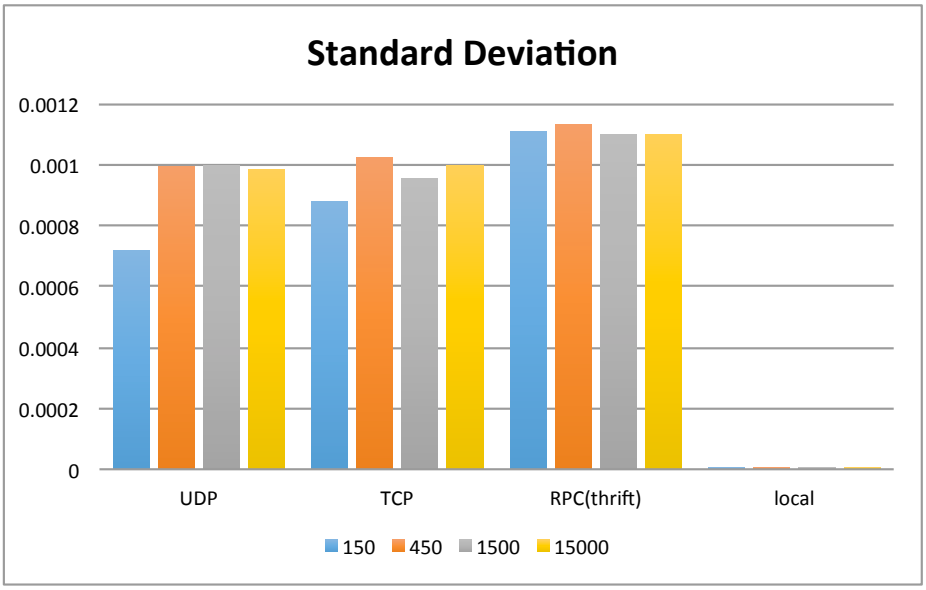


Table in details:

Average Time per Transaction				
Data Load (#of commands)	UDP	TCP	RPC(thrift)	local
150	0.001805662	0.001352976	0.002160333	0.0000028356
150×3	0.001922187	0.001405676	0.002118373	0.0000040000
150×10	0.002009229	0.001411843	0.002212935	0.0000028500
150×100	0.002011238	0.001716986	0.002194689	0.0000029500
Standard Deviation				
Data Load	UDP	TCP	RPC(thrift)	local
150	0.000718383	0.000880444	0.001108891	0.0000014294
×3	0.000995443	0.001023353	0.001133238	0.0000014482
×10	0.000998413	0.000952871	0.00109792	0.0000023280
×100	0.000984472	0.000995904	0.001099678	0.0000020690
Average Throughput				
Data Load	UDP	TCP	RPC(thrift)	local
150	553.8136518	739.1113215	462.891601	352660
×3	520.2406721	711.4016533	472.0602977	350108
×10	497.7033025	708.2938223	451.8849628	249968
×100	497.2061348	582.4157787	455.6452517	338459