Math for DHADVTKV

July 15, 2019

1 2PC

$$\begin{aligned} bestTT = &\frac{\#P(H+16)}{bandwidth} + s + l + \frac{\#P(H+1064)}{bandwidth} + \#P * s + l \\ &+ \frac{\#P(H+1080)}{bandwidth} + s + l + \frac{\#P(H+9)}{bandwidth} + \#P * s + l \\ &+ \frac{\#P(H+33)}{bandwidth} + s + l \frac{\#P(H)}{bandwidth} + \#P * s + l \\ &= 6l + 3s(\#P+1) + \frac{6 * \#P * H + 2202 * \#P}{bandwidth} \end{aligned} \tag{1}$$

$$\begin{aligned} avgUsedBandwidth = &\#P(H+16) + \#P(H+1064) \\ &+ \#P(H+1080) + \#P(H+9) \\ &+ \#P(H+33) + \#P(H) \\ &= 6 * \#P * H + 2202 * \#P \end{aligned} \tag{2}$$

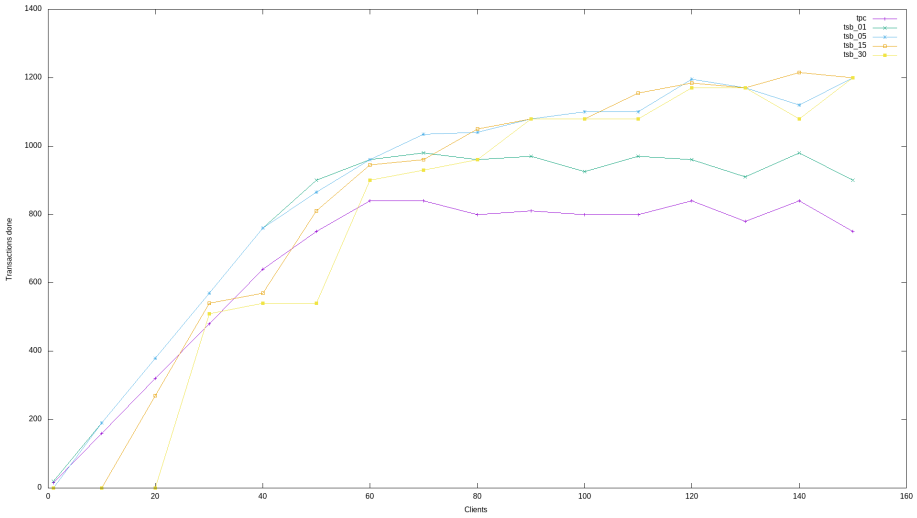
2 TSB

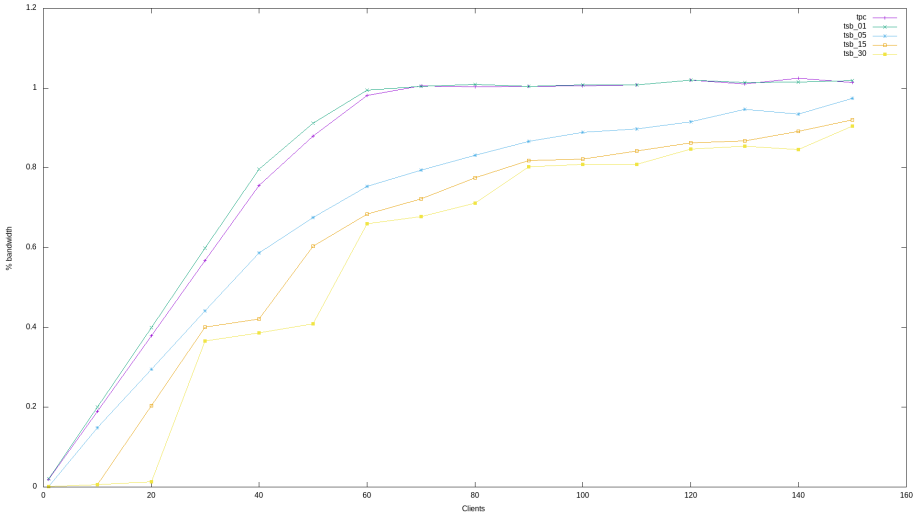
$$\begin{aligned} bestTT = &\frac{\#P(H+16)}{bandwidth} + s + l + \frac{\#P(H+1064)}{bandwidth} + \#P * s + l \\ &+ \frac{\#P(H+1092)}{bandwidth} + s + l + \frac{\#P(H+57*batchSize)}{bandwidth} + \#P * s + l \\ &+ \frac{H+17}{bandwidth} + s + l \frac{\#P(H+25*batchSize)}{bandwidth} + s + l \\ &= 6l + 2s(2+\#P) + \frac{H(1+5*\#P) + \#P(2172+82*batchSize) + 17}{bandwidth} \end{aligned} \tag{3}$$

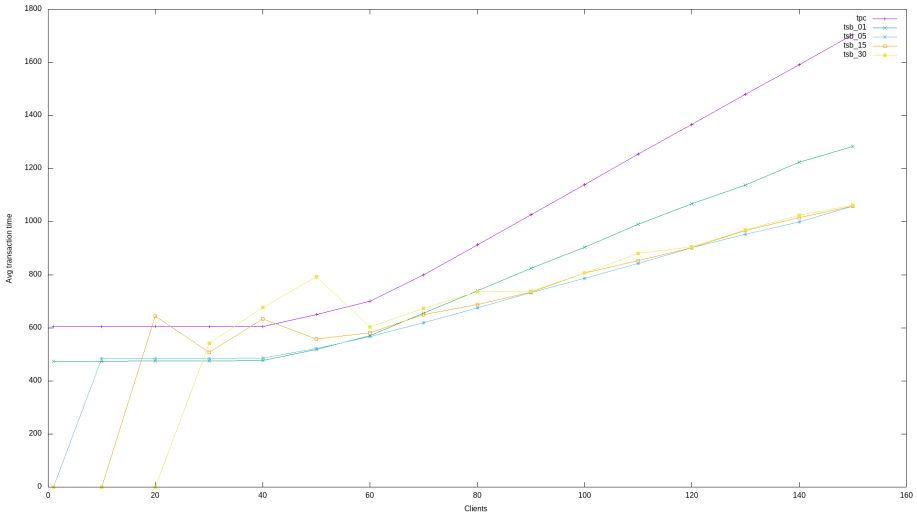
$$
\begin{aligned}
avgUsedBandwidth &= \#P(H+16) + \#P(H+1064) \\
&\quad + \#P(H+1092) + \#P(H/batchSize + 57) \\
&\quad + H + 17 + \#P(H/batchSize + 25) \\
&= \#P * H(3 + 2/batchSize) + 2254 * \#P + H + 17
\end{aligned}
\tag{4}
$$

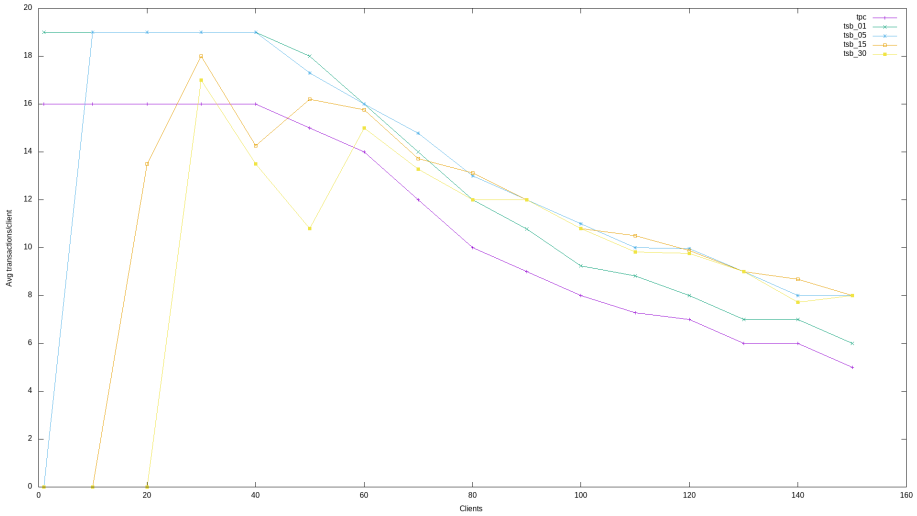
3 Experimental results

The next plots show the results of simulating a system with 8 partitions and network speed of 10 Gbps and a delay of communication between nodes of 100 μs.




tpc
tsb_01
tsb_05
tsb_15
tsb_30
% bandwidth
Clients
0
0.2
0.4
0.6
0.8
1
1.2
0
20
40
60
80
100
120
140
160


tpc
tsb_01
tsb_05
tsb_15
tsb_30
Avg transaction time
Clients
0
200
400
600
800
1000
1200
1400
1600
1800
0
20
40
60
80
100
120
140
160


tpc
tsb_01
tsb_05
tsb_15
tsb_30
Avg transactions/client
Clients
0
2
4
6
8
10
12
14
16
18
20
0
20
40
60
80
100
120
140
160