|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | Serial | Parallel 2 | Parallel 8 | Parallel 16 | Parallel 32 |
| 100 | prod | 23.000000s | 12.000000s  24.950001s | 12.000000s  106.320000s | 16.000000s  224.750000s | 16.000000s  484.540009s |
| cons | 23.200000s | 12.000000s  25.350000s | 12.000000s  113.790001s | 17.000000s  245.880005s | 16.000000s  541.750000s |
| command | real 0m23.280s user 0m23.210s sys 0m0.005s | real0m12.767s  user0m25.343s  sys0m0.018s | real0m3.727s  user0m28.734s  sys0m0.145s | real0m2.221s  user0m32.689s  sys0m0.312s | real0m1.599s  user0m31.599s  sys0m7.690s |
| 1000 | prod | 215.000000s | 113.000000s  224.809998s | 124.000000  967.859985s | 120.000000s  2019.900024s | 144.000000s  3995.599854s |
| cons | 215.199997s | 113.000000s  225.199997s | 124.000000s  975.329956s | 125.000000s  2046.400024s | 160.000000s  4135.319824s |
| command | real 3m35.259s user 3m35.208s sys 0m0.010s | real1m52.619s  user3m45.181s  sys0m0.030s | real0m30.657s  user 4m4.301s  sys 0m0.170s | real0m16.140s  user4m16.831s  sys0m0.324s | real0m9.538s  user4m14.632s  sys0m6.857s |
| 5000 | prod | 1104.000000s | 578.000000s  1155.619995s | 628.000000s  5010.109863s | 640.000000s  10311.279297s | 736.000000s  20763.810547s |
| cons | 1103.560000s | 578.000000s  1156.039917s | 628.000000s  5016.099609s | 644.000000  10337.200195s | 742.000000s  20851.589844s |
| command | real 18m23.693s user 18m23.558s sys 0m0.012s | real9m38.088s  user. 19m15.992s  sys0m0.056s | real2m36.935s  user20m54.510s  sys 0m0.206s | real1m20.929s  user21m33.042s  sys0m0.395s | real0m46.789s  user21m34.400s  sys0m12.279s |
| 10000 | prod | 2232.000000s | 1166.000000  2332.709961s | 1244.000000  9950.529297s | 1288.000000s  20615.509766s | 1440.000000s  42344.345324s |
| cons | 2231.979980s | 1167.000000s  2333.090088s | 1244.000000s  9959.879883s | 1288.000000s  20645.070312s | 1448.000000s  42345.347864s |
| command | real 37m12.130s user 37m11.970s sys 0m0.026s | real 19m26.596s  user 38m52.973s  sys 0m0.129s | real5m11.414s  user41m29.944s  sys 0m0.205s | real2m41.456s  user43m1.355s  sys0m0.399s | real 1m36.423s  user 44m32.332s  system 17.424s |

This table is the performance comparison between “serial” and “parallel 2,8,16,32”. And we can see that by using multi-thread for the producer module and a second thread for the consumer:

As the number of threads rises:

1. “real” time decreases by times.2 is nearly 2 times, 8 is nearly 8 times, 16 is nearly 16 times, 32 is nearly 32 times
2. “time” rises a little with the increase of the number of threads(2->8->16->32)
3. “clock” increases by times.
4. all parallel ones’ times are nearly half of “serial” one