CSE 160
PA3 Task3 Report
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all data were collected using data: blkSize:512, N:4, M:4, P:4, Serial Time: 62.168

1. Case: Single Machine, 4 worker

   standard output
   Parameters: 512, 4, 4, 4, 4
   Worker 1: 16, 18.17000000 Worker 2: 16, 18.19000000
   Worker 3: 16, 18.16000000 Worker 4: 16, 18.19000000
   Total Time: 18.26000000
   Nodes: tscc-0-34

   mpirun command
   mpirun —np 5 —mca btl self,sm,tcp ./mmmw 512 4 4 4 out
   TSCC node: tscc-0-34

   Expected result: moderate speed up compared to the serial code (2 to 3 times faster)
   Measured speed up: 3.405 **Calculated efficiency:** 0.8511

   Conclusion: My parallel program is running well on single machine with 4 workers

2. Case: Single Machine, 8 worker

   standard output
   Parameters: 512, 4, 4, 4, 8
   Worker 1: 8, 8.77000000 Worker 2: 8, 9.14000000
   Worker 3: 8, 8.80000000 Worker 4: 8, 9.16000000
   Worker 5: 8, 8.79000000 Worker 6: 8, 9.13000000
   Worker 7: 8, 8.77000000 Worker 8: 8, 9.14000000
   Total Time: 9.21000000
   Nodes: tscc-0-39

   mpirun command
   mpirun —np 9 —mca btl self,sm,tcp ./mmmw 512 4 4 4 out
   TSCC node: tscc-0-39

   Expected result: decent speed up compared to the serial code (6 to 8 times faster). Faster than single machine with 4 workers
   Measured speed up: 6.75 **Calculated efficiency:** 0.8437

   Conclusion: My parallel program is running well on single machine with 8 workers

3. Case: Single Machine, 15 worker
   standard output
   Parameters: 512, 4, 4, 4, 15
   Worker 1: 4, 4.67000000 Worker 2: 4, 4.65000000
   Worker 3: 4, 4.65000000 Worker 4: 4, 4.66000000
   Worker 5: 4, 4.65000000 Worker 6: 4, 4.65000000
   Worker 7: 4, 4.65000000 Worker 8: 4, 4.65000000
   Worker 9: 4, 4.65000000 Worker 10: 4, 4.64000000
   Worker 11: 4, 4.65000000 Worker 12: 5, 5.80000000
   Worker 13: 5, 5.83000000 Worker 14: 5, 5.80000000
   Worker 15: 5, 5.83000000
   Total Time: 5.85000000
   Nodes: tscc-0-18

   mpirun command
   mpirun —np 16 —mca btl self,sm,tcp ./mmmw 512 4 4 4 out
   TSCC node: tscc-0-39

   Expected result: great speed up compared to the serial code (10 to 15 times faster). Faster than single machine with 4 and 8 workers
   Measured speed up: 10.627 **Calculated efficiency:** 0.7084

   Conclusion: My parallel program is running well on single machine with 15 workers. The efficiency has dropped a little bit on this given problem size.

4. Case: TCP connection, 4 worker
   standard output
   Parameters: 512, 4, 4, 4, 4
   Worker 1: 16, 17.08000000 Worker 2: 16, 17.08000000
   Worker 3: 16, 17.12000000 Worker 4: 16, 17.10000000
   Total Time: 19.21000000
   Nodes: tscc-0-19 tscc-0-33 tscc-0-5 tscc-0-57 tscc-0-8

   mpirun command
   mpirun —np 5 —mca btl self,tcp —mca btl_tcp_if_include 132.249.107.0/24 —map-by node ./mmmw 512 4 4 4 out
   TSCC connection: TCP Connection

   Expected result: moderate speed up compared to the serial code (2 to 3 times faster). Faster than serial code, but slower than single machine with 4 worker
   Measured speed up: 3.2362 **Calculated efficiency:** 0.8090

   Conclusion: My parallel program is running well on 4 workers connected via TCP.

5. Case: TCP connection, 8 worker
   standard output
   Parameters: 512, 4, 4, 4, 8
   Worker 1: 8, 8.56000000 Worker 2: 8, 8.58000000
   Worker 3: 8, 8.61000000 Worker 4: 8, 8.59000000
   Worker 5: 8, 8.55000000 Worker 6: 8, 8.57000000
   Worker 7: 8, 8.57000000 Worker 8: 8, 8.55000000

Total Time: 10.25000000
Nodes: tscc-0-0 tscc-0-15 tscc-0-23 tscc-0-24 tscc-0-37 tscc-0-38 tscc-0-4 tscc-0-5 tscc-0-5

mpirun command
mpirun —np 9 —mca btl self,tcp —mca btl_tcp_if_include 132.249.107.0/24 —map-by node ./mmmw 512 4 4 4 out
TSCC connection: TCP Connection

Expected result: decent speed up compared to the serial code (4 to 8 times faster). Faster than serial code and 4 workers via TCP, but slower than single machine with 8 workers
Measured speed up: 6.0652 **Calculated efficiency:** 0.7561

Conclusion: My parallel program is running well on 8 workers connected via TCP. The efficiency has dropped a little bit on this given problem size.

6. Case: TCP connection, 15 worker
standard output
Parameters: 512, 4, 4, 4, 15
Worker 1: 4, 2.60000000 Worker 2: 4, 2.34000000
Worker 3: 7, 1.20000000 Worker 4: 3, 3.17000000
Worker 5: 4, 3.55000000 Worker 6: 4, 3.59000000
Worker 7: 4, 4.24000000 Worker 8: 4, 4.24000000
Worker 9: 4, 4.23000000 Worker 10: 4, 4.25000000
Worker 11: 4, 4.24000000 Worker 12: 4, 4.22000000
Worker 13: 4, 4.24000000 Worker 14: 5, 5.30000000
Worker 15: 5, 5.30000000
Total Time: 6.75000000
Nodes: tscc-0-0 tscc-0-13 tscc-0-18 tscc-0-2 tscc-0-23 tscc-0-27 tscc-0-29 tscc-0-32 tscc-0-36 tscc-0-38 tscc-0-39 tscc-0-4 tscc-0-5 tscc-0-57 tscc-0-58 tscc-0-62

mpirun command
mpirun —np 16 —mca btl self,tcp —mca btl_tcp_if_include 132.249.107.0/24 —map-by node ./mmmw 512 4 4 4 out
TSCC connection: TCP across tscc-0-0 tscc-0-15 tscc-0-23 tscc-0-24 tscc-0-37 tscc-0-38 tscc-0-4 tscc-0-5 tscc-0-5

Expected result: great speed up compared to the serial code (10 to 15 times faster). Faster than serial code, 4 and 8 workers via TCP, but slower than single machine with 15 workers
Measured speed up: 9.2101 **Calculated efficiency:** 0.6140

Conclusion: My parallel program is running well on 15 workers connected via TCP. The efficiency has dropped on this given problem size (the cost of message passing is displayed).