

Speedup Evaluation

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st315-001@st315-001-VirtualBox:~$ time mpirun -np 4 -hostfile hostfile ./mpi_quicksort
Authorization required, but no authorization protocol specified

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Sorted data:
35085211 42999170 84353895 135497281 137086862 149790315 184003526 233665123 278722862 294702567 304089172 336465782 356426800 412776091 424238335 468703135 491705403 511702305 5215953
68 572660336 596516640 608413784 610515434 620175811 635723050 709393584 719805386 749241873 752392754 756898537 760313758 783368690 805750846 846038886 855636226 859484421 861021530 9
38019582 943947739 945117276 982986996 1025202362 1059961393 1100661313 1101513929 1102520059 1125898167 1129566413 1131176229 1141616124 1159126585 1189641421 1264095060 1303455736 13
15634022 1350490027 1365180540 1369133869 1374344843 1411549676 1424268980 1433925857 1469340894 1474612399 1477171087 1540383426 1548233367 1585990364 1632621729 1649768492 1653377373
1656478042 1681692777 1714636915 1726956429 1734575198 1749698586 1780695788 1801979802 1804289383 1827336327 1843993368 1889947178 1911759956 1914544919 1918502651 1937477084 1956297
539 1957747793 1967513926 1973594324 1984210012 1998098814 2001100545 2038664370 2044897763 2053999932 2084420925 2089018456 2145174067

real    0m0.869s
user    0m0.086s
sys     0m0.130s

st315-001@st315-001-VirtualBox:~$ time mpirun -np 4 -hostfile hostfile ./mpi_opencl_quicksort
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15634022 1350490027 1365180540 1369133869 1374344843 1411549676 1424268980 1433925857 1469340894 1474612399 1477171087 1540383426 1548233367 1585990364 1632621729 1649768492 1653377373
1656478042 1681692777 1714636915 1726956429 1734575198 1749698586 1780695788 1801979802 1804289383 1827336327 1843993368 1889947178 1911759956 1914544919 1918502651 1937477084 1956297
539 1957747793 1967513926 1973594324 1984210012 1998098814 2001100545 2038664370 2044897763 2053999932 2084420925 2089018456 2145174067

real    0m0.883s
user    0m0.124s
sys     0m0.173s
st315-001@st315-001-VirtualBox:~$
```

Time

MPI Version

real: 0m0.869s

user: 0m0.086s

sys: 0m0.130s

MPI + OpenCL Version

real: 0m0.883s

user: 0m0.124s

sys: 0m0.173s

Speedup Comparison

The MPI Version completes the task slightly faster than the MPI + OpenCL Version:

- MPI real time: 0.869 seconds

- MPI + OpenCL real time: 0.883 seconds

This slight difference shows that for the problem size and setup in this case, using OpenCL did not

significantly speed up the sorting process. The primary reason for this could be the overhead of setting up OpenCL contexts, memory management, and the fact that the problem size might not be large enough to fully benefit from GPU acceleration.

In smaller workloads or less complex tasks, the initialization and memory transfer costs in OpenCL can outweigh the computational benefits provided by GPU offloading. Therefore, the extra cost of offloading to OpenCL on GPUs resulted in similar or slightly slower performance compared to the MPI-only version.

Github Link

<https://github.com/Lonely-DM/SIT315/tree/main/M3.T2C>

Video Link

<https://youtu.be/oqKfpjWS1ps>