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Matrix Multiplication ijk Forms with MPI

Report

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1. Description

For all the form I broadcast B.

Evenly distribute matrix A by looking at the rows and number of processors.

If the row is odd numbers some processors will take more rows, and some will take less rows.

The only different from ijk, ikj and kji is that the loop that they calculate is different, MPI_Scatterv handle the distribution

2. Table timing

ijk		Times		
		1	2	3
cores	1	2073.692	**1653.24**	1842.34
	4	**718.41**	782.02	738.94
	12	365.86	**342.73**	390.91
	16	253.21	**211.82**	271.6
	20	**152.35**	162.21	182.07

ikj		Times		
		1	2	3
cores	1	**532.34**	562.08	535.11
	4	295.72	**274.59**	291.17
	12	95.01	102.73	**93.56**
	16	73.42	74.9	**73.21**
	20	61.27	62.15	**59.34**

kij		Times		
		1	2	3
cores	1	612.87	589.81	**569.12**
	4	**275.31**	278.25	286.36
	12	96.81	**94.03**	94.91
	16	**73.55**	77.24	74.6
	20	**60.02**	61.65	60.94

3. Table speedup and Efficiency

ijk Times	Speed up	Efficiency
1653.24	100	1
718.41	230.1249	0.575312
342.73	482.3739	0.401978
211.82	780.4929	0.487808
152.35	1085.159	0.54258

ikj Times	Speed up	Efficiency
532.34	100	1
274.59	193.8672	0.484668
93.56	568.9825	0.474152
73.21	727.1411	0.454463
59.34	897.1014	0.448551

kij Times	Speed up	Efficiency
569.12	100	1
275.31	206.7197	0.516799
94.03	605.2536	0.504378
73.55	773.7865	0.483617
60.02	948.2173	0.474109

4. Graph speedup

ikj Speedup

kij Speed up

5. Graph Efficiency

ijk efficiency
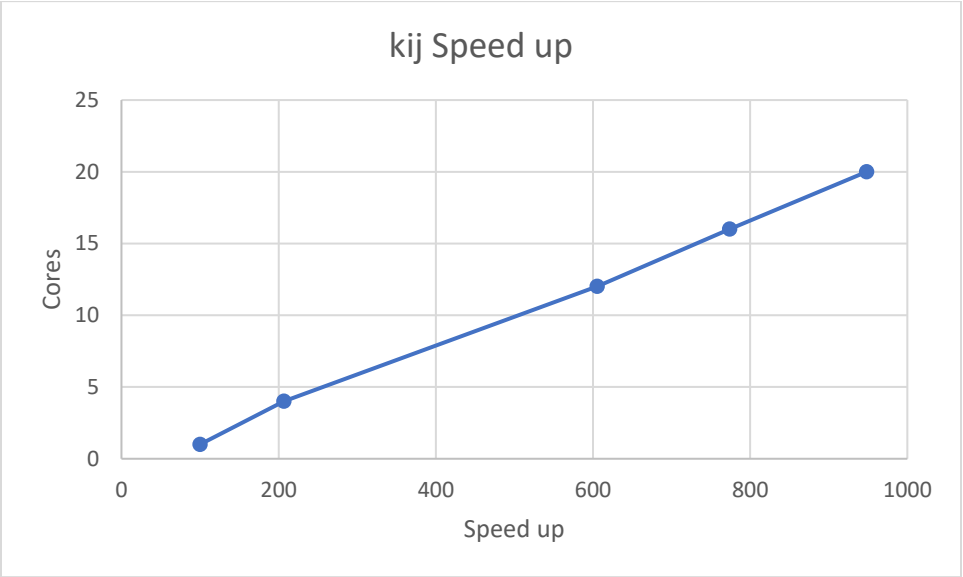
ikj efficiency

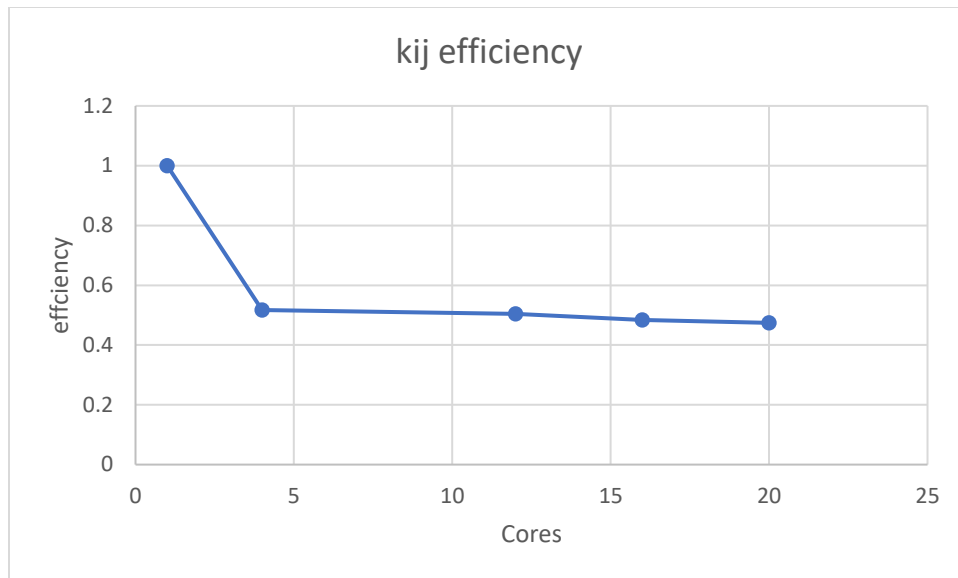kij efficiency
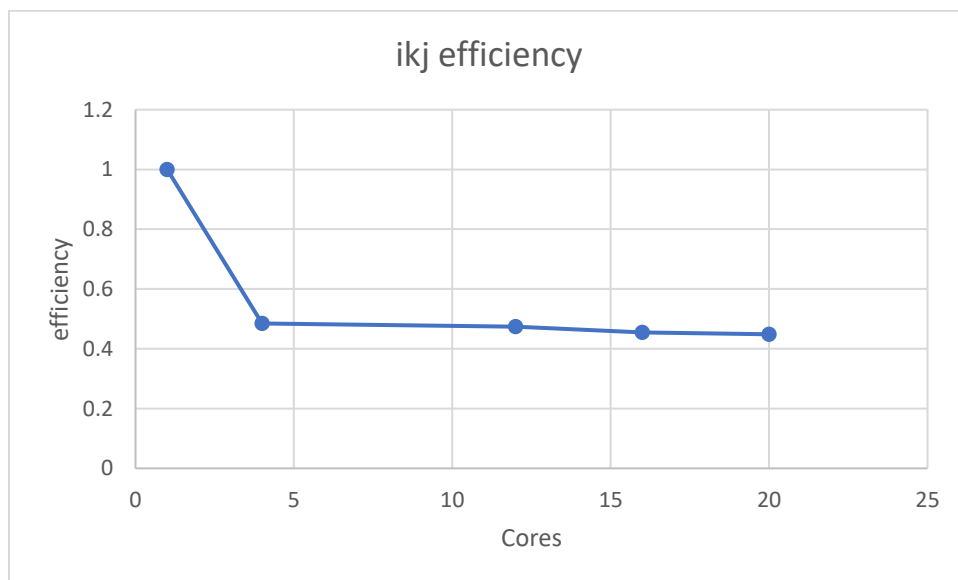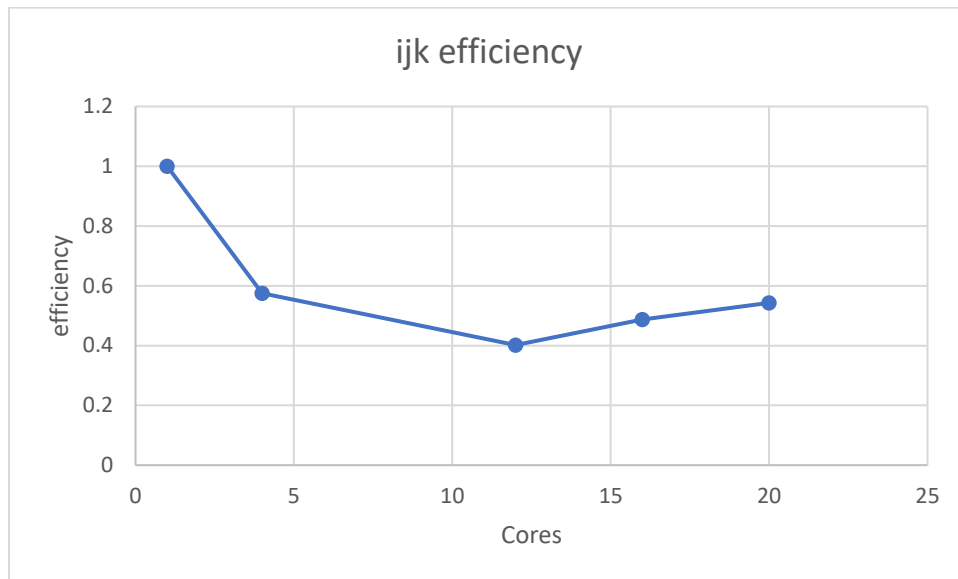
6. Observations, analysis, & conclusions

First, I thought kij will have a fastest run but it turn out that ikj is slightly faster

During the work I also learn that if communication overhead it will make parallel way slower than running normally.

In concussion, ijk is the slowest because the way how they given out data that not much can do to parallel it. Ikj and kij is somewhat similar in the way how rows and columns are given to all thread so their run time is very close