Marconi 100 GPU + OpenACC, Version V4 (Transforms on GPU)
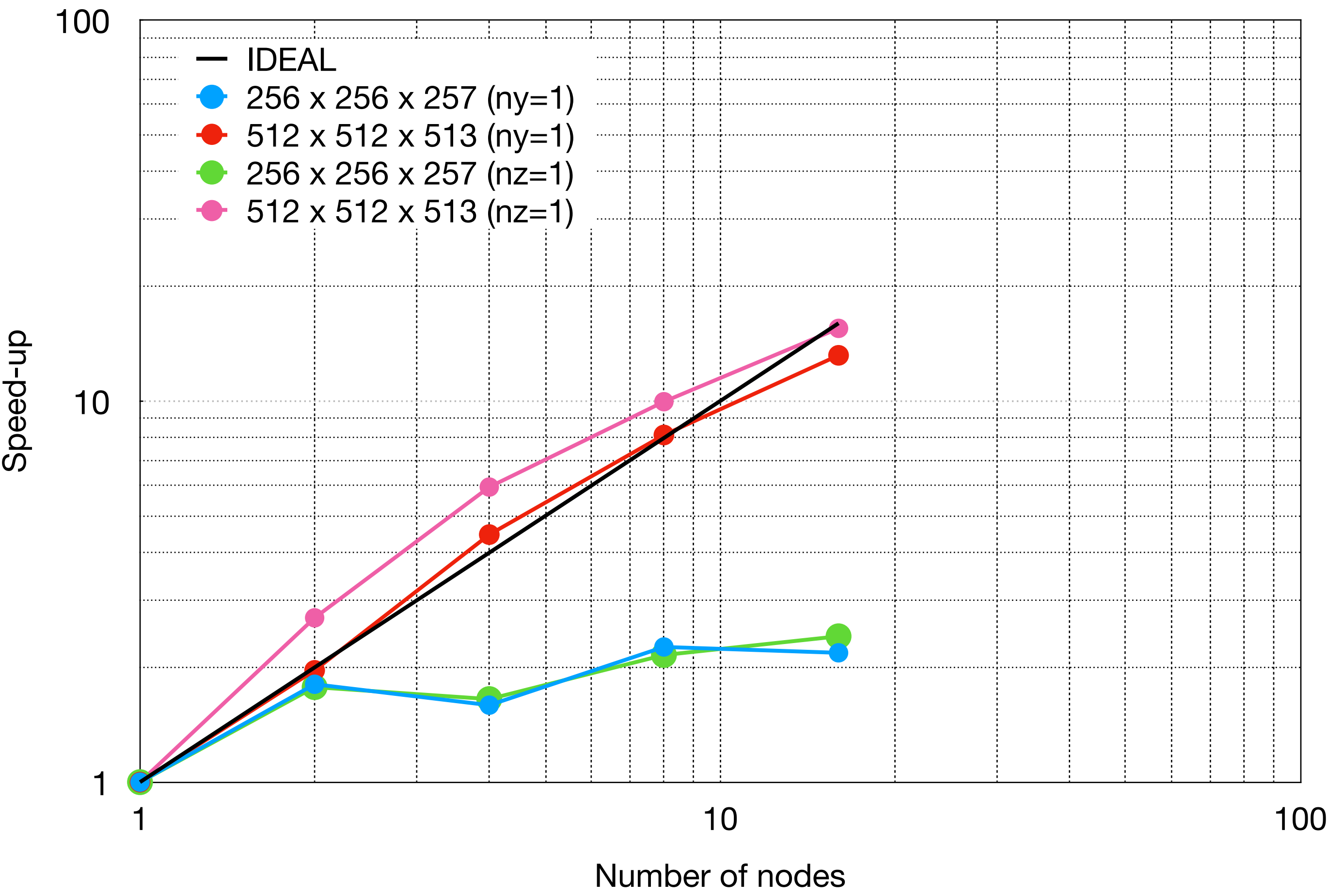
TEST	Grid	Decomposition	NY_CPU	NZ_CPU	Tasks/node	nodes	Total tasks	Time x time step	Notes
0	256 x 256 x 257	SLAB	1	4	4	1	4	2.6856	
1	256 x 256 x 257	SLAB	4	1	4	1	4	3.0752	
2	256 x 256 x 257	SLAB	1	8	4	2	8	1.4866	
3	256 x 256 x 257	SLAB	8	1	4	2	8	1.7321	
4	256 x 256 x 257	SLAB	1	16	4	4	16	1.6868	
5	256 x 256 x 257	SLAB	16	1	4	4	16	1.8619	
6	256 x 256 x 257	SLAB	1	32	4	8	32	1.1867	
7	256 x 256 x 257	SLAB	32	1	4	8	32	1.4267	
8	256 x 256 x 257	SLAB	1	64	4	16	64	1.2293	
9	256 x 256 x 257	SLAB	64	1	4	16	64	1.274	
10	512 x 512 x 513	SLAB	1	4	4	1	4	25.9585	
11	512 x 512 x 513	SLAB	4	1	4	1	4	42.0030	
11	512 x 512 x 513	SLAB	1	8	4	2	8	13.2129	
10	512 x 512 x 513	SLAB	8	1	4	4	8	15.5638	
11	512 x 512 x 513	SLAB	1	16	4	4	16	5.8170	
12	512 x 512 x 513	SLAB	16	1	4	4	16	7.0623	
13	512 x 512 x 513	SLAB	1	32	4	8	32	3.1868	
14	512 x 512 x 513	SLAB	32	1	4	8	32	4.2162	
15	512 x 512 x 513	SLAB	1	64	4	16	64	1.9693	
16	512 x 512 x 513	SLAB	64	1	4	16	64	2.7073	

Table 1

CORES	NODES	SPEED-UP IDEAL	Z - SLAB (NY=1)				Y - SLAB (NZ=1)			
			256 x 256 x 257		512 x 512 x 513		256 x 256 x 257		512 x 512 x 513	
			TIME	SPEED-UP	TIME	SPEED-UP	TIME	SPEED-UP	TIME	SPEED-UP
		Ideal	Time	Speed-up	Time	Speed-up	Time	Speed-up	Time	Speed-up
1	1	1	2.6856	1.00000	25.9585	1.00000	3.0752	1.00000	42.0030	1.00000
2	2	2	1.4866	1.80654	13.2129	1.96463	1.7321	1.77542	15.5638	2.69876
4	4	4	1.6868	1.59213	5.8170	4.46252	1.8619	1.65165	7.0623	5.94750
8	8	8	1.1867	2.26308	3.1868	8.14563	1.4267	2.15546	4.2162	9.96229
16	16	16	1.2293	2.18466	1.9693	13.18159	1.274	2.41381	2.7073	15.51472

STRONG SCALABILITY (M100)

Legend:
- IDEAL
- 256 x 256 x 257 (ny=1)
- 512 x 512 x 513 (ny=1)
- 256 x 256 x 257 (nz=1)
- 512 x 512 x 513 (nz=1)

X-axis: Number of nodes
Y-axis: Speed-up

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Ny=1 Nz=4 Single-node, 4 GPUs

Profile	Hpc-sdk	Cuda version	Spectrum-MPI		Notes	Time
Base	21	11.3	Not loaded	Mpif90		2.70
Base	21	Not loaded	Not loaded	Mpif90		2.68
Candidate	21	11.6	Not loaded	Mpif90		2.71
Candidate	22	11.6	Not loaded	Mpif90		Error
Candidate	22	Not loaded	Not loaded	Mpif90		2.35
Global	21	11.5	Not loaded	Mpif90		2.58
Global	21	11.0	Not loaded	Mpif90		2.55
Global	21	Not loaded	Loaded	Mpipgifort		3.10
Global	22	Not loaded	Loaded	Mpipgifort		3.11
Global	22	Not loaded	Loaded	Mpipgifort	Mpirun -gpu	2.38
Global	22	Not loaded	Loaded	Mpipgifort	No socket mapping	2.39
Global	22	11.5	Not loaded	Mpif90		Error

Marconi 100 GPU + OpenACC, Version V7 (Solver and transforms on GPUs)

TEST	Grid	Decomposition	NY_CPU	NZ_CPU	Tasks/node	nodes	Total tasks	Time x time step	Notes
0	256 x 256 x 257	SLAB	1	4	4	1	4	0.897	
1	256 x 256 x 257	SLAB	4	1	4	1	4	1.453	
2	256 x 256 x 257	SLAB	1	8	4	2	8	0.529	
3	256 x 256 x 257	SLAB	8	1	4	2	8	0.705	
4	256 x 256 x 257	SLAB	1	16	4	4	16	0.350	
5	256 x 256 x 257	SLAB	16	1	4	4	16	0.563	
6	256 x 256 x 257	SLAB	1	32	4	8	32	0.342	
7	256 x 256 x 257	SLAB	32	1	4	8	32	0.534	
8	256 x 256 x 257	SLAB	1	64	4	16	64	0.457	
9	256 x 256 x 257	SLAB	64	1	4	16	64	0.630	
10	512 x 512 x 513	SLAB	1	4	4	1	4	12.071	
11	512 x 512 x 513	SLAB	4	1	4	1	4	13.235	
11	512 x 512 x 513	SLAB	1	8	4	2	8	6.690	
10	512 x 512 x 513	SLAB	8	1	4	4	8	7.701	
11	512 x 512 x 513	SLAB	1	16	4	4	16	2.791	
12	512 x 512 x 513	SLAB	16	1	4	4	16	3.889	
13	512 x 512 x 513	SLAB	1	32	4	8	32	1.2958	
14	512 x 512 x 513	SLAB	32	1	4	8	32	2.612	
15	512 x 512 x 513	SLAB	1	64	4	16	64	0.846	
16	512 x 512 x 513	SLAB	64	1	4	16	64	1.695	

Table 1

			Z - SLAB (NY=1)				Y - SLAB (NZ=1)			
			256 x 256 x 257		512 x 512 x 513		256 x 256 x 257		512 x 512 x 513	
		SPEED-UP	TIME	SPEED-UP	TIME	SPEED-UP	TIME	SPEED-UP	TIME	SPEED-UP
CORES	NODES	IDEAL	Time	Speed-up	Time	Speed-up	Time	Speed-up	Time	Speed-up
1	1	1	0.897	1.00000	12.07	1.00000	1.453	1.00000	13.235	1.00000
2	2	2	0.529	1.69565	6.690	1.80419	0.705	2.06099	7.701	1.71861
4	4	4	0.350	2.56286	2.791	4.32461	0.563	2.58082	3.889	3.40319
8	8	8	0.342	2.62281	1.2958	9.31471	0.534	2.72097	2.612	5.06700
16	16	16	0.457	1.96280	0.846	14.26714	0.630	2.30635	1.695	7.80826

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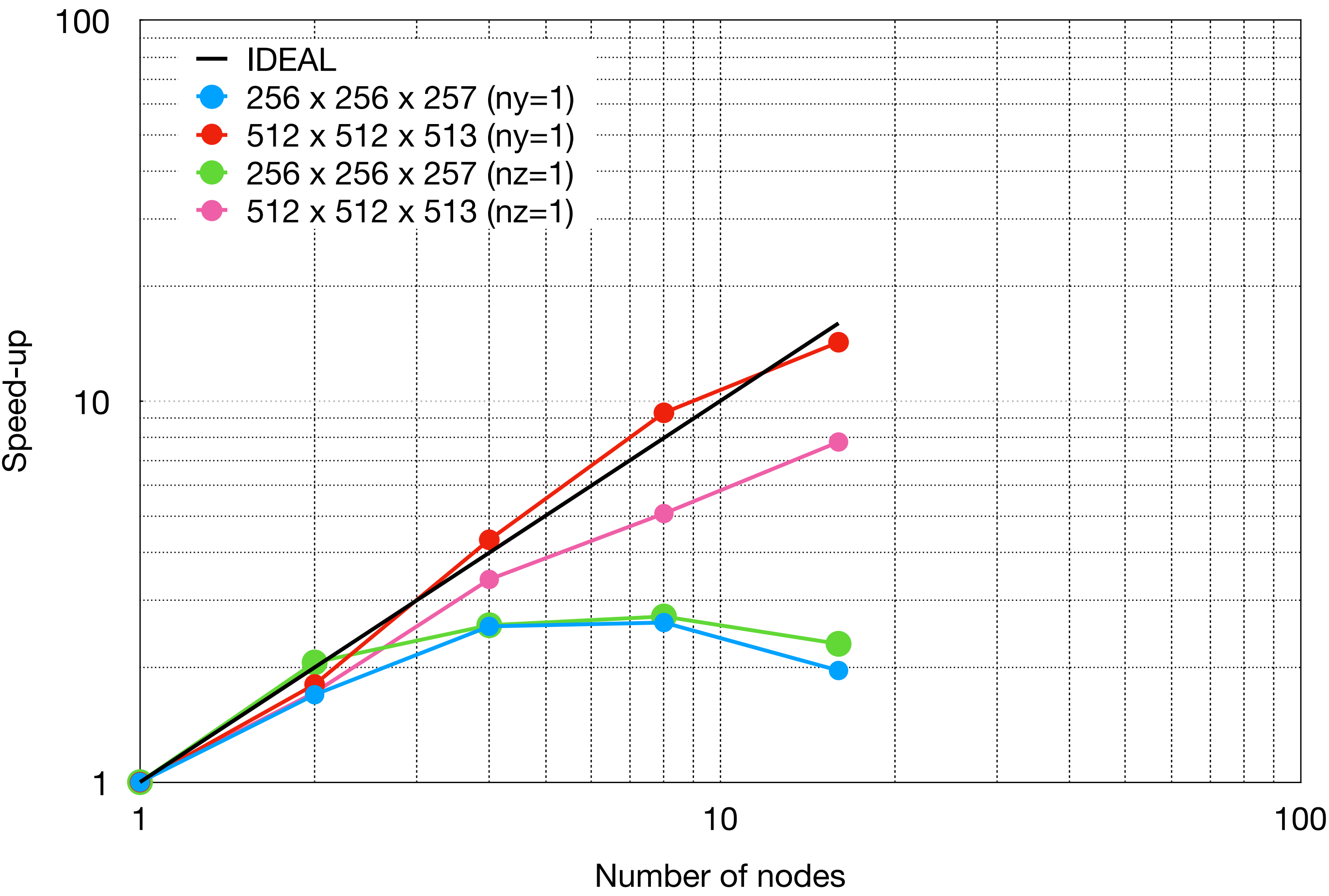
Table 1

		SPEED-UP	Z - SLAB (NY=1)	
			1024 x 512 x 129	
		SPEED-UP	TIME	SPEED-UP
NODES	GPUs	IDEAL	Time	Speed-up
1	4	1	6.704	1.00000
2	8	2	1.868	3.58887
4	16	4	1.344	4.98810
8	32	8	0.615	10.90081
16	64	16	0.370	18.11892

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