4.1 Single-Core

4.1.1 Naive Matrix Multiplication

Table 1: C++ Performance Results

Dimensions	Execution Time (s)	GFlops	L1 DCM	L2 DCM
600x600	0.154	2.80	241678983	448582
1000x1000	0.702	2.85	1136969844	3488117
1400x1400	2.846	1.93	3125017136	58169452
1800x1800	6.711	1.74	7059740261	94416650
2200x2200	16.870	1.26	15939144633	558295715
2600x2600	41.912	0.84	30910168160	2305966036
3000x3000	67.189	0.80	50421145206	6043903995

Table 2: Java Performance Results

Dimensions	Execution Time (s)	GFlops
600x600	0.254	1.70
1000x1000	1.581	1.27
1400x1400	8.502	0.65
1800x1800	23.912	0.49
2200x2200	51.042	0.42
2600x2600	104.170	0.34
3000x3000	175.885	0.31

4.1.2 Line-by-Line Matrix Multiplication

Table 3: C++ Line-by-Line Performance Results

Dimensions	Execution Time (s)	GFlops	L1 DCM	L2 DCM
600x600	0.109	3.96	27610902	197852
1000x1000	0.474	4.22	128270508	958787
1400x1400	1.487	3.69	356961253	4028340
1800x1800	3.175	3.67	772784793	9800958
2200x2200	5.891	3.61	2014640122	4182780
2600x2600	9.736	3.61	4294621566	6984457
3000x3000	14.951	3.61	6698316610	10414106

Table 4: Java Line-by-Line Performance Results

Dimensions	Execution Time (s)	GFlops
600x600	0.091	4.75
1000x1000	0.399	5.01
1400x1400	1.342	4.09
1800x1800	2.947	3.96
2200x2200	5.505	3.87
2600x2600	10.947	3.21
3000x3000	16.040	3.37

Table 5: C++ Line-by-Line Bigger Matrices Performance Results

Dimensions	Execution Time (s)	GFlops	L1 DCM	L2 DCM
4096x4096	38.332	3.59	17281550488	26563644
6144x6144	131.659	3.52	58311966805	89317155
8192x8192	313.217	3.51	138166449164	204171358
10240x10240	623.608	3.44	269797217196	502826446

Table 6: C++ Block Multiplication Performance Results (Block Sizes: 128, 256, 512)

Block Size	Dimensions	Execution Time (s)	GFlops	L1 DCM	L2 DCM
128	4096x4096	165.188	0.83	72724290894	51805287
128	6144x6144	599.105	0.77	254882822662	193298357
128	8192x8192	1302.356	0.84	589064508547	713376418
128	10240x10240	2636.833	0.81	1176844573765	1382600763
256	4096x4096	167.468	0.82	72029153308	897392949
256	6144x6144	572.747	0.81	247672155393	3195262285
256	8192x8192	1335.049	0.82	576990897213	11366549854
256	10240x10240	2727.813	0.79	1172701454549	25526270656
512	4096x4096	188.230	0.73	121210979798	3686113280
512	6144x6144	561.051	0.83	247393755023	5869301468
512	8192x8192	1669.21	0.66	1149957655421	81980586791
512	10240x10240	2753.329	0.78	1158583317494	67194411717

Table 7: C++ Line-by-Line Performance Results (Outer Loop Parallelization)

Dimensions	Execution Time (s)	L1 DCM	L2 DCM	FP OPS	TOT INS
600x600	0.027	1924091	17330	27360001	113622169
1000x1000	0.116	9370417	60217	126000001	511795717
1400x1400	0.277	41090728	104111	344960001	1392538475
1800x1800	0.528	90382230	149096	732240001	2949387953
2200x2200	1.131	167081583	236023	1335840001	5372806495
2600x2600	2.086	280300693	555219	2203760001	8855308697
3000x3000	3.559	429083491	898157	3384000001	13588892279
4096x4096	8.299	1091464928	2332638	8589934593	34454331821
6144x6144	30.345	3683033942	9221214	28991029286	116178953875
8192x8192	73.170	8723285628	27789743	68719476737	275258134329
10240x10240	216.851	16994047992	131991061	134217736591	537461781358

Table 8: C++ Line-by-Line Performance Results (Inner Loop Parallelization)

Dimensions	Execution Time (s)	L1 DCM	L2 DCM	FP OPS	TOT INS
600x600	0.170	4303194	2220916	27360001	176516701
1000x1000	0.458	19228602	5246945	126000001	622628615
1400x1400	1.340	47916291	13397481	344960001	1649689186
1800x1800	2.950	93257787	34408060	732240001	3495964625
2200x2200	5.079	150167551	125759014	1335840001	6020016060
2600x2600	7.828	225078374	197407259	2203760001	9385227382
3000x3000	11.612	327859145	303356737	3384000001	14234349974
4096x4096	27.848	856407327	657927564	8589934593	35654285153
6144x6144	73.143	2636101874	1002581155	28991029249	116461371453
8192x8192	152.773	6077988446	1439078099	68719476737	269361045658
10240x10240	285.668	12285236091	1986263686	134217728001	514585201807