Report 2

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Part 1

N	Time (seconds)		Performance (GFLOPS)	
	Lapack	my version	Lapack	my version
1000	0.064579	3.668186	10.3542431	0.1822881
2000	0.463179	29.852558	11.5318988	0.17892381
3000	1.452284	100.91096	12.4066643	0.17855345
4000	3.370753	239.525575	12.6673971	0.1782635
5000	6.345522	467.8553	13.1405002	0.17822462

NOTE: The total number of float-point operation is 2/3*n^3 + n^2 + n^2, as mentioned on slides page 44.

How To Run

#NOTE: lapack is located in home directory (~/lapack-3.8.0)
Make part1
Sbatch part1.job.sh

Part 2

I used blocked version of dgemm3 with cache reusing in project 1 to perform the matrix multiplication during the LU factorization step. According to Project 1, the optimal block size is 126. Then I shift the N to avoid boundary condition problems. I also present the result of both with and without -O2 compiler flag.

N	Time (seconds)			
	Lapack	my version	my block version	my block version -O2
1008	0.068124	3.72935	1.28587	0.302005
2016	0.479404	30.376102	8.22751	1.936633
3024	1.483592	103.087115	25.037408	6.100866
4032	3.500611	243.67154	58.374398	14.36271
5040	6.472502	477.564157	107.632305	26.852303

N	Performance (GFLOPS)			
	Lapack	my version	my block version	my block version -O2
1008	10.052656	0.18363177	0.532578827	2.26760198
2016	11.4110199	0.18009186	0.664902088	2.824742001
3024	12.4385642	0.17901126	0.737047316	3.024776215
4032	12.4925033	0.17946862	0.749153671	3.04478713
5040	13.1943071	0.17882452	0.793443745	3.180367032

How To Run

#NOTE: lapack is located in home directory (~/lapack-3.8.0)
Make part2 #This will produce two executable files: part2 and part2_o2
Sbatch part2.job.sh #This will run ./part2 and ./part2_o2 sequentially and put the result together in p2.txt

Correctness

I check all the results towards lapack version by checking if the maximum difference is smaller than 1e-2.