HOMEWORK #5 – MANDELBROT SET

TABLE A : 1 COMPUTER

Communication Latency Optimization	Workers	Avg. time as seen by the client (Tc milliseconds)	Parallel Efficiency : T1/C.Tc
On	Multiple	14119 (T1)	1
On	Single	13009 (T1)	1
Off	Multiple	4876 (T1)	1
Off	Single	3376 (T1)	1

TABLE B : 16 COMPUTERS

Communication Latency Optimization	Workers	Avg. time as seen by the client (Tc milliseconds)	Parallel Efficiency : T1/C.Tc
On	Multiple	6023	0.147
On	Single	5777	0.141
Off	Multiple	4435	0.068
Off	Single	3498	0.060

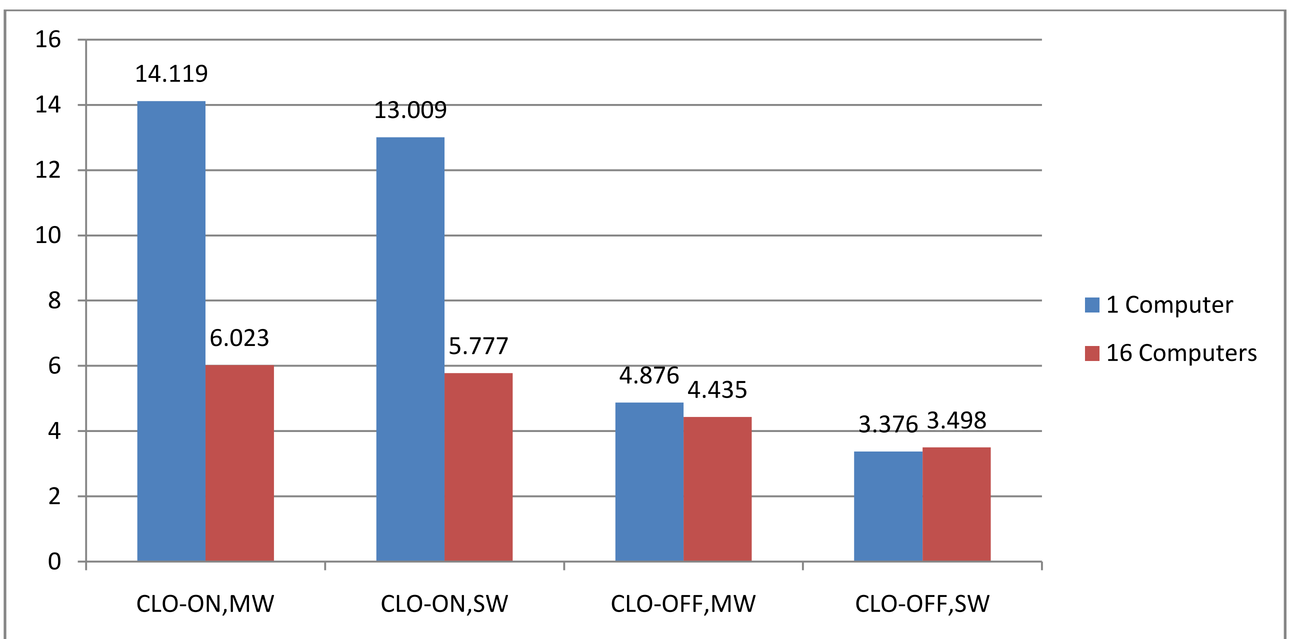
TABLE C : AVERAGE EXECUTION BASED ON LATENCY OPTIMIZATION

Communication Latency Optimization	Computers	Avg. execution time across different worker types viz. multiple/single (milliseconds)
On	1	13564
Off	1	4126
On	16	5900
Off	16	3966.5

Diff. = 9.4 s

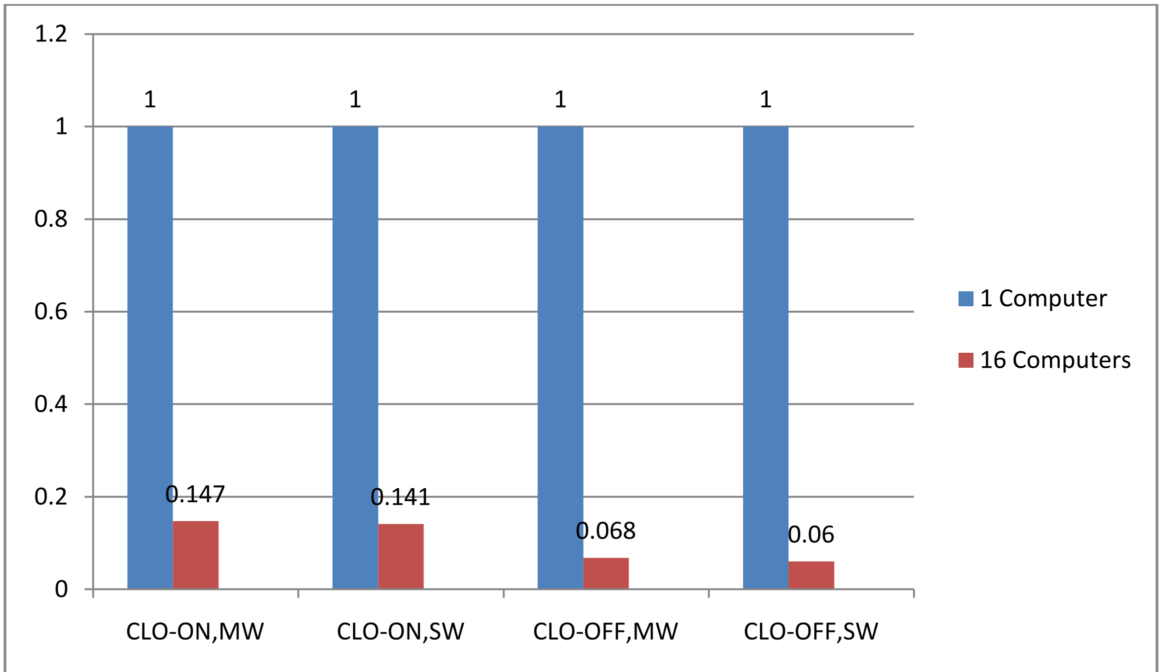
Diff. = 1.9 s

GRAPH A - EXECUTION TIMES



CLO – Communication Latency Optimization
MW – Multiple Workers
SW – Single Worker

GRAPH B - EFFICIENCY PLOT



CLO – Communication Latency Optimization
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In the case : C=16, it can be seen that the parallel efficiency decreases with increase in number of parallel processors. This suggests that the degree of parallelization keeps decreasing and approaches zero as more parallel computational power is added to the infrastructure. This was an expected result. Not all tasks can achieve perfect parallelization, and this also holds good for the Mandelbrot Set task which we experimented with.

All other numbers are consistent with the expectations. Mandelbrot Set Task has very few decompositions in the 'Divide' phase and hence there is no sufficient overhead seen when optimizations are switched off in Tables A and B.