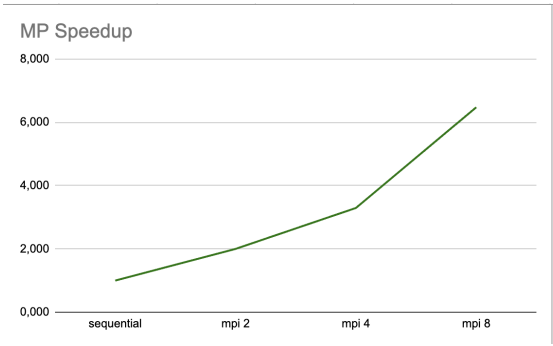
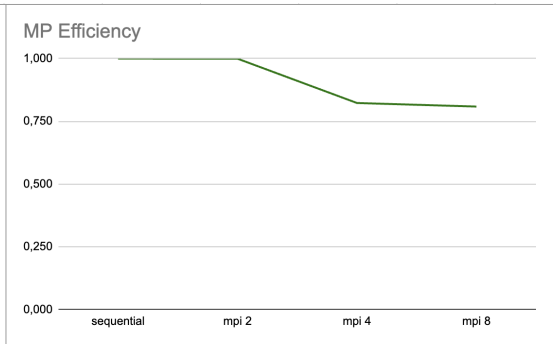
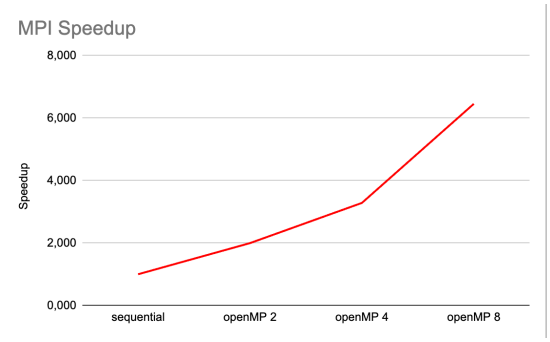
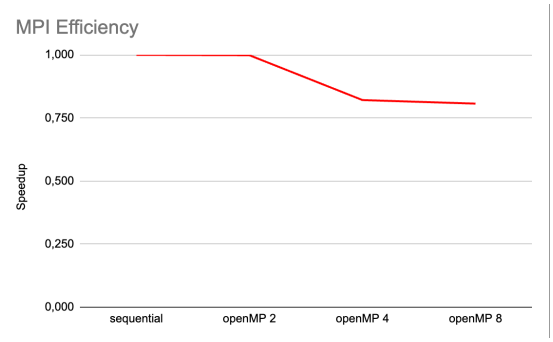
Task 3: Performance Measurement

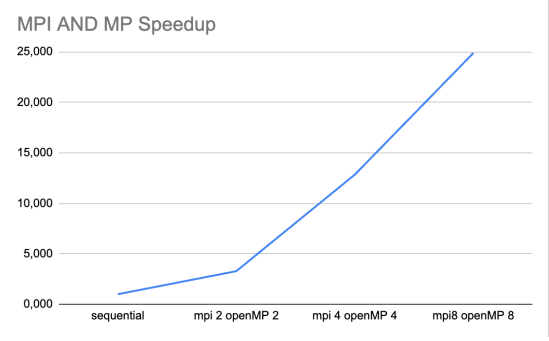
0.1 Mandelbrot

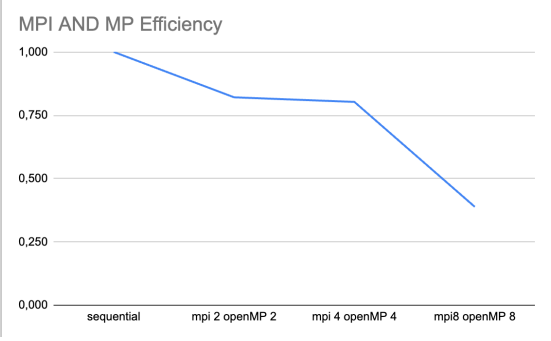




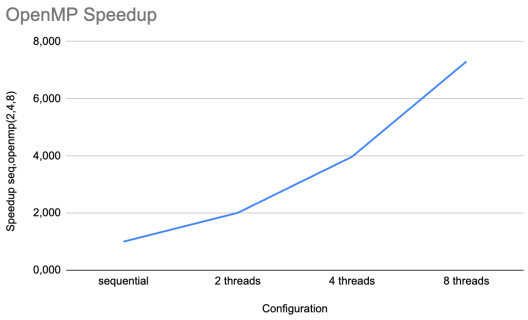


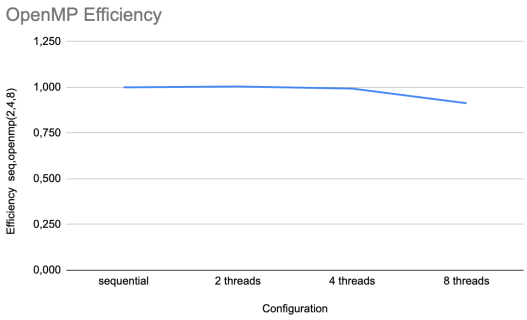


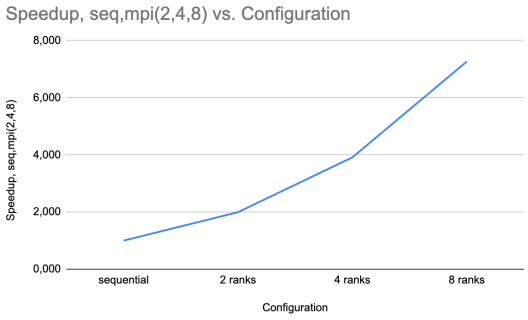


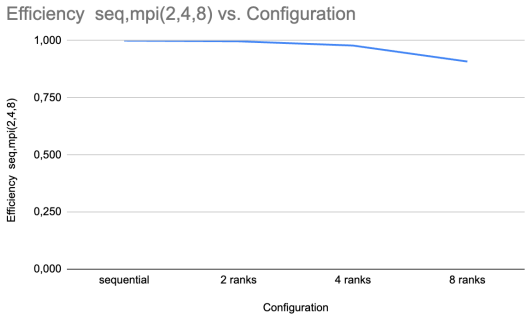


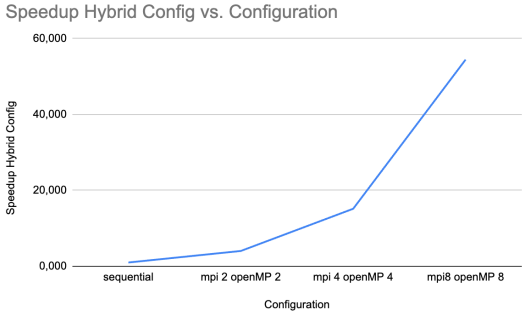
0.2 Gemm.c

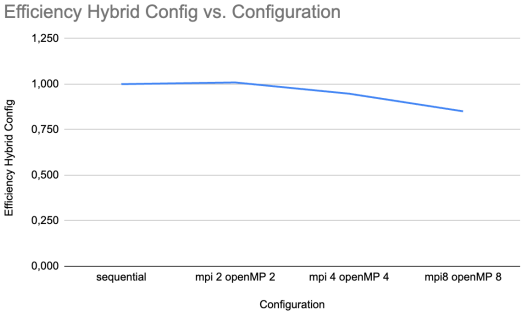












The charts clearly illustrate the distinction in speedup achieved through the use of multiple threads or ranks. For instance, while there is a notable improvement in speedup performance, a corresponding decline in efficiency is evident. This decline occurs because the allocation of resources begins to outweigh the benefits of the speedup, resulting in suboptimal resource utilization. Consequently, the system is unable to fully leverage all available computational resources, even though the execution times are much better even with lower resource utilization percentage. In the Hybrid implementation, we see the most improved speedup, but also less efficiency, these are non-proportional to each other.

tasks per node	cpus-per-task	mean time	sdv time	Speedup seq,openmp(2,4,8)	Efficiency seq,openmp(2,4,8)	Configuration	Max	Min
1	1	134,1347	5,4680	1,000	1,000	sequential	135,2777	134,0131
1	2	66,7563	4,1691	2,009	1,005	2 threads	67,1823	66,1044
1	4	33,7628	0,0007	3,973	0,993	4 threads	33,9690	33,2119
1	8	18,3617	0,0205	7,305	0,913	8 threads	18,7887	18,2642

tasks per node	cpus-per-task	time mean	sdv time	Speedup, seq,mpi(2,4,8)	Efficiency seq,mpi(2,4,8)	Configuration	Max	Min
1	1	134,1347	0,0060	1,000	1,000	sequential	135,2777	134,0131
2	1	67,2725	0,0237	1,994	0,997	2 ranks	67,9573	66,9612
4	1	34,2737	6,3173	3,914	0,978	4 ranks	34,9545	33,9757
8	1	18,4557	1,0509	7,268	0,908	8 ranks	18,9854	18,0521

tasks per node	cpus-per-task	time mean	sdv time	Speedup Hybrid Config	Efficiency Hybrid Config	Configuration	Max	Min
1	1	134,1347	7,7335	1,000	1,000	sequential	135,2777	134,0131
2	2	33,2311	7,7335	4,036	1,009	mpi 2 openMP 2	33,6768	32,9975
4	4	8,8478	1,2877	15,160	0,948	mpi 4 openMP 4	8,9921	8,0258
8	8	2,4633	0,0133	54,453	0,851	mpi8 openMP 8	2,8796	2,1235