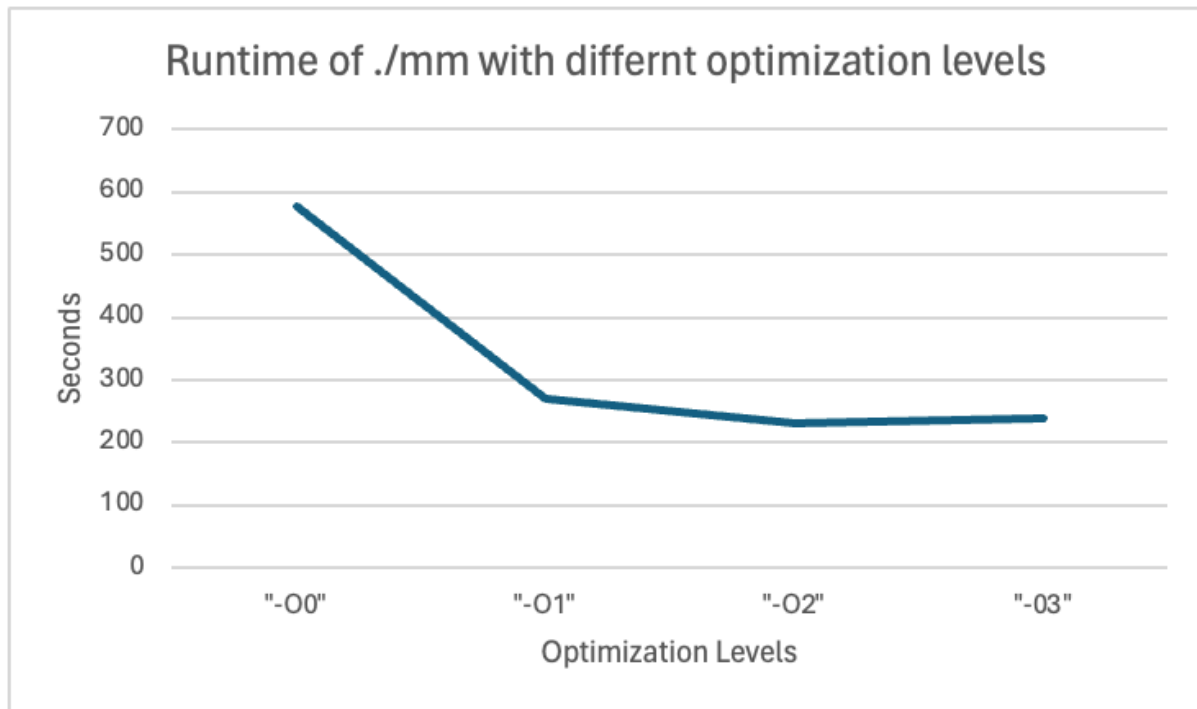


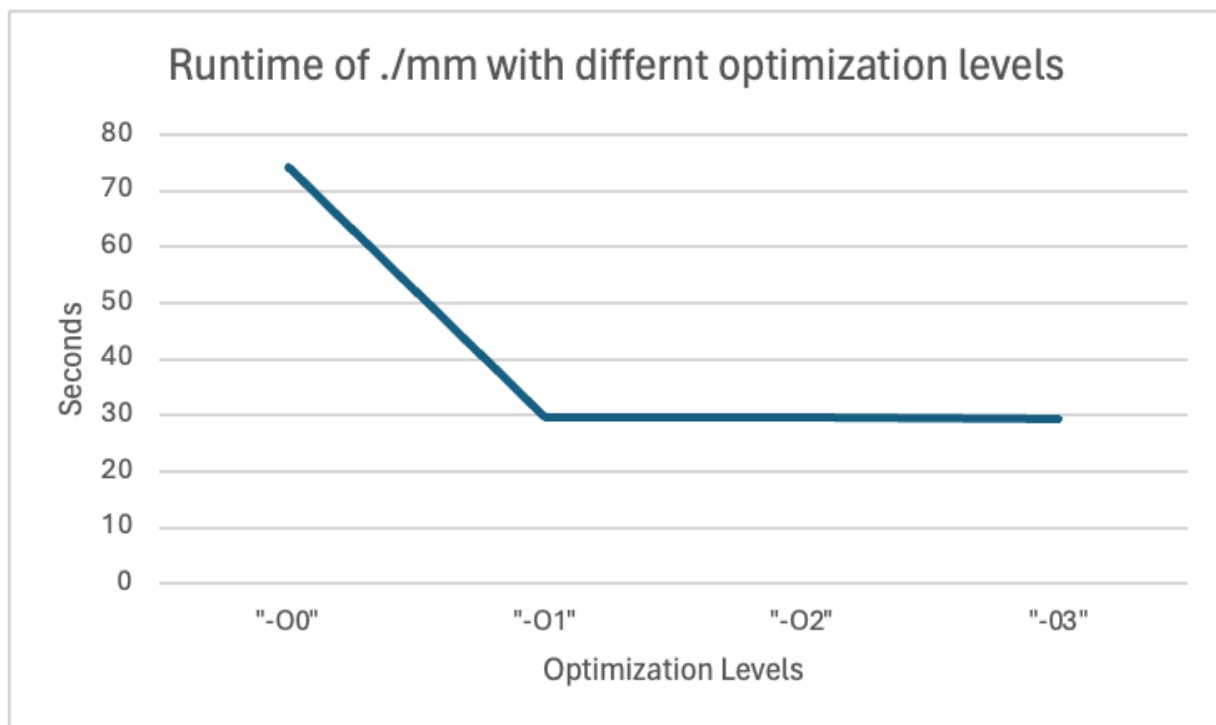
Dave Patel

matmul	arm.csc.calpoly.edu				Other system (laptop or workstation)			
	-O0	-O1	-O2	-O3	-O0	-O1	-O2	-O3
Runtime (Measured)	576.454s	269.058s	232.162s	237.753s	74.14s	29.734s	29.651s	29.244s
Cycles	1,152,007,376,002	537,563,725,902	463,217,389,282	475,353,501,494	x	x	x	x
Instructions	398,277,432,680	80,172,932,932	88,687,078,515	88,669,581,411	x	x	x	x
Branches	10,005,753,982	9,997,361,370	9,988,968,677	9,985,036,362	x	x	x	x
Branch-misses	101,122,385	96,816,937	84,169,432	84,906,643	x	x	x	x
Cache References	175,823,979,016	21,007,995,509	21,003,803,302	21,001,705,969	x	x	x	x
Cache Misses	8,639,046,916	8,631,842,368	8,632,180,230	8,631,485,715	x	x	x	x

Server Run time



Local Run Time



	Just Loop Unrolling	Just Column-Major	Loop Unrolling plus Column-Major
Runtime	76.980s	68.075s	33.966s
Cycles	149,971,246,172	132,647,161,366	64,439,803,672
Instructions	50,008,014,908	88,698,213,941	50,030,020,314
Cache Misses	2,169,563,995	269,560,190	138,000,173
Cache References	12,411,772,272	21,001,706,034	12,411,771,596
Branches	3,542,585,866	9,985,036,395	3,542,585,527
Branch Misses	82,274,626	82,015,658	89,216,072

Analysis: The method of loop unrolling plus column-major ordering outperforms ./mm regarding the number of cycles, runtime, and instructions per cycle. This is because individually, loop unrolling and column-major ordering both outperform ./mm in those same respected categories, so when put together they become even more optimized. When looking at the individual programs before they are put together, we can see that the number of cache misses goes down significantly when loop unrolling is implemented, and even more when it's just column-major ordering. Another significant data point is how the runtime goes down when implementing loop unrolling, and continues to do so as we look at the runtime for just column-major ordering and when both are implemented. Overall, the data suggest that either loop unrolling or column-major ordering, individually still optimizes the original ./mm, and when put together reaches an even higher level of optimization.