Homework-5 Perf understanding using matrix multiplication code

perf also called as perf_events is a powerful linux utility for measuring CPU performance using performance counters, tracepoints, kprobes and uprobes. These enable identification of most frequently executed parts of code also referred to as hotspots, by which functioning of cache, prefetching, predictions can be most efficient.

Performance counters: CPU hardware registers which count cache misses, branch mispredictions and number of instructions executed.

Tracepoints : a type of breakpoints, which on hitting execute a run time function(called a probe generally provided by the user) that can evaluate CPU performance at specific instances of code execution. perf creates tracepoints dynamically to trace kernel and userspace using kprobes and uprobes frameworks hence perf is categorised as a linux's tracing subsystem.

Perf Analysis with matrix multiplication code:

no.	Number of entries in matrix (N)	Total Time for execution (sec)	Time spent in user code(mmult prog) (sec)	Time spent in kernel (OS mode) (sec)
1	100	0.015420434	0.011682000	0.003894000
2	64	0.006742689	0.002910000	0.003881000
3	128	0.016101503	0.013336000	0.002857000
4	512	0.323469304	0.318647000	0.005010000
5	1024	3.366551884	3.356678000	0.007996000
6	4096			
7	8192			
8	16384			

Performance of CPU is decreasing with increase in N value, as N value rises above 1024 there is a drastic increase in execution time indicating very complex computing and lesser CPU performance.

N>1024 values are perf command is taking lot of time to execute and giving variable answers on same execution.