

perf stat ./mmul-c 16 > p.out

Printing Result Matrix:

Done.

Performance counter stats for './mmul-c 16':

1.19 msec	task-clock:u	#	0.324 CPUs utilized
0	context-switches:u	#	0.000 K/sec
0	cpu-migrations:u	#	0.000 K/sec
28	page-faults:u	#	0.024 M/sec
962,787	cycles:u	#	0.808 GHz
482,216	instructions:u	#	0.50 insn per cycle
48,814	branches:u	#	40.987 M/sec
7,497	branch-misses:u	#	15.36% of all branches

0.003679985 seconds time elapsed

0.001839000 seconds user

0.000000000 seconds sys

482,216 / (0.808 GHz * 0.50) = 0.0011936039604

Percent Difference: 102.035% difference

perf stat ./mm 16 > p.out

Printing Result Matrix:

Done.

Performance counter stats for './mm 16':

5.14 msec	task-clock:u	#	0.705 CPUs utilized
0	context-switches:u	#	0.000 K/sec
0	cpu-migrations:u	#	0.000 K/sec
29	page-faults:u	#	0.006 M/sec
8,975,653	cycles:u	#	1.745 GHz
8,345,987	instructions:u	#	0.93 insn per cycle
1,127,334	branches:u	#	219.119 M/sec
230,194	branch-misses:u	#	20.42% of all branches

0.007299528 seconds time elapsed

0.005870000 seconds user

0.000000000 seconds sys

8,345,987 / (1.745 GHz * 0.93) = 0.00514279631512

Percent Difference: 34.6677% difference

perf stat ./mmmul-c 64 > p.out

Printing Result Matrix:

Done.

Performance counter stats for './mmmul-c 64':

10.09 msec task-clock:u	#	0.766 CPUs utilized
0 context-switches:u	#	0.000 K/sec
0 cpu-migrations:u	#	0.000 K/sec
29 page-faults:u	#	0.003 M/sec
18,748,354 cycles:u	#	1.858 GHz
11,259,662 instructions:u	#	0.60 insn per cycle
702,648 branches:u	#	69.651 M/sec
36,571 branch-misses:u	#	5.20% of all branches

0.013176878 seconds time elapsed

0.005403000 seconds user

0.005403000 seconds sys

11,259,662 / 1.858 GHz * 0.60 = 0.010100163258

Percent Difference: 26.4356% difference

perf stat ./mm 64 > p.out

Printing Result Matrix:

Done.

Performance counter stats for './mm 64':

289.17 msec task-clock:u	#	0.990 CPUs utilized
0 context-switches:u	#	0.000 K/sec
0 cpu-migrations:u	#	0.000 K/sec
28 page-faults:u	#	0.097 K/sec
576,371,999 cycles:u	#	1.993 GHz
557,257,895 instructions:u	#	0.97 insn per cycle
76,479,501 branches:u	#	264.475 M/sec
15,252,623 branch-misses:u	#	19.94% of all branches

0.292101372 seconds time elapsed

0.289855000 seconds user

0.000000000 seconds sys

557,257,895 / (1.993 GHz * 0.97) = 0.288255230937

Percent Difference: 1.32544% difference

perf stat ./mmmul-c 256 > p.out

Printing Result Matrix:

Done.

Performance counter stats for './mmmul-c 256':

746.83 msec	task-clock:u	#	0.988 CPUs utilized
0	context-switches:u	#	0.000 K/sec
0	cpu-migrations:u	#	0.000 K/sec
42	page-faults:u	#	0.056 K/sec
1,489,759,292	cycles:u	#	1.995 GHz
543,066,663	instructions:u	#	0.36 insn per cycle
23,574,844	branches:u	#	31.567 M/sec
484,138	branch-misses:u	#	2.05% of all branches

0.755804137 seconds time elapsed

0.747535000 seconds user

0.000000000 seconds sys

543,066,663 / (1.995 GHz * 0.36) = 0.756149628237

Percent Difference: 0.0457013% difference

perf stat ./mm 256 > p.out

Printing Result Matrix:

Done.

Performance counter stats for './mm 256':

19,072.62 msec	task-clock:u	#	0.999 CPUs utilized
0	context-switches:u	#	0.000 K/sec
0	cpu-migrations:u	#	0.000 K/sec
81	page-faults:u	#	0.004 K/sec
38,107,871,625	cycles:u	#	1.998 GHz
35,565,266,666	instructions:u	#	0.93 insn per cycle
5,017,397,303	branches:u	#	263.068 M/sec
1,027,651,134	branch-misses:u	#	20.48% of all branches

19.083298022 seconds time elapsed

19.063221000 seconds user

0.009996000 seconds sys

35,565,266,666 / (1.998 GHz * 0.93) = 19.1402513621

Percent Difference: 0.298001% difference

perf stat ./mmmul-c 1024 > p.out

Printing Result Matrix:

Done.

Performance counter stats for './mmmul-c 1024':

45,803.52 msec task-clock:u	#	0.998 CPUs utilized
0 context-switches:u	#	0.000 K/sec
0 cpu-migrations:u	#	0.000 K/sec
614 page-faults:u	#	0.013 K/sec
91,424,507,841 cycles:u	#	1.996 GHz
32,045,318,228 instructions:u	#	0.35 insn per cycle
1,182,987,808 branches:u	#	25.827 M/sec
11,528,451 branch-misses:u	#	0.97% of all branches

45.888594353 seconds time elapsed

45.782776000 seconds user

0.020001000 seconds sys

32,045,318,228/(1.996 GHz* 0.35) = 45.8707675752

Percent Difference: 0.0388555% difference

Amhdal's Law:

S = old/new

45.888594353/45.8707675752 = 1.00038863047

F = (S-1/E-1) * (1-1/s)

F = 1.5097496638×10⁻⁹

perf stat ./mm 1024 > p.out

Printing Result Matrix:

Done.

Performance counter stats for './mm 1024':

1,226,693.89 msec task-clock:u	#	1.000 CPUs utilized
0 context-switches:u	#	0.000 K/sec
0 cpu-migrations:u	#	0.000 K/sec
620 page-faults:u	#	0.001 K/sec
2,449,762,531,803 cycles:u	#	1.997 GHz
2,289,250,800,260 instructions:u	#	0.93 insn per cycle

328,503,419,943 branches:u # 267.796 M/sec
62,357,824,795 branch-misses:u # 18.98% of all branches

1226.871014252 seconds time elapsed

1226.528339000 seconds user

0.159986000 seconds sys

$2,289,250,800,260 / (1.997 \text{ GHz} * 0.93) = 1232.62894356$

Percent Difference: 0.46822% difference

Amhdal's Law:

$S = \text{old/new}$

$1226.871014252 / 1232.62894356 = 0.995328740788$

$F = (S-1/E-1) * (1-1/s)$

$F = 2.1923070973 \times 10^{-7}$

Amhdal's Law:

$S = \text{old/new}$

$45.888594353 / 1226.871014252 = 0.0374029493076$

$F = (S-1/E-1) * (1-1/s)$

$F = 0.247732625142$