Cache: Report

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<u>Case 1:</u> L1d Cache Size = 1 kB

a. L1i = 4B

Program	Instructions Executed	Clock Cycles Taken	Speed of Processor
1-even.asm	83	3419	0.024276104
2-prime.asm	7	307	0.022801302
3-descending.asm	386	16000	0.024125
4-histogram.asm	163	7216	0.022588693
5-fibonnaci.asm	83	3424	0.024240654
6-arithematic.asm	54	2218	0.024346258
evenorodd.asm	6	267	0.02247191
descending.asm	365	15131	0.024122663

b. L1i = 8B

Program	Instructions Executed	Clock Cycles Taken	Speed of Processor
1-even.asm	83	3502	0.023700742
2-prime.asm	7	313	0.022364218
3-descending.asm	386	16379	0.023566762
4-histogram.asm	163	7347	0.022185925
5-fibonnaci.asm	83	3506	0.023673702
6-arithematic.asm	54	2272	0.023767605
evenorodd.asm	6	272	0.022058824
descending.asm	365	15487	0.023568153

c. L1i = 32B

Program	Instructions Executed	Clock Cycles Taken	Speed of Processor
1-even.asm	83	2508	0.0330941
2-prime.asm	7	325	0.02153846
3-descending.asm	386	12377	0.031186879
4-histogram.asm	163	3662	0.044511195
5-fibonnaci.asm	83	2025	0.040987656
6-arithematic.asm	54	970	0.055670105
evenorodd.asm	6	282	0.021276595
descending.asm	365	12588	0.029472513

d. L1i = 128B

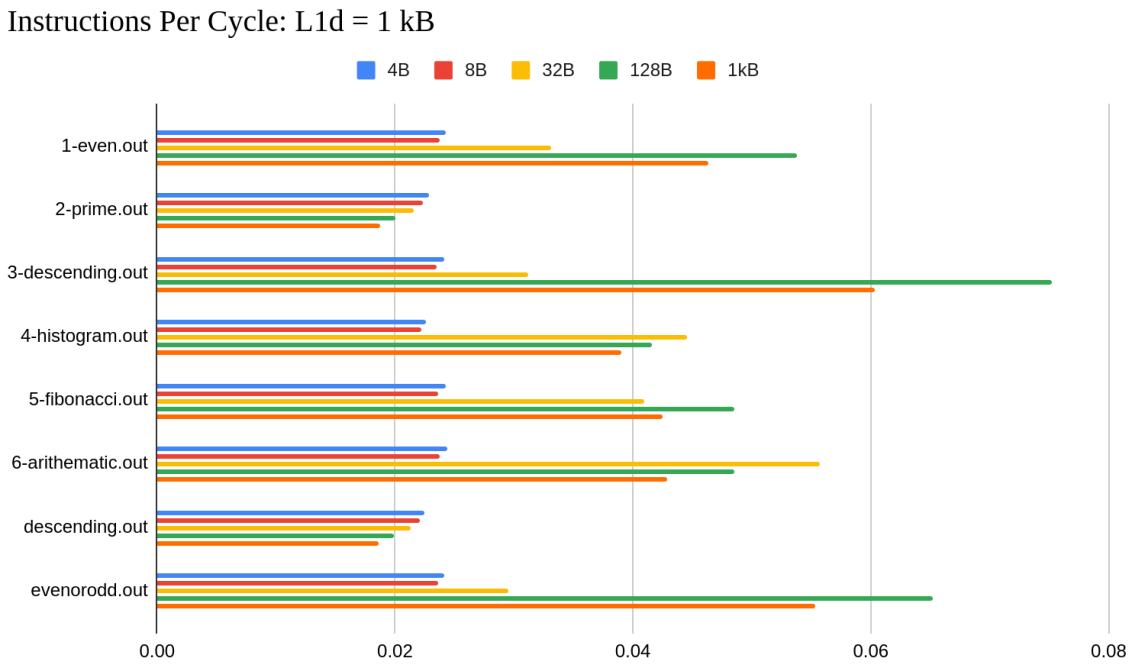
Program	Instructions Executed	Clock Cycles Taken	Speed of Processor
1-even.asm	83	1544	0.053756475
2-prime.asm	7	349	0.020057306
3-descending.asm	386	5220	0.07528736
4-histogram.asm	163	3922	0.04156043
5-fibonnaci.asm	83	1709	0.048566412
6-arithematic.asm	54	1114	0.04847397
evenorodd.asm	6	302	0.01986755
descending.asm	365	5597	0.06521351

e. L1i = 1kB

Program	Instructions Executed	Clock Cycles Taken	Speed of Processor
1-even.asm	83	1792	0.046316963
2-prime.asm	7	373	0.018766755
3-descending.asm	386	6512	0.060350124
4-histogram.asm	163	4182	0.038976565
5-fibonnaci.asm	83	1953	0.04249872
6-arithematic.asm	54	1258	0.04292528
evenorodd.asm	6	322	0.01863354
descending.asm	365	6589	0.055395357

Observations:

- Most benchmarks reach their highest speed (instructions per cycle) when the size of the L1i cache is 128 B. For the initial increase in size from 4B to 32B, the increase in size is balanced by the increase in latency. However, at 128B, the increase in size outweighs the increase in latency, thus showing significant change.
- As size is increased from 128B, the increase in the hit rate is of very little significance. Hence, the increased latency causes a decrease in speed.



<u>Case 2:</u> L1i Cache Size = 1 kB

a. L1d = 4B

Program	Instructions Executed	Clock Cycles Taken	Speed of Processor
1-even.asm	83	1715	0.0483965
2-prime.asm	7	370	0.018918918
3-descending.asm	386	7173	0.05562526
4-histogram.asm	163	3906	0.041730672
5-fibonnaci.asm	83	1873	0.044313934
6-arithematic.asm	54	1192	0.045302015
evenorodd.asm	6	319	0.018808777
descending.asm	365	7472	0.050990365

b. L1d = 8B

Program	Instructions Executed	Clock Cycles Taken	Speed of Processor
1-even.asm	83	1722	0.04819977
2-prime.asm	7	370	0.018918918
3-descending.asm	386	7149	0.055532243
4-histogram.asm	163	3930	0.04147583
5-fibonnaci.asm	83	1880	0.044148937
6-arithematic.asm	54	1198	0.045075126
evenorodd.asm	6	319	0.018808777
descending.asm	365	7154	0.052138664

c. L1d = 32B

Program	Instructions Executed	Clock Cycles Taken	Speed of Processor
1-even.asm	83	1736	0.04781106
2-prime.asm	7	370	0.018918918
3-descending.asm	386	6246	0.06292027
4-histogram.asm	163	4042	0.04032657
5-fibonnaci.asm	83	1894	0.043822598
6-arithematic.asm	54	1210	0.0446281
evenorodd.asm	6	319	0.018808777
descending.asm	365	6176	0.05909974

d. L1d = 128B

Program	Instructions Executed	Clock Cycles Taken	Speed of Processor
1-even.asm	83	1764	0.047052152
2-prime.asm	7	370	0.018918918
3-descending.asm	386	6330	0.062085308
4-histogram.asm	163	3954	0.041224077
5-fibonnaci.asm	83	1922	0.043184184
6-arithematic.asm	54	1234	0.04376013
evenorodd.asm	6	319	0.018808777
descending.asm	365	6320	0.057753164

e. **L1d = 1kB**

Program	Instructions Executed	Clock Cycles Taken	Speed of Processor
1-even.asm	83	1764	0.047052152
2-prime.asm	7	373	0.018766755
3-descending.asm	386	6512	0.060350124
4-histogram.asm	163	4182	0.038976565
5-fibonnaci.asm	83	1953	0.04249872
6-arithematic.asm	54	1258	0.04292528
evenorodd.asm	6	322	0.01863354
descending.asm	365	6589	0.055395357

Observations:

- The obtained speeds are almost identical for most programs.
- This is because the number of data memory accesses is low. Thus the varying cache size does not have a significant effect on all of the benchmarks.

Note: descending.asm and 3-descending.asm are anomalies as they show an exaggerated variation. This is because the number of instructions executed is high compared to other programs.