

Appendix: Architecturally-independent and time-based characterization of SPEC CPU 2017

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Abstract—This is an appendix to our ISPASS 2020 extended abstract [1].

REFERENCES

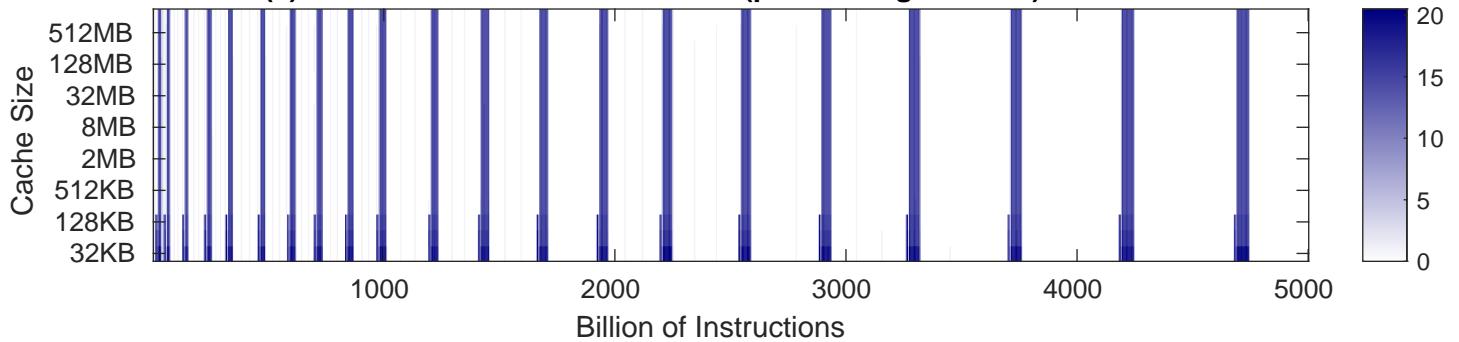
- [1] M. Hassan, C. H. Park, and D. Black-Schaffer, “Architecturally-independent and time-based characterization of spec cpu 2017,” in *Proceedings of the 2020 IEEE International Symposium on Performance Analysis of Systems and Software*, ser. ISPASS ’20. IEEE, 2020.

I. APPENDIX

This appendix contains plots of all the SPEC 2006 and SPEC 2017 benchmarks. Each benchmark has 7 figures. Figure (a) is the time based plot as a function of cache size for different cache sizes. Figure (b),(c) and (d) show the execution being aggregated into MPKI bins. Figure (e) shows the aggregate MPKI. Figure (f) and (g) show the percentage of misses that occur in different MPKI bins when the program execution was in a particular MPKI bin.

Memory Behavior Analysis: SPEC 2017 - bwaves i.p 1 - 5003B instructions

(a) MPKI over time and cache size (prefetching enabled)



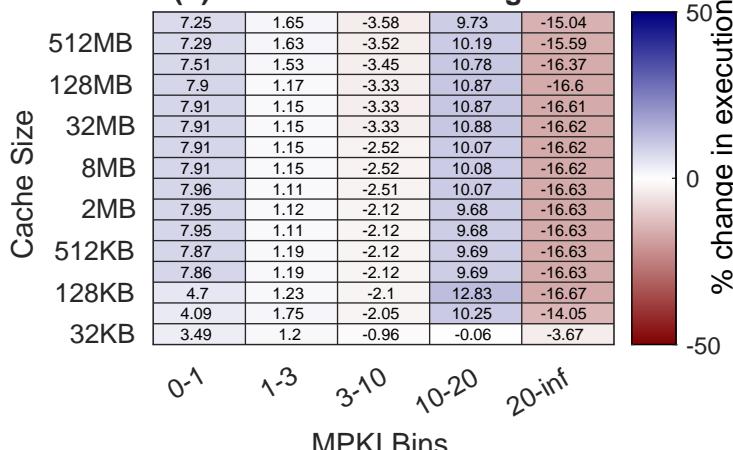
(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	86.32	2	0.39	11.12	0.17
	86.31	2.01	0.39	11.12	0.17
	86.29	2.03	0.39	11.12	0.17
128MB	86.29	2.03	0.39	11.12	0.17
	86.29	2.03	0.39	11.12	0.17
	86.29	2.03	0.39	11.12	0.17
32MB	86.29	2.03	0.39	11.12	0.17
	86.29	2.03	0.39	11.12	0.17
8MB	86.29	2.03	0.39	11.12	0.17
	86.28	2.04	0.39	11.12	0.17
2MB	86.27	2.05	0.39	11.12	0.17
	86.27	2.05	0.39	11.12	0.17
512KB	86.19	2.13	0.39	11.12	0.17
	86.18	2.13	0.39	11.12	0.17
128KB	83.02	2.17	0.41	14.23	0.17
	82.39	2.71	0.46	10.81	3.63
32KB	81.66	2.28	1.55	0.49	14.02

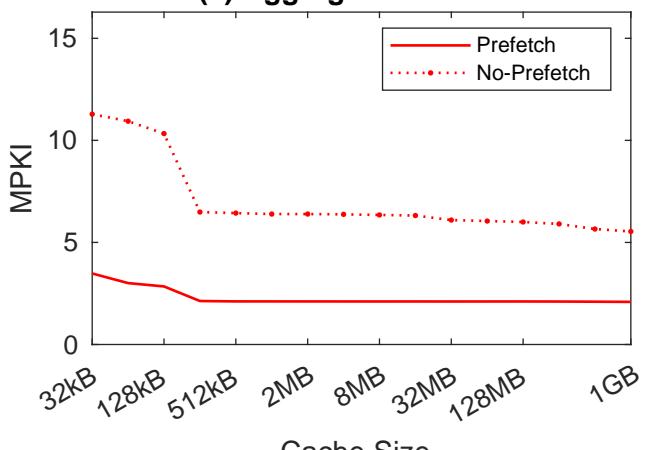
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
	79.07	0.35	3.97	1.39	15.21
	79.02	0.38	3.91	0.93	15.76
	78.78	0.5	3.84	0.34	16.54
	78.39	0.86	3.72	0.25	16.77
	78.38	0.88	3.72	0.25	16.78
	78.38	0.88	2.91	1.05	16.79
	78.38	0.88	2.91	1.04	16.79
	78.32	0.93	2.9	1.05	16.8
	78.32	0.93	2.51	1.44	16.8
	78.32	0.94	2.51	1.44	16.8
	78.32	0.94	2.51	1.43	16.8
	78.32	0.94	2.51	1.43	16.8
	78.32	0.94	2.51	1.4	16.84
	78.3	0.96	2.51	0.56	17.68
	78.17	1.08	2.51	0.55	17.69

(d) Effects of Prefetching



(e) Aggregate MPKI



(f) Execution with Prefetching

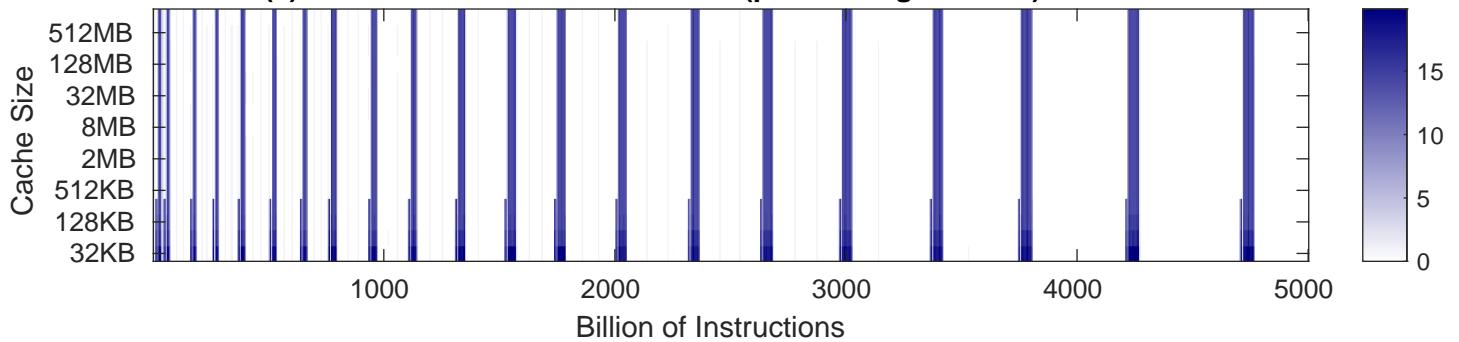
	0-1	1-3	3-10	10-20	20-inf
512MB	2.2	1.99	1.28	92.03	2.5
	2.51	2.13	1.28	91.59	2.49
	2.79	2.19	1.27	91.27	2.48
128MB	2.95	2.2	1.27	91.1	2.47
	2.93	2.19	1.27	91.13	2.47
32MB	2.9	2.17	1.27	91.19	2.47
	2.95	2.19	1.27	91.11	2.47
8MB	2.94	2.19	1.27	91.13	2.47
	2.94	2.21	1.27	91.11	2.47
2MB	2.99	2.24	1.27	91.04	2.47
	3.01	2.24	1.27	91.01	2.47
512KB	3	2.27	1.27	90.99	2.47
	3.04	2.25	1.25	91.01	2.45
128KB	2.18	1.7	0.94	93.33	1.85
	2.2	1.93	0.93	69.75	25.19
32KB	2.38	1.47	2.41	2.13	91.6

(g) Execution without Prefetching

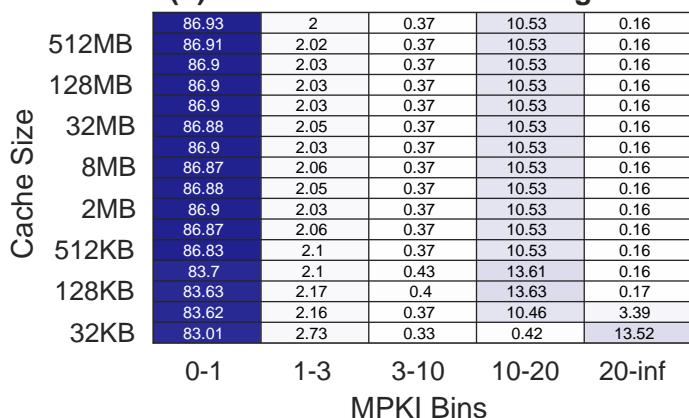
	0-1	1-3	3-10	10-20	20-inf
	2.62	0.09	5.48	4.11	87.7
	2.61	0.09	5.97	2.74	88.58
	2.53	0.12	5.73	0.83	90.8
	2.47	0.22	5.47	0.65	91.2
	2.45	0.22	5.42	0.62	91.28
	2.43	0.22	5.38	0.6	91.37
	2.34	0.22	3.93	1.98	91.53
	2.33	0.21	3.92	2.4	91.14
	2.39	0.22	3.96	2.68	90.75
	2.38	0.22	3.37	3.49	90.53
	2.39	0.22	3.37	3.49	90.53
	2.37	0.22	3.34	3.45	90.61
	2.36	0.22	3.32	3.43	90.67
	1.49	0.14	2.08	2.22	94.07
	1.42	0.14	1.97	0.74	95.73
	1.52	0.15	1.96	0.88	95.5

Memory Behavior Analysis: SPEC 2017 - bwaves i.p 2 - 5003B instructions

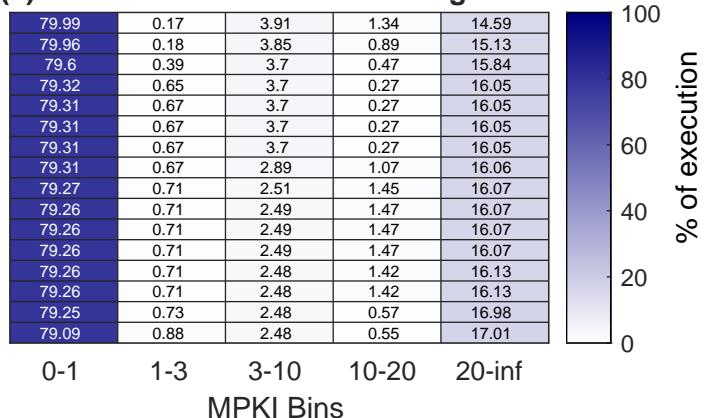
(a) MPKI over time and cache size (prefetching enabled)



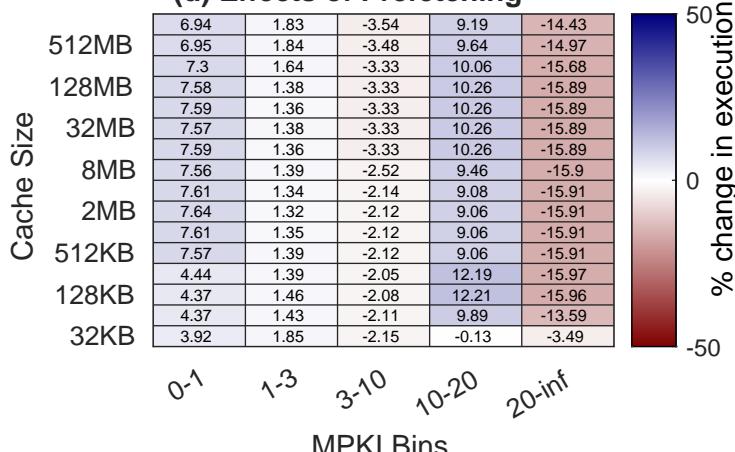
(b) Execution with Prefetching



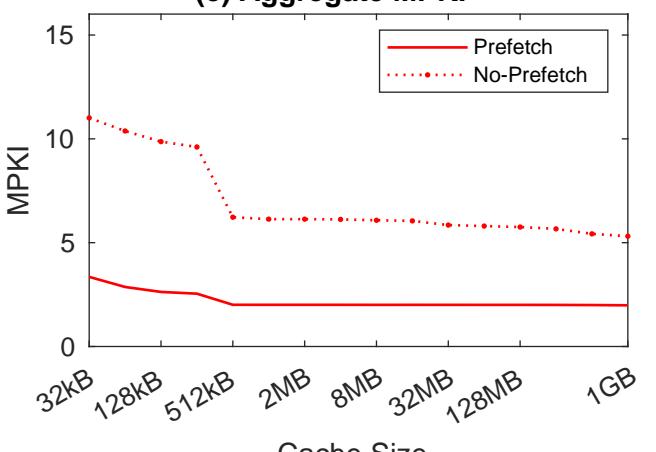
(c) Execution without Prefetching



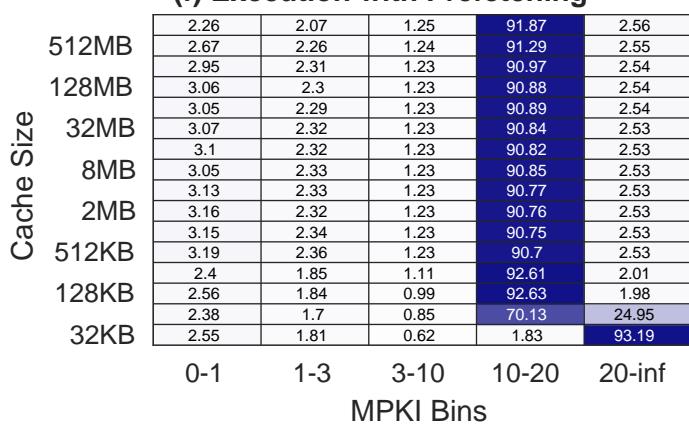
(d) Effects of Prefetching



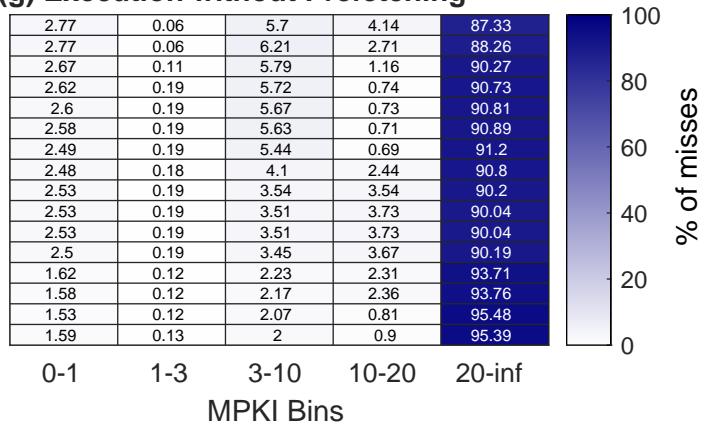
(e) Aggregate MPKI



(f) Execution with Prefetching

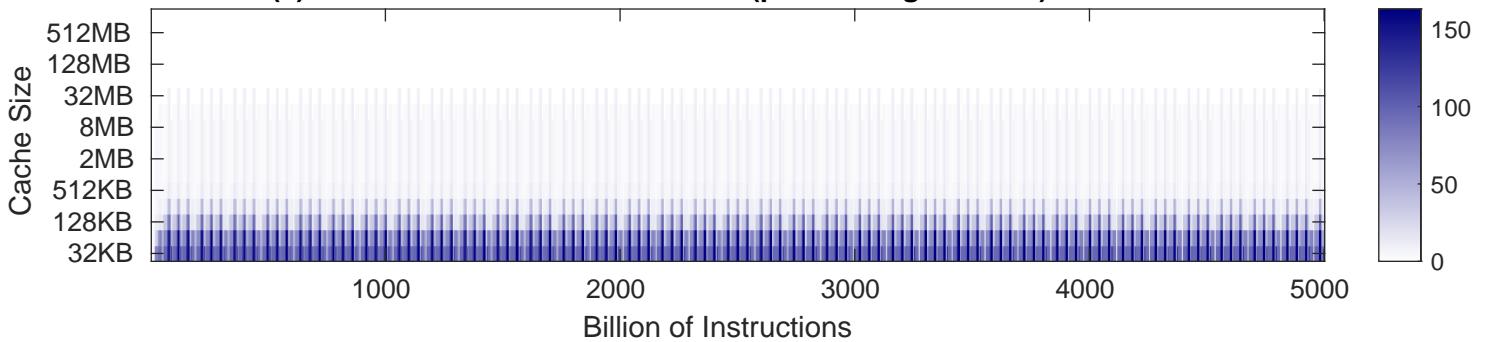


(g) Execution without Prefetching



Memory Behavior Analysis: SPEC 2017 - cactuBSSN - 5003B instructions

(a) MPKI over time and cache size (prefetching enabled)



(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	99.12	0.64	0.24	0	0
	98.75	0.79	0.45	0	0
	98.74	0.74	0.52	0	0
	98.72	0.73	0.55	0	0
	98.68	0.72	0.6	0	0
32MB	74.86	0.69	0.52	23.92	0
	20.77	0.49	54.79	23.95	0
	10.33	0.31	65.39	23.97	0
	10.33	0.3	65.4	23.97	0
	10.33	0.3	65.4	23.97	0
	10.33	0.3	65.4	23.97	0
512KB	10.3	0.24	65.35	24.11	0
	10.2	0.17	10.99	54.6	24.03
	7.54	0.05	0.52	24.53	67.36
	6.79	0.5	0.29	0.73	91.7
128KB	5.75	0.29	0.46	1.25	92.25
32KB					

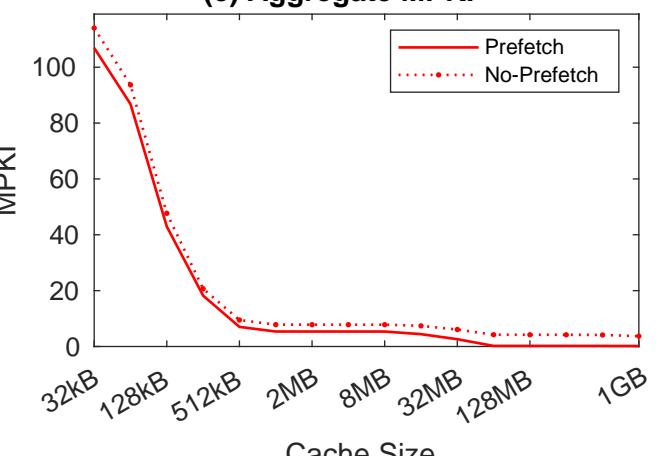
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
	24.56	65.08	2.08	5.17	3.11
	6.98	82.43	1.46	5.94	3.19
	3.02	86.33	1.32	6.12	3.22
	1.33	87.99	1.29	6.17	3.22
	0.5	88.81	1.28	6.18	3.22
	0	65.69	1.1	29.96	3.25
	0	1.3	65.46	29.99	3.25
	0	1.2	65.5	30.04	3.25
	0	1.2	65.5	30.05	3.25
	0	1.2	65.42	30.12	3.26
	0	1.2	65.31	30.21	3.29
	0	1.2	10.75	60.82	27.24
	0	1.2	0.2	18.29	80.31
	0	0.98	0.07	3.31	95.64
	0	0.98	0.07	2.23	96.72

(d) Effects of Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	74.56	-64.44	-1.84	-5.17	-3.11
	91.77	-81.64	-1.01	-5.94	-3.19
	95.72	-85.59	-0.8	-6.12	-3.22
	97.39	-87.26	-0.74	-6.17	-3.22
	98.18	-88.09	-0.68	-6.18	-3.22
	74.86	-65	-0.58	-6.04	-3.25
	20.77	-0.81	-10.67	-6.04	-3.25
	10.33	-0.89	-0.11	-6.07	-3.25
	10.33	-0.9	-0.1	-6.08	-3.25
	10.33	-0.9	-0.02	-6.15	-3.26
	10.33	-0.9	-0.02	-6.15	-3.26
	10.3	-0.96	0.04	-6.1	-3.29
	10.2	-1.03	0.24	-6.22	-3.21
	7.54	-1.15	0.32	6.24	-12.95
	6.79	-0.48	0.22	-2.58	-3.94
	5.75	-0.69	0.39	-0.98	-4.47

(e) Aggregate MPKI



(f) Execution with Prefetching

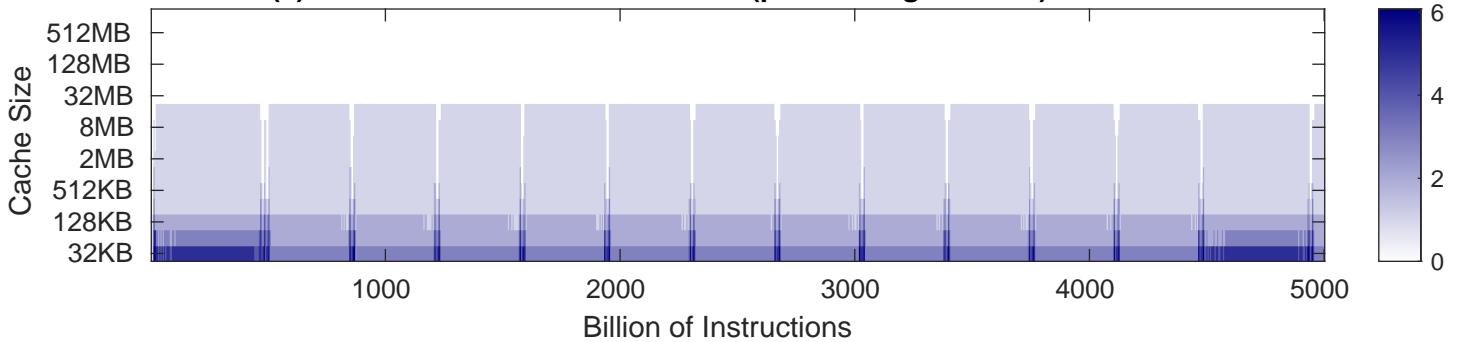
	0-1	1-3	3-10	10-20	20-inf
512MB	84.28	7.57	8.15	0	0
	79.94	8.87	11.19	0	0
	77.82	8.04	14.14	0	0
	76.71	7.81	15.47	0	0
	74.43	7.47	18.1	0	0
	3.39	0.57	1.17	94.87	0
	1.06	0.25	41.53	57.16	0
	0.03	0.12	52.6	47.25	0
	0.04	0.12	52.6	47.25	0
	0.03	0.12	52.61	47.24	0
	0.04	0.11	52.68	47.17	0
	0.05	0.07	51.45	48.43	0
	0.06	0.02	5.63	30.65	63.64
	0	0	0.08	9.02	90.9
	0	0.01	0.02	0.15	99.82
	0	0	0.03	0.19	99.78

(g) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
	5.18	34.52	3.85	20.82	35.63
	1.56	38.94	2.09	23.44	33.97
	0.61	39.88	1.79	23.76	33.96
	0.21	40.25	1.72	23.88	33.94
	0.01	40.38	1.69	24	33.91
	0	18.2	1.01	57.15	23.64
	0	0.31	32.63	47.64	19.42
	0	0.26	36.17	45.19	18.39
	0	0.26	36.16	45.2	18.38
	0	0.26	36.07	45.29	18.39
	0	0.26	36.13	45.25	18.37
	0	0.21	38.09	46.45	15.24
	0	0.1	4.89	31.96	63.06
	0	0.04	0.04	6.04	93.88
	0	0.02	0.01	0.55	99.43
	0	0.01	0	0.3	99.68

Memory Behavior Analysis: SPEC 2017 - cam4 - 5003B instructions

(a) MPKI over time and cache size (prefetching enabled)



(b) Execution with Prefetching

Cache Size	0-1	1-3	3-10	10-20	20-inf
512MB	99.99	0.01	0	0	0
128MB	99.98	0.02	0	0	0
32MB	99.94	0.06	0	0	0
8MB	99.89	0.11	0	0	0
2MB	99.75	0.25	0	0	0
512KB	99.61	0.39	0	0	0
128KB	89.81	10.18	0.01	0	0
32KB	37.42	62.54	0.04	0	0
8MB	17.52	82.34	0.13	0	0
2MB	16.21	83.6	0.19	0	0
512KB	14.04	85.62	0.34	0	0
128KB	11.05	88.27	0.68	0	0
32KB	8.14	90.47	1.4	0	0
8MB	4.61	92.2	3.19	0	0
2MB	1.06	86.34	12.43	0.18	0
512KB	0.91	39.01	59.55	0.47	0.05

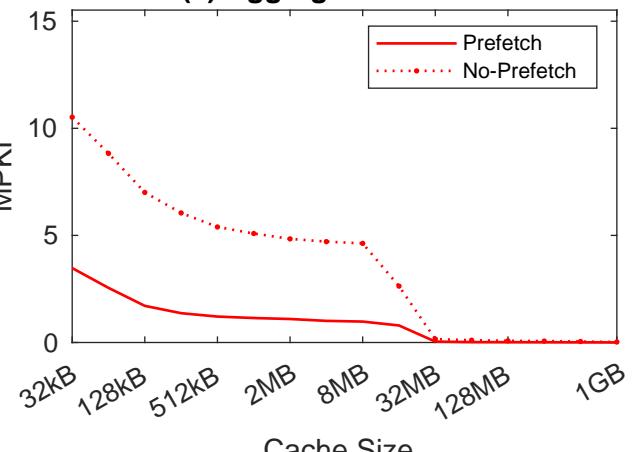
(c) Execution without Prefetching

Cache Size	0-1	1-3	3-10	10-20	20-inf
512MB	99.55	0.36	0.09	0	0
128MB	99.03	0.79	0.18	0	0
32MB	98.65	1.09	0.25	0.01	0
8MB	98.2	1.4	0.36	0.03	0
2MB	97.59	1.77	0.6	0.04	0
512KB	96.56	2.29	0.99	0.13	0.03
128KB	8.53	83.24	8.02	0.18	0.03
32KB	7.37	4.17	88.2	0.22	0.05
8MB	6.71	4.63	88.32	0.29	0.06
2MB	6.62	3.49	89.43	0.4	0.06
512KB	6.34	3.64	88.96	0.94	0.11
128KB	5.19	4.63	87.24	2.58	0.36
32KB	0.29	9.09	86.31	3.42	0.89
8MB	0.16	4.3	89.91	4.54	1.1
2MB	0.01	0.64	90.38	7.68	1.3
512KB	0.01	0.59	60.59	36.62	2.19

(d) Effects of Prefetching

Cache Size	0-1	1-3	3-10	10-20	20-inf
512MB	0.44	-0.35	-0.09	0	0
128MB	0.95	-0.77	-0.18	0	0
32MB	1.29	-1.03	-0.25	-0.01	0
8MB	1.69	-1.29	-0.36	-0.03	0
2MB	2.16	-1.52	-0.6	-0.04	0
512KB	3.05	-1.9	-0.99	-0.13	-0.03
128KB	81.28	-73.06	-8.01	-0.18	-0.03
32KB	30.05	58.37	-88.16	-0.22	-0.05
8MB	10.81	77.71	-88.19	-0.29	-0.06
2MB	9.59	80.11	-89.24	-0.4	-0.06
512KB	7.7	81.98	-88.62	-0.94	-0.11
128KB	5.86	83.64	-86.56	-2.58	-0.36
32KB	7.85	81.38	-84.91	-3.42	-0.89
8MB	4.45	87.9	-86.72	-4.54	-1.1
2MB	1.05	85.7	-77.95	-7.5	-1.3
512KB	0.9	38.42	-1.04	-36.15	-2.14

(e) Aggregate MPKI



(f) Execution with Prefetching

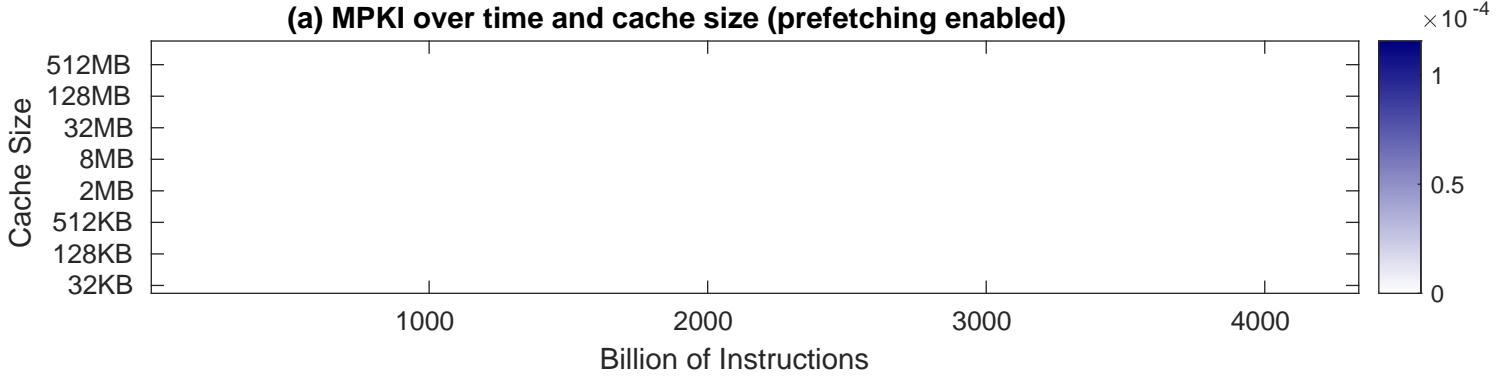
Cache Size	0-1	1-3	3-10	10-20	20-inf
512MB	94.98	5.02	0	0	0
128MB	96.39	3.61	0	0	0
32MB	94.03	5.97	0	0	0
8MB	91.21	8.79	0	0	0
2MB	80.38	19.62	0	0	0
512KB	85.2	14.8	0	0	0
128KB	83.66	16.32	0.02	0	0
32KB	23.91	75.94	0.15	0	0
8MB	7.73	91.71	0.57	0	0
2MB	6.95	92.34	0.71	0	0
512KB	5.68	93.15	1.16	0.02	0
128KB	3.71	93.96	2.33	0	0
32KB	3.13	92.47	4.4	0	0
8MB	1.76	90.71	7.53	0	0
2MB	0.14	80.55	18.47	0.85	0
512KB	0.09	32.34	65.53	1.69	0.35

(g) Execution without Prefetching

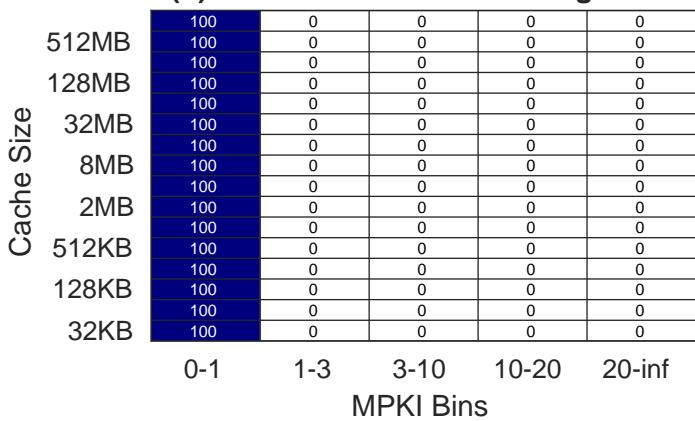
Cache Size	0-1	1-3	3-10	10-20	20-inf
512MB	50.74	24.51	21.79	2.96	0
128MB	52.28	27.01	19.3	1.41	0
32MB	49.49	28.31	20.52	1.67	0
8MB	43.3	28.81	23.6	4.29	0
2MB	39.41	26.03	29.43	5.13	0
512KB	31.89	24.68	29.28	10.81	3.34
128KB	1.8	83.92	13.12	0.91	0.24
32KB	0.91	1.69	96.52	0.65	0.23
8MB	0.8	1.85	96.25	0.81	0.29
2MB	0.79	1.36	96.46	1.09	0.3
512KB	0.81	1.35	94.72	2.59	0.54
128KB	0.74	1.5	90.1	6	1.67
32KB	0.02	2.76	85.99	7.32	3.91
8MB	0	1.58	85.68	8.41	4.33
2MB	0	0.19	83.96	11.11	4.74
512KB	0	0.15	54.04	39.45	6.36

Memory Behavior Analysis: SPEC 2017 - exchange2 - 4339B instructions

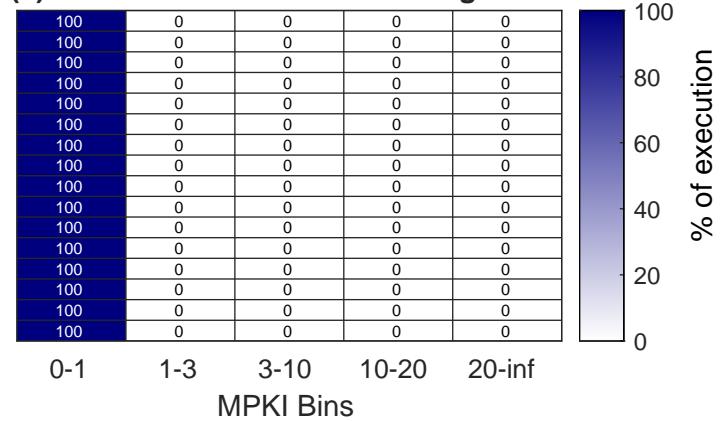
(a) MPKI over time and cache size (prefetching enabled)



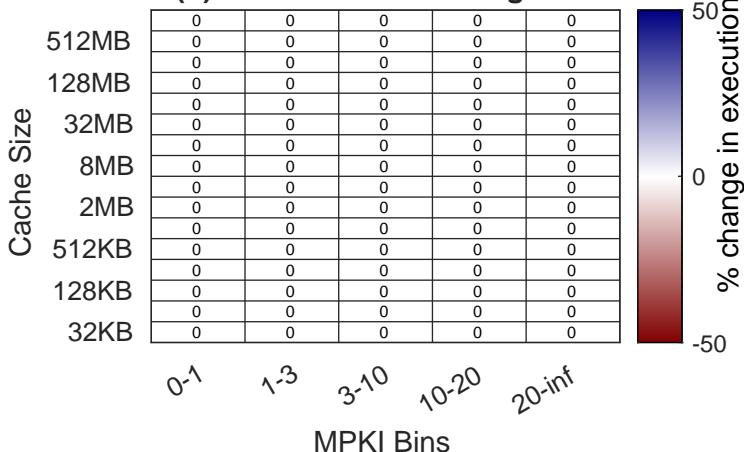
(b) Execution with Prefetching



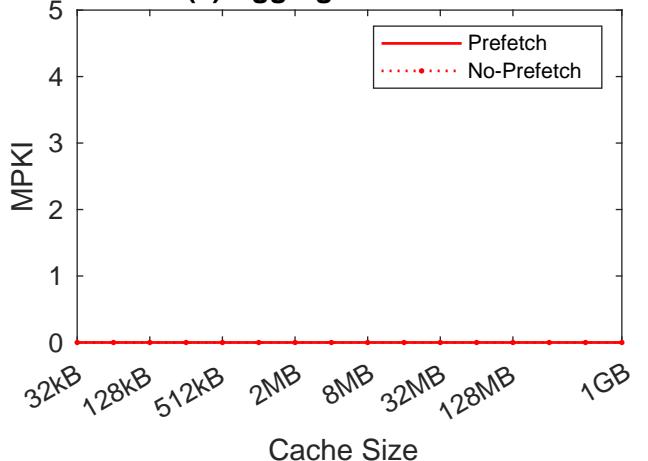
(c) Execution without Prefetching



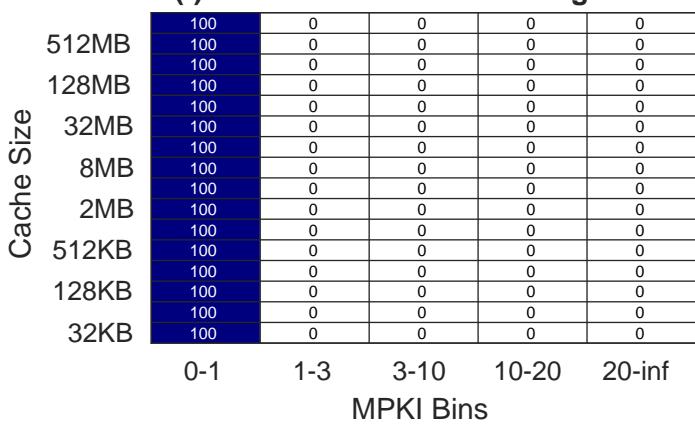
(d) Effects of Prefetching



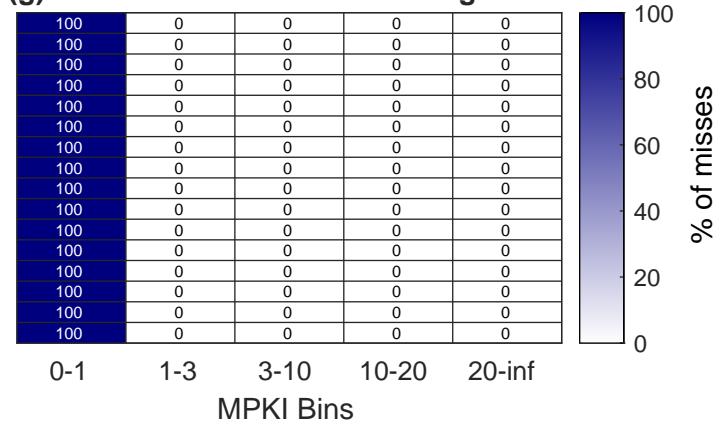
(e) Aggregate MPKI



(f) Execution with Prefetching

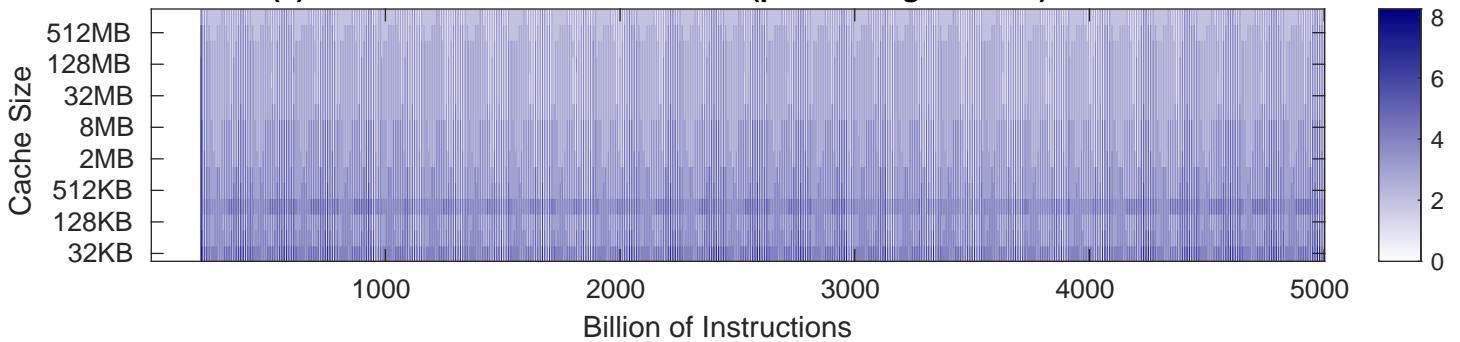


(g) Execution without Prefetching



Memory Behavior Analysis: SPEC 2017 - fotonik3d - 5003B instructions

(a) MPKI over time and cache size (prefetching enabled)



(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	41.88	37.8	17.06	3.26	0.01
128MB	41.84	35.17	19.07	3.91	0.01
32MB	41.84	33.69	17.75	6.7	0.02
8MB	41.82	33.31	18.64	6.21	0.02
2MB	41.78	33.28	19.07	5.86	0.02
512KB	41.72	33.33	19.08	5.85	0.02
128KB	41.57	33.44	19.11	5.86	0.02
32KB	41.52	33.26	19.31	5.89	0.02
512MB	41.52	33.26	19.31	5.89	0.02
128MB	41.52	33.26	17.6	7.61	0.02
32MB	41.52	33.21	16.21	7.33	1.73
8MB	41.52	33.19	16.18	5.96	3.16
2MB	25.1	43.02	22.75	5.77	3.36
512KB	41.4	33.23	16.23	5.98	3.16
128KB	41.28	33.25	16.19	6.03	3.25
32KB	41.01	0.85	48.53	6.2	3.41

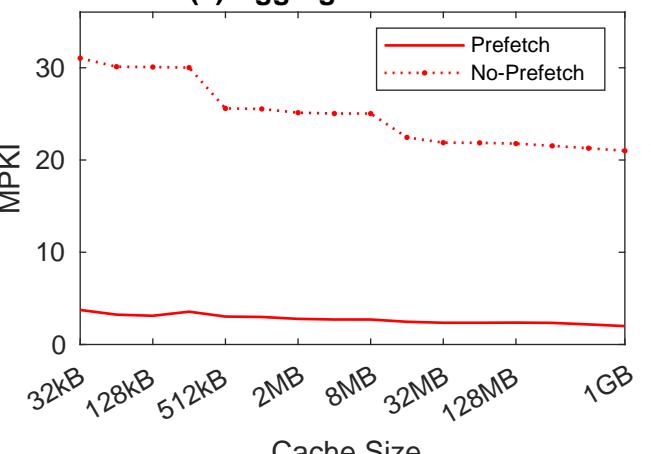
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
4.21	0	0.01	19.96	75.82	
4.2	0	0	15.2	80.59	
4.2	0	0	10.87	84.93	
4.2	0	0	10.04	85.76	
4.2	0	0	9.22	86.58	
4.2	0	0	9.19	86.61	
4.2	0	0	3	92.8	
4.2	0	0	3	92.8	
4.2	0	0	3	92.8	
4.2	0	0	1.44	94.36	
4.2	0	0	1.05	94.76	
4.2	0	0	1.02	94.79	
4.2	0	0	0.68	95.12	
4.2	0	0	0.17	95.63	
4.2	0	0	0.02	95.78	
4.2	0	0	0.02	95.78	

(d) Effects of Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	37.67	37.8	17.05	-16.7	-75.81
128MB	37.64	33.69	17.75	-4.17	-84.91
32MB	37.62	33.31	18.64	-3.83	-85.74
8MB	37.58	33.28	19.07	-3.36	-86.56
2MB	37.52	33.33	19.08	-3.34	-86.59
512KB	37.37	33.44	19.11	2.86	-92.78
128KB	37.32	33.26	19.31	2.89	-92.78
32KB	37.32	33.26	19.31	2.89	-92.78
512MB	37.32	33.21	16.21	6.17	-94.34
128MB	37.32	33.19	16.18	4.94	-91.63
32MB	20.9	43.02	22.75	5.09	-91.76
8MB	37.2	33.23	16.23	5.81	-92.47
2MB	37.08	33.25	16.19	6.01	-92.53
512KB	36.81	0.85	48.53	6.18	-92.37

(e) Aggregate MPKI



(f) Execution with Prefetching

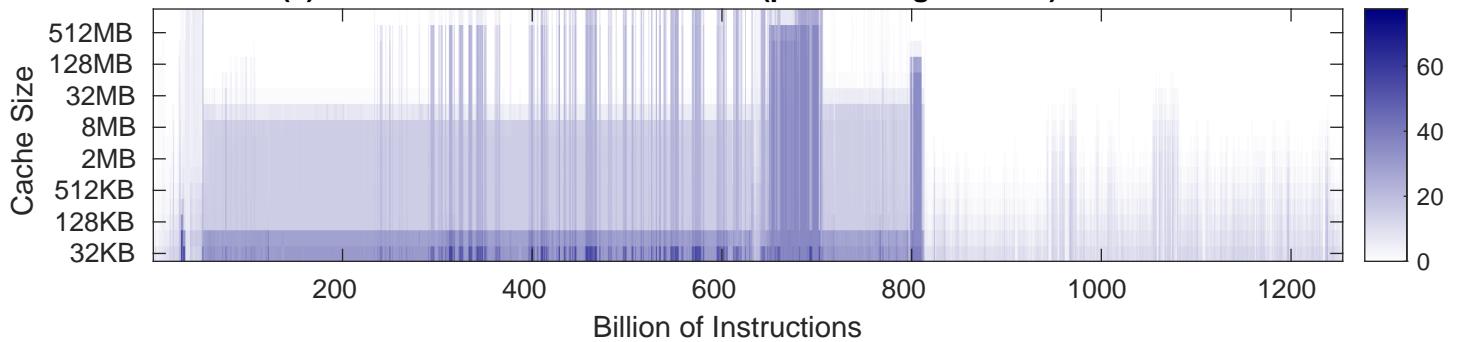
	0-1	1-3	3-10	10-20	20-inf
512MB	0.5	35.52	42.77	20.98	0.22
128MB	0.45	29.28	44.47	25.57	0.23
32MB	0.42	25.37	33.66	40.27	0.28
8MB	0.41	24.5	35.87	38.92	0.3
2MB	0.4	24.6	37.26	37.43	0.31
512KB	0.39	24.69	37.27	37.33	0.31
128KB	0.35	27.9	35.73	35.73	0.3
32KB	0.33	28.45	38.26	32.68	0.27
512MB	0.35	28.45	38.25	32.67	0.27
128MB	0.35	27.73	31.69	39.96	0.27
32MB	0.34	25.81	25.59	35.46	12.81
8MB	0.33	25.46	25.11	26.63	22.47
2MB	1.94	27.02	29.1	21.5	20.44
512KB	2.64	25.14	24.52	25.79	21.9
128KB	2.49	26.23	23.78	25.75	21.76
32KB	2.13	0.44	53.73	23.73	19.96

(g) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
0.01	0	0	16.55	83.43	
0.01	0	0	8.98	91.01	
0.01	0	0	8.26	91.73	
0.01	0	0	7.5	92.49	
0.01	0	0	7.52	92.47	
0.01	0	0	2.53	97.46	
0.01	0	0	2.27	97.72	
0.01	0	0	1.04	98.95	
0.01	0	0	0.74	99.25	
0.01	0	0	0.72	99.27	
0.01	0	0	0.42	99.57	
0.01	0	0	0.1	99.89	
0.01	0	0	0.01	99.98	
0.01	0	0	0.01	99.98	

Memory Behavior Analysis: SPEC 2017 - gcc i.p. 1 - 1254B instructions

(a) MPKI over time and cache size (prefetching enabled)



(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	82.01	2.37	6.39	3.41	5.82
128MB	81.33	1.83	2.65	1.54	12.65
32MB	79.96	1.98	3.71	1.4	12.94
8MB	79.45	1.93	3.12	1.6	13.9
2MB	78.17	2.69	3.44	1.65	14.05
512KB	67.45	5.4	11.1	1.95	14.1
128KB	35.21	1.7	38.12	10.68	14.29
32KB	33.24	2.2	4.37	45.19	15.01
	30.68	3.41	5.07	45.73	15.1
2MB	25.35	6.73	6.53	46.21	15.18
512KB	19.8	8.01	9.98	47.02	15.19
128KB	12.26	10.55	13.21	48.63	15.36
32KB	4.08	11.93	18.08	50.14	15.76
	1.07	6.59	23.87	52.18	16.29
32KB	0.38	1.98	25.14	11.69	60.8
	0.09	1.03	17.48	19.96	61.45

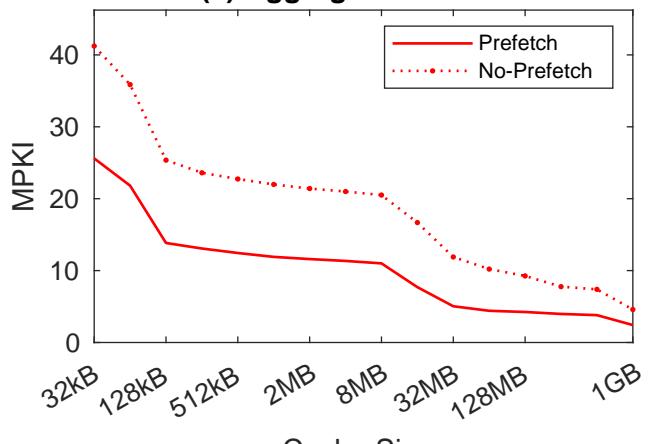
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	80.53	2.51	4.53	3.41	9.02
128MB	79.94	2.3	2.74	0.91	14.11
32MB	78.46	2.54	3.84	0.88	14.27
8MB	64.4	8.63	8.16	2.71	16.1
2MB	56.48	12.55	7.5	5.93	17.53
512KB	29.78	26.87	15.66	5.94	21.76
128KB	27.74	6.37	4.86	33.17	27.86
32KB	25.32	7.51	4.28	3.08	59.81
	21.43	9.09	5.77	3.67	60.04
2MB	16.86	10.19	8.3	4.12	60.52
512KB	11.92	11.06	10.89	5.2	60.93
128KB	4.49	12.6	14.46	6.46	62
32KB	1.27	9.9	17.86	8.25	62.72
	0.67	2.82	21.67	11.07	63.77
32KB	0.2	1.65	16.26	16.32	65.57
	0.05	0.58	6.07	27.23	66.06

(d) Effects of Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	1.48	-0.14	1.86	0	-3.2
128MB	1.39	-0.47	-0.09	0.63	-1.46
32MB	1.5	-0.56	-0.13	0.52	-1.33
8MB	15.05	-6.7	-5.04	-1.11	-2.2
2MB	21.69	-9.86	-4.06	-4.28	-3.48
512KB	37.67	-21.47	-4.56	-3.99	-7.66
128KB	7.47	-4.67	33.26	-22.49	-13.57
32KB	7.92	-5.31	0.09	42.11	-44.8
	9.25	-5.68	-0.7	42.06	-44.94
2MB	8.49	-3.46	-1.77	42.09	-45.34
512KB	7.88	-3.05	-0.91	41.82	-45.74
128KB	7.77	-2.05	-1.25	42.17	-46.64
32KB	2.81	2.03	0.22	41.89	-46.96
	0.4	3.77	2.2	41.11	-47.48
32KB	0.18	0.33	8.88	-4.63	-4.77
	0.04	0.45	11.41	-7.27	-4.61

(e) Aggregate MPKI



(f) Execution with Prefetching

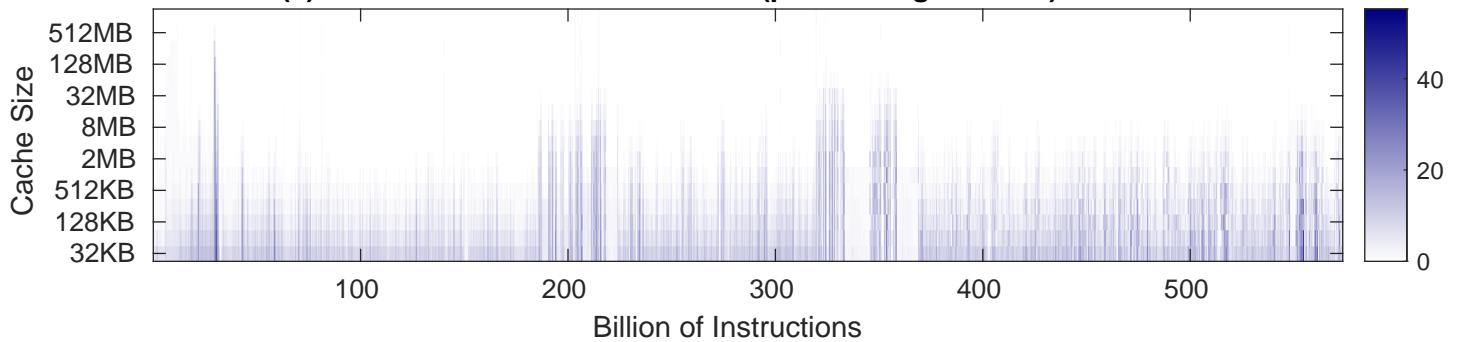
	0-1	1-3	3-10	10-20	20-inf
512MB	2.59	1.79	15.3	23	57.31
128MB	1.74	0.92	4.75	5.33	87.26
32MB	1.73	0.81	4	5.64	87.82
8MB	2.46	1.07	4.27	5.47	86.73
2MB	4.44	1.7	12.05	5.62	76.19
512KB	0.7	0.41	29.49	18.88	50.52
128KB	0.64	0.36	2.34	59.84	36.82
32KB	0.8	0.52	2.66	60.12	35.91
	0.79	1.04	3.29	59.58	35.31
512KB	0.77	1.24	4.75	58.8	34.44
128KB	0.61	1.56	6.17	58.35	33.31
32KB	0.23	1.69	8.02	57.52	32.53
	0.05	1.01	10.25	56.72	31.97
32KB	0.01	0.17	7.74	7.31	84.78
	0	0.08	5.27	10.24	84.41

(g) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	2.71	0.94	6.54	10.42	79.39
128MB	1.75	0.53	2.43	1.55	92.78
32MB	1.72	0.56	3.4	4.37	86.66
8MB	2.39	1.62	4.95	4.37	83.04
2MB	2.28	2.05	4.35	8.28	80.76
512KB	1.02	4.34	7.22	6.66	67.18
128KB	0.72	0.61	2.04	29.44	95.42
32KB	0.58	0.6	1.27	2.13	94.63
	0.52	0.74	1.59	2.51	93.71
2MB	0.46	0.82	2.21	2.8	92.48
512KB	0.37	0.89	2.86	3.39	91.24
128KB	0.15	0.95	3.71	3.94	89.85
32KB	0.04	0.82	4.45	4.84	88.32
	0.02	0.23	5.42	6.01	90.37
32KB	0	0.03	1.08	9.13	89.76

Memory Behavior Analysis: SPEC 2017 - gcc i.p. 2 - 573B instructions

(a) MPKI over time and cache size (prefetching enabled)



(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	99.84	0.12	0.03	0	0
128MB	99.79	0.17	0.03	0	0
32MB	99.63	0.23	0.12	0.02	0
8MB	99.46	0.33	0.14	0.07	0
2MB	98.94	0.84	0.14	0.09	0
512KB	96.84	1.76	1.29	0.09	0.02
128KB	94.42	2.95	2.44	0.17	0.02
32KB	89.8	4.5	4.52	1.17	0.02
0-1	82.48	8.89	6.19	2.41	0.03
1-3	70.78	14.94	10.51	3.57	0.19
3-10	54.32	22.35	18.05	4.93	0.35
10-20	34.4	31.02	26.89	7.13	0.56
20-inf	11.72	37.23	39.34	10.57	1.15
512MB	2.49	25.49	55.29	14.89	1.83
128MB	0.96	8.61	65.37	22.44	2.62
32MB	0.24	6.16	47.55	42.37	3.68

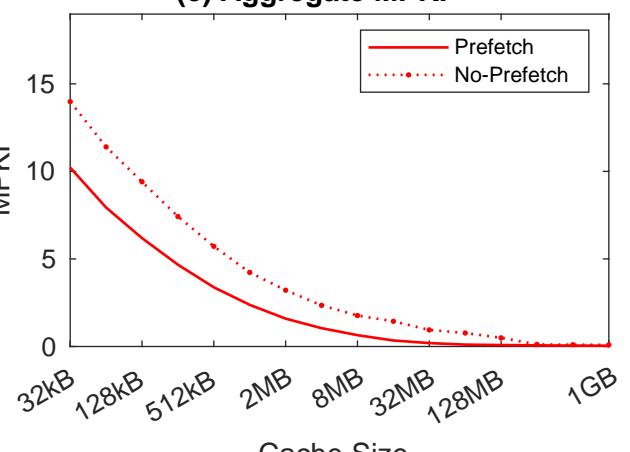
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	99.41	0.52	0.07	0	0
128MB	99.39	0.52	0.09	0	0
32MB	98.88	0.91	0.19	0.02	0
8MB	92.47	4.53	2.37	0.58	0.05
2MB	87.88	7.15	3.7	1.17	0.1
512KB	84.34	9.64	4.25	1.53	0.23
128KB	73.67	16.77	6.26	2.65	0.65
32KB	67.39	19.7	8.98	3.07	0.85
0-1	57.09	23.94	13.36	4.34	1.27
1-3	46.12	24.55	21.03	6.54	1.76
3-10	36.56	25.04	25.06	11.23	2.11
10-20	18.17	31.09	31.89	14.54	4.31
20-inf	2.79	28.51	42.6	20.16	5.95
512MB	1.81	7.64	55.22	27.2	8.13
128MB	0.7	2.95	47.97	38.52	9.87
32MB	0.14	1.22	19.35	67.2	12.08

(d) Effects of Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	0.43	-0.4	-0.04	0	0
128MB	0.4	-0.35	-0.06	0	0
32MB	0.75	-0.68	-0.07	0	0
8MB	6.99	-4.2	-2.23	-0.51	-0.05
2MB	11.06	-6.31	-3.56	-1.08	-0.1
512KB	12.5	-7.88	-2.96	-1.44	-0.21
128KB	20.75	-13.82	-3.82	-2.48	-0.63
32KB	22.41	-15.2	-4.46	-1.9	-0.83
0-1	25.39	-15.05	-7.17	-1.93	-1.24
1-3	24.66	-9.61	-10.52	-2.97	-1.57
3-10	17.76	-2.69	-7.01	-6.3	-1.76
10-20	16.23	-0.07	-5	-7.41	-3.75
20-inf	8.93	8.72	-3.26	-9.59	-4.8
512MB	0.68	17.85	0.07	-12.31	-6.3
128MB	0.26	5.66	17.4	-16.08	-7.25
32MB	0.1	4.94	28.2	-24.83	-8.4

(e) Aggregate MPKI



(f) Execution with Prefetching

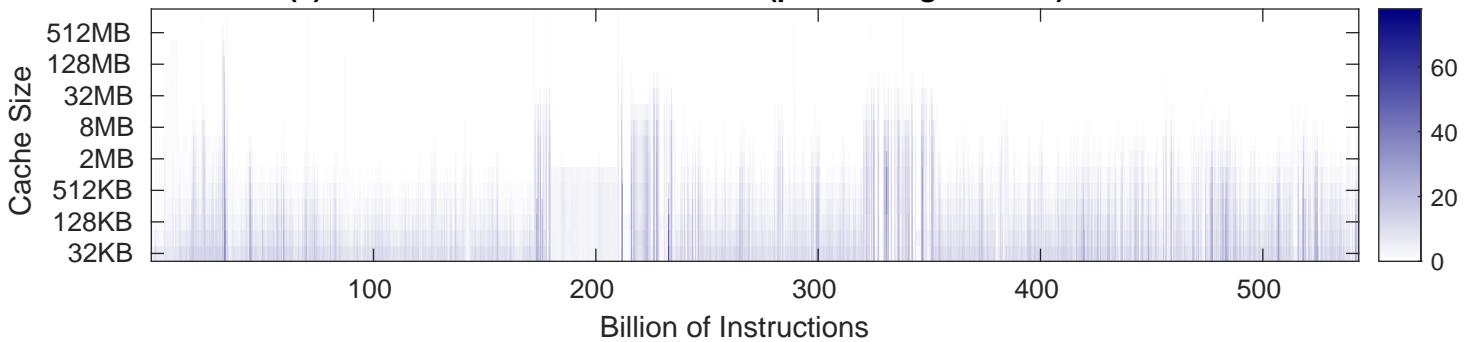
	0-1	1-3	3-10	10-20	20-inf
512MB	92.61	4.03	3.36	0	0
128MB	91.39	5.58	3.03	0	0
32MB	83.27	5.53	8.13	3.07	0
8MB	72.39	5.71	10.08	11.82	0
2MB	68.92	11.37	7.99	11.72	0
512KB	44.3	15.21	32.79	5.89	1.81
128KB	35.71	14.91	41.82	6.51	1.04
32KB	26.51	12.28	39.23	21.41	0.56
0-1	20.2	14.88	33.9	30.33	0.69
1-3	14.01	17.19	35.47	30.67	2.67
3-10	10.53	16.67	41.12	28.33	3.34
10-20	6.16	16.13	45.04	28.88	3.79
20-inf	1.94	14.39	47.03	30.61	6.03
512MB	0.24	8.69	51.36	32.43	7.28
128MB	0.08	1.94	52.35	37.42	8.21
32MB	0.01	1.24	35.96	53.85	8.93

(g) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	87.5	8.37	4.14	0	0
128MB	87.41	7.83	4.76	0	0
32MB	79.04	11.09	7.62	2.25	0
8MB	42.94	14.55	24.5	15.76	2.24
2MB	34.22	14.78	26.98	20.7	3.31
512KB	29.81	15.89	25.72	23.23	5.36
128KB	21.59	18.76	22.68	26.14	10.82
32KB	16.68	18.27	27.73	25.16	12.16
0-1	12.12	17.74	30.17	26.26	13.72
1-3	7.81	13.39	35.5	29.16	14.14
3-10	5.42	10.34	34.37	36.77	13.09
10-20	2.43	9.58	32.17	37.27	18.54
20-inf	0.27	7.48	33.1	38.91	20.23
512MB	0.13	1.88	35.44	40.3	22.25
128MB	0.04	0.48	30.17	46.67	22.64
32MB	0.01	0.19	10.94	66.41	22.45

Memory Behavior Analysis: SPEC 2017 - gcc i.p. 3 - 543B instructions

(a) MPKI over time and cache size (prefetching enabled)



(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	99.71	0.28	0.02	0	0
128MB	99.69	0.29	0.02	0	0
32MB	99.41	0.48	0.11	0	0
8MB	99.28	0.52	0.15	0.06	0
2MB	97.99	1.66	0.28	0.07	0
512KB	95.4	2.21	2.3	0.07	0.02
128KB	91.47	4.07	3.89	0.55	0.02
32KB	87.46	4.71	5.95	1.86	0.02
	79.84	9.69	7.27	3.13	0.07
	67.17	16.63	11.54	4.36	0.29
	46.97	25.54	21.38	5.71	0.41
	28.26	26.81	36.13	8.01	0.79
	11.05	27.03	48.89	11.54	1.49
	3.74	16.22	62.09	15.91	2.04
	1.49	6.76	64.7	24.14	2.91
	0.01	4.29	44.49	46.05	4.16

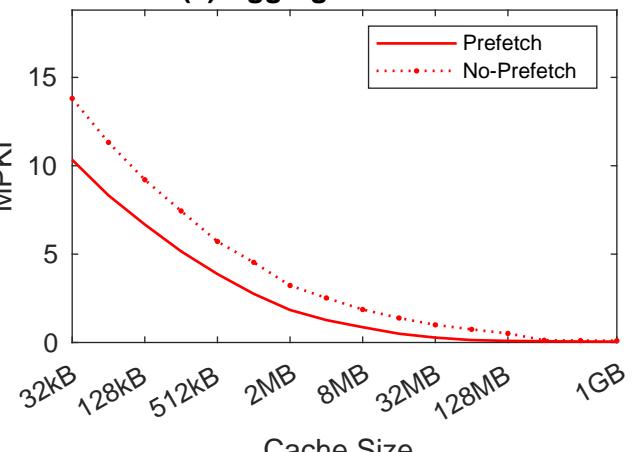
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	99.25	0.63	0.13	0	0
128MB	99.12	0.77	0.11	0	0
32MB	98.71	1.05	0.22	0.02	0
8MB	92.47	4.73	2.23	0.52	0.06
2MB	87.59	7.88	3.46	0.98	0.09
512KB	82.99	10.55	4.57	1.69	0.2
128KB	75.38	15.01	6.41	2.73	0.48
32KB	66.75	19.63	8.75	3.94	0.94
	56.25	23.07	14.38	4.49	1.8
	46.77	24.34	20.97	5.47	2.45
	27.38	29.9	30.53	9.1	3.09
	15.21	27.23	40.8	12.67	4.09
	4.86	20.31	50.93	17.9	6
	2.82	8.67	55.35	25.65	7.51
	0.74	4.09	44.78	41.39	9
	0.24	1.4	19.87	66.93	11.56

(d) Effects of Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	0.46	-0.35	-0.11	0	0
128MB	0.57	-0.48	-0.09	0	0
32MB	0.7	-0.57	-0.11	-0.02	0
8MB	6.81	-4.21	-2.08	-0.46	-0.06
2MB	10.4	-6.22	-3.18	-0.91	-0.09
512KB	12.41	-8.34	-2.27	-1.62	-0.18
128KB	16.09	-10.94	-2.52	-2.18	-0.46
32KB	20.71	-14.92	-2.8	-2.08	-0.92
	23.59	-13.38	-7.11	-1.36	-1.73
	20.4	-7.71	-9.43	-1.11	-2.16
	19.59	-4.36	-9.15	-3.39	-2.68
	13.05	-0.42	-4.67	-4.66	-3.3
	6.19	6.72	-2.04	-6.36	-4.51
	0.92	7.55	6.74	-9.74	-5.47
	0.75	2.67	19.92	-17.25	-6.09
	0.77	2.89	24.62	-20.88	-7.4

(e) Aggregate MPKI



(f) Execution with Prefetching

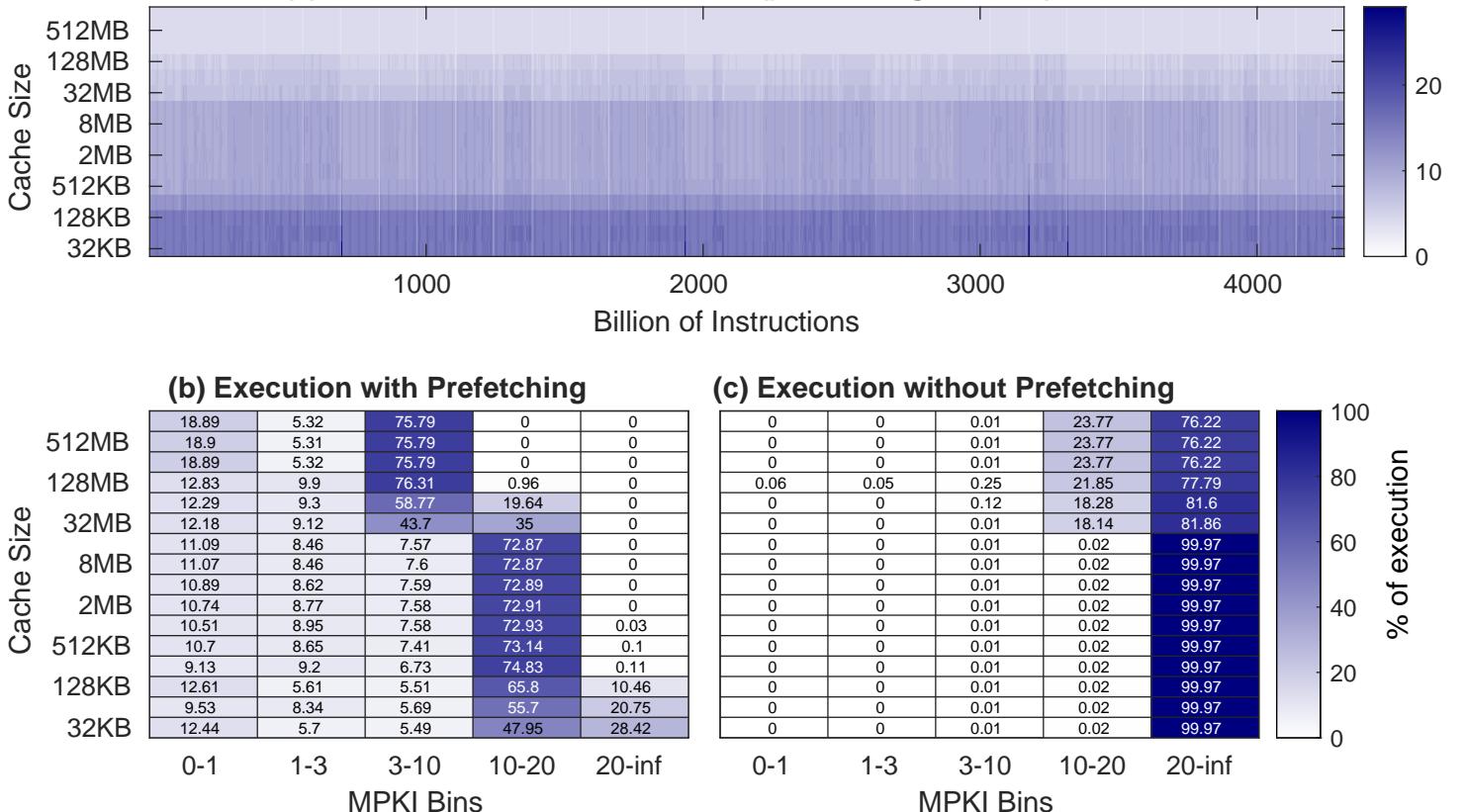
	0-1	1-3	3-10	10-20	20-inf
512MB	89.2	8.68	2.12	0	0
128MB	88.53	9.62	1.85	0	0
32MB	79.84	11.12	9.04	0	0
8MB	71.06	8.97	12.09	7.88	0
2MB	61.77	19.41	10.64	8.18	0
512KB	35.46	14.54	44.91	3.66	1.42
128KB	26.35	15.69	43.81	13.28	0.87
32KB	20.62	9.62	41.67	27.5	0.58
	17.47	13.21	33.9	34.05	1.37
	12.85	16.81	33.94	32.78	3.62
	7.97	18.15	41.27	28.99	3.63
	4.26	12.81	49.31	28.48	5.13
	1.3	9.84	51.44	30.19	7.23
	0.3	5.08	54.47	32.19	7.96
	0.11	1.47	51.06	38.41	8.94
	0.06	0.79	31.5	57.48	10.17

(g) Execution without Prefetching

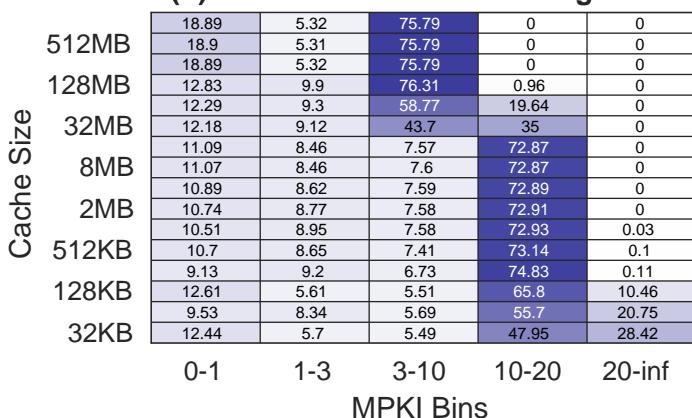
	0-1	1-3	3-10	10-20	20-inf
512MB	83.55	9.93	6.51	0	0
128MB	82.52	12.12	5.37	0	0
32MB	75.78	13.38	9.25	1.59	0
8MB	46.38	14.66	24.09	12.27	2.6
2MB	36.55	16.67	26.54	17.19	3.06
512KB	29.53	16.54	26.36	22.67	4.91
128KB	21.86	17.92	24.48	27.68	8.06
32KB	15.44	16.99	25.35	30.15	12.07
	10.95	15.92	30.52	25.5	17.12
	8.25	13.01	35.85	23.86	19.03
	3.92	12.44	38.15	27.47	18.02
	1.9	8.7	39.8	30.23	19.37
	0.37	5.43	40	32.43	21.76
	0.19	2.04	37.96	37.43	22.38
	0.03	0.7	27.99	49.37	21.9
	0.01	0.23	9.47	67.51	22.79

Memory Behavior Analysis: SPEC 2017 - lmb - 4312B instructions

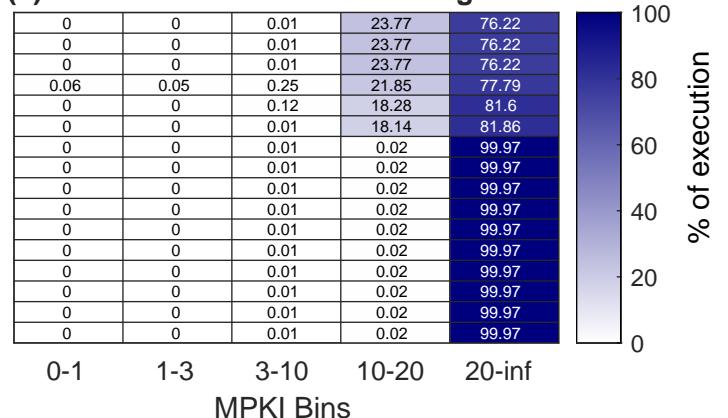
(a) MPKI over time and cache size (prefetching enabled)



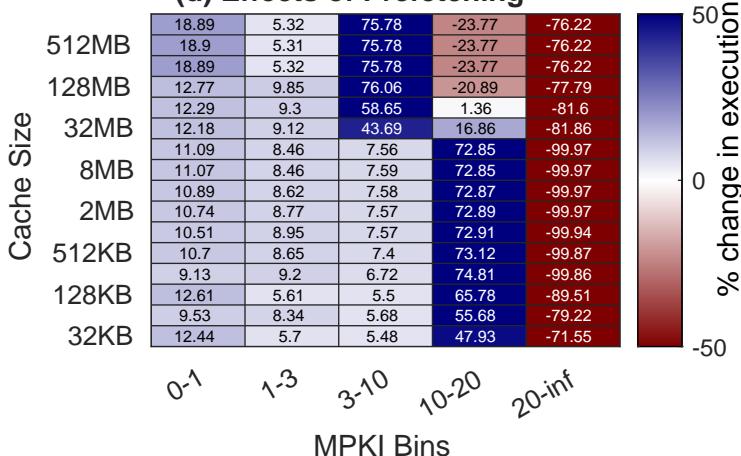
(b) Execution with Prefetching



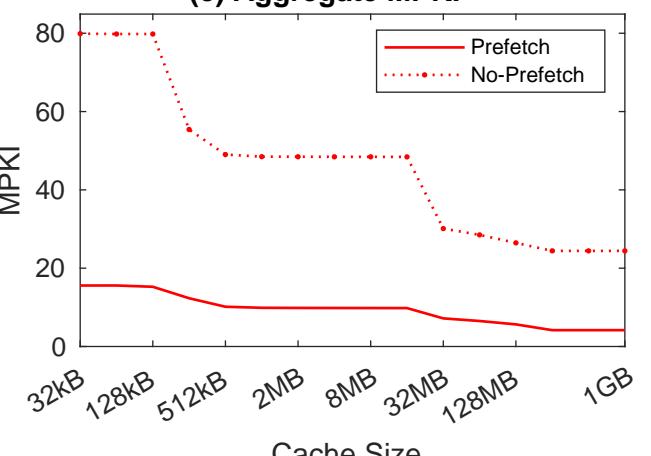
(c) Execution without Prefetching



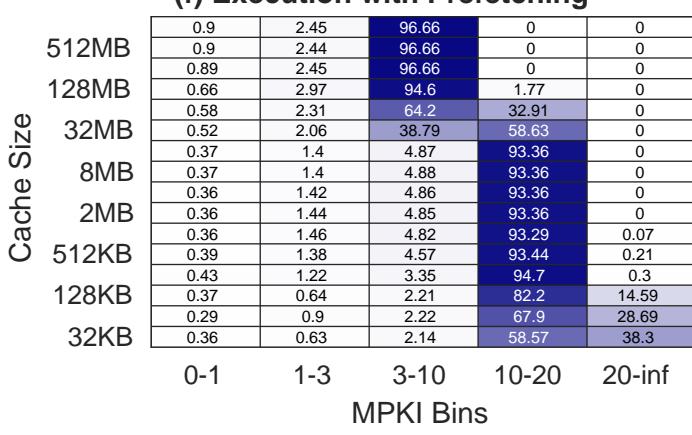
(d) Effects of Prefetching



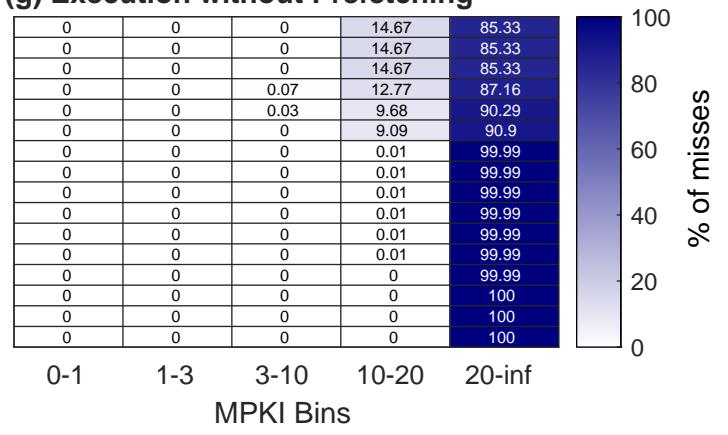
(e) Aggregate MPKI



(f) Execution with Prefetching

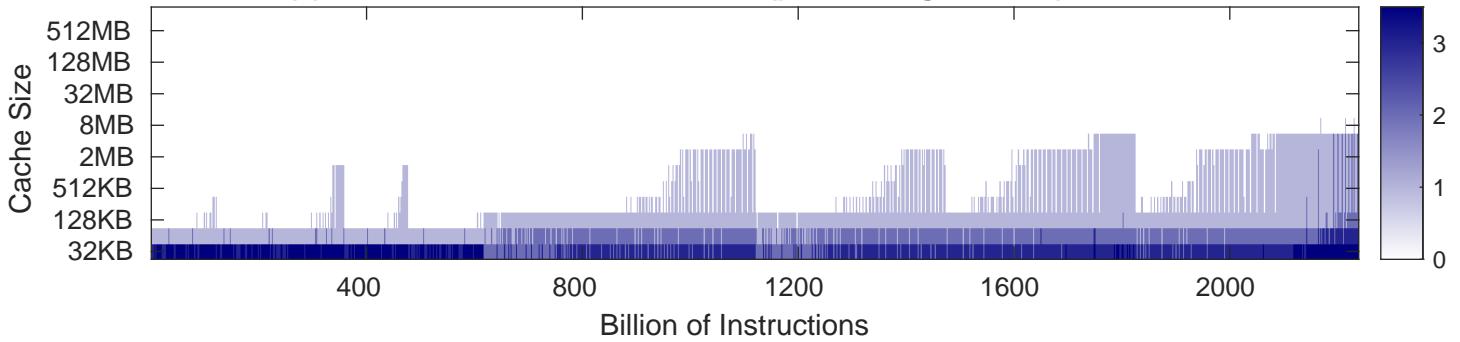


(g) Execution without Prefetching



Memory Behavior Analysis: SPEC 2017 - leela - 2238B instructions

(a) MPKI over time and cache size (prefetching enabled)



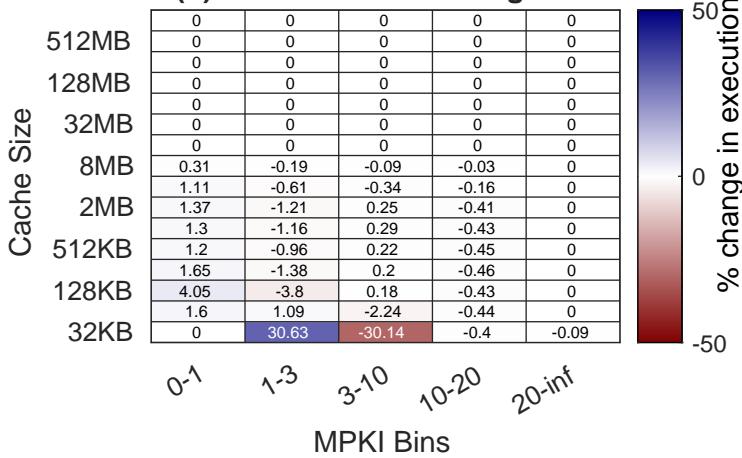
(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	99.55	0.34	0.12	0	0
2MB	96.36	2.4	0.87	0.37	0
512KB	93.33	4.24	1.83	0.6	0
128KB	92.32	4.7	2.36	0.62	0
32KB	91.48	5.46	2.42	0.64	0
	90.67	6.22	2.45	0.66	0
	87.54	9.24	2.47	0.75	0
	12.71	82.7	3.59	1	0
	0.04	63.74	34.88	1.34	0

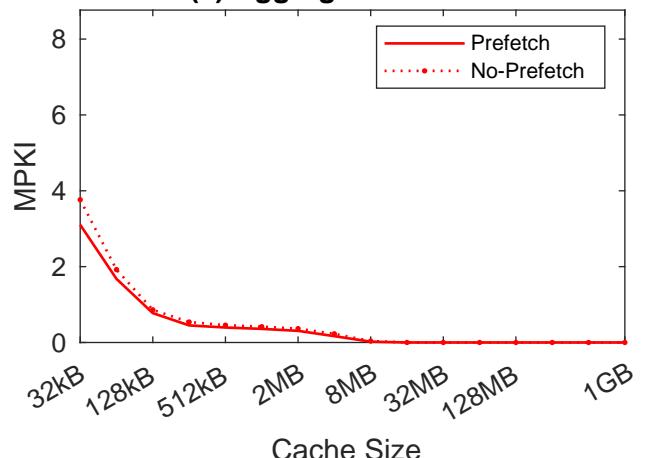
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
100	0	0	0	0	0
100	0	0	0	0	0
100	0	0	0	0	0
100	0	0	0	0	0
100	0	0	0	0	0
100	0	0	0	0	0
99.24	0.53	0.21	0.03	0	0
95.25	3.01	1.21	0.53	0	0
91.96	5.45	1.58	1.01	0	0
91.02	5.86	2.07	1.05	0	0
90.28	6.42	2.2	1.09	0	0
89.02	7.6	2.25	1.12	0	0
83.49	13.04	2.29	1.18	0	0
11.11	81.61	5.83	1.44	0	0
0.04	33.11	65.02	1.74	0.09	0

(d) Effects of Prefetching



(e) Aggregate MPKI



(f) Execution with Prefetching

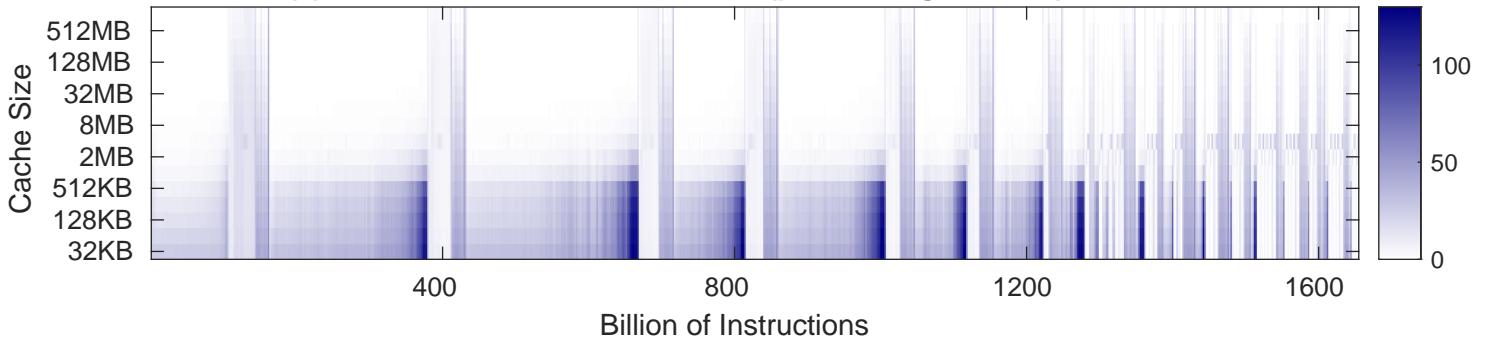
	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	50.01	28.38	21.6	0	0
2MB	19.2	22.32	30.69	27.78	0
512KB	15.36	18.76	42.29	23.58	0
128KB	18.04	18.12	43.12	20.72	0
32KB	20.58	20.23	39.68	19.51	0
	27.29	20.14	34.9	17.67	0
	48.92	18.97	20.48	11.63	0
	5.9	75.17	11.64	7.3	0
	0	48.97	45.56	5.47	0

(g) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
100	0	0	0	0	0
100	0	0	0	0	0
100	0	0	0	0	0
100	0	0	0	0	0
100	0	0	0	0	0
36.53	19.72	35.79	7.95	0	0
15.57	20.8	31.5	32.12	0	0
12.02	21.88	30.43	35.67	0	0
14.75	20.73	32.01	32.51	0	0
17.62	21.5	30.06	30.82	0	0
25.98	21.41	25.88	26.73	0	0
41.37	24.15	16.66	17.82	0	0
4.42	72	13.62	9.91	0.05	0
0	24.13	69.16	6.17	0.54	0

Memory Behavior Analysis: SPEC 2017 - mcf - 1654B instructions

(a) MPKI over time and cache size (prefetching enabled)



(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	85.93	5.25	6.18	0.85	1.8
128MB	83.24	3.92	9.18	0.92	2.73
32MB	81.48	4.3	9.32	1.44	3.46
8MB	79.08	4.69	9.15	2.98	4.11
2MB	76.28	5.29	10.2	3.59	4.63
512KB	70.26	8.18	12.28	4.15	5.13
128KB	59.16	16.29	13.73	5.23	5.59
32KB	43.77	25.2	17.04	7.78	6.22
	10.52	38.17	26.7	14.24	10.37
512MB	4.62	24	42.05	17.18	12.15
128MB	2.79	6.53	44.98	22.77	22.94
32MB	2.56	6	15.45	27.84	48.16
8MB	2.48	5.91	10.1	21.65	59.86
2MB	2.45	5.88	9.87	15.16	66.64
512KB	2.45	5.73	9.8	5.11	76.91
128KB	2.45	5.51	9.48	3.38	79.17
32KB					

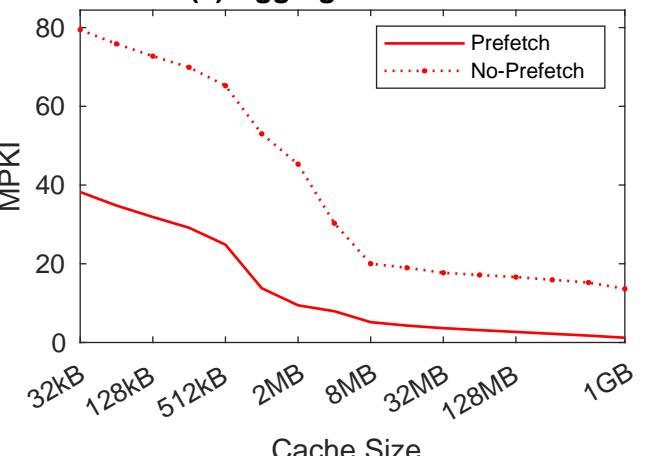
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	28.23	4.78	25.63	21.82	19.54
128MB	24.66	3.08	28.19	22.07	21.99
32MB	22.77	2.9	28.09	23.41	22.83
8MB	20.36	2.98	27.97	24.88	23.81
2MB	17.63	3.37	28.68	25.94	24.38
512KB	14.71	2.96	30.53	26.61	25.2
128KB	7.7	0.91	35.81	28.56	27.02
32KB	7.67	0.59	30.93	31.19	29.63
	2.64	0.31	21.02	34.3	41.73
512MB	0.49	0.15	14.51	31.75	53.1
128MB	0.1	0.04	5.68	26.94	67.24
32MB	0.02	0.01	0.01	12.24	87.72
8MB	0.02	0.01	0	6.26	93.71
2MB	0.02	0.01	0	1.1	98.88
512KB	0.02	0.01	0	0.82	99.15
128KB	0.02	0.01	0	0.76	99.21
32KB					

(d) Effects of Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	57.7	0.47	-19.45	-20.97	-17.74
128MB	58.58	0.84	-19.01	-21.15	-19.26
32MB	58.71	1.4	-18.77	-21.97	-19.37
8MB	58.72	1.71	-18.82	-21.9	-19.7
2MB	58.65	1.92	-18.48	-22.35	-19.75
512KB	55.55	5.22	-18.25	-22.46	-20.07
128KB	51.46	15.38	-22.08	-23.33	-21.43
32KB	36.1	24.61	-13.89	-23.41	-23.41
	7.88	37.86	5.68	-20.06	-31.36
512MB	4.13	23.85	27.54	-14.57	-40.95
128MB	2.69	6.49	39.3	-4.17	-44.3
32MB	2.46	5.99	15.44	15.6	-39.56
8MB	2.43	5.87	9.87	14.06	-32.24
2MB	2.43	5.72	9.8	4.29	-22.24
512KB	2.43	5.5	9.48	2.62	-20.04
128KB					
32KB					

(e) Aggregate MPKI



(f) Execution with Prefetching

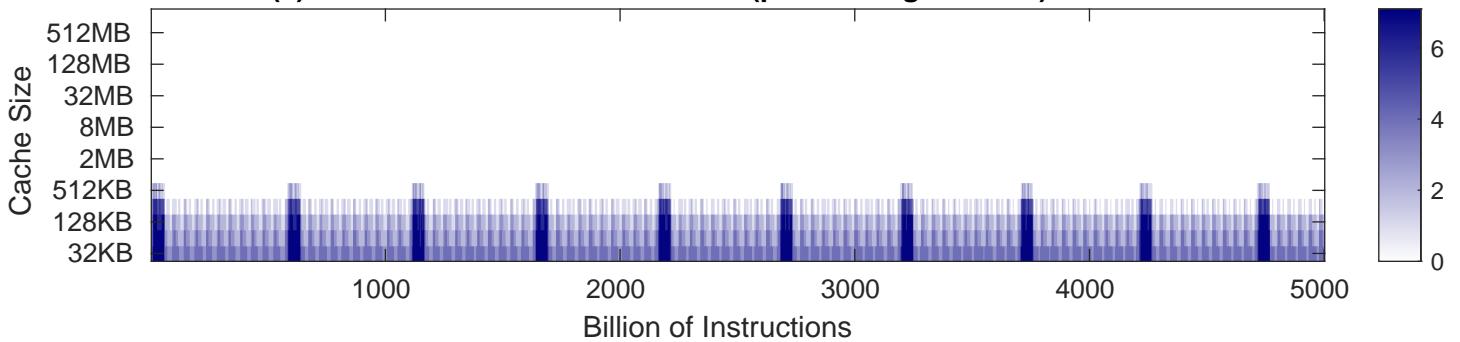
	0-1	1-3	3-10	10-20	20-inf
512MB	3.45	8.72	23.76	10.33	53.74
128MB	2.04	4.31	26.72	7.8	59.12
32MB	2.12	3.79	23.69	9.05	61.35
8MB	2.87	3.42	18.45	14.43	60.83
2MB	4.12	3.33	17.56	15.74	59.25
512KB	5.04	3.93	18.32	16.2	56.5
128KB	5.29	6.62	18.55	17.53	52.01
32KB	4.29	8.37	18.49	21.41	47.43
	0.66	8.49	18.96	25.85	46.04
512MB	0.28	5.45	23.65	27.01	43.6
128MB	0.12	0.86	21.37	23.29	54.37
32MB	0.06	0.43	4.15	17.23	78.12
8MB	0.05	0.36	2.09	11.61	85.9
2MB	0.05	0.32	1.86	7.93	89.84
512KB	0.04	0.29	1.74	2.5	95.43
128KB	0.04	0.25	1.63	1.37	96.71
32KB					

(g) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	0.14	0.69	12.72	22.33	64.13
128MB	0.09	0.32	12.37	20.52	66.7
32MB	0.09	0.32	11.78	20.99	66.82
8MB	0.09	0.36	11.62	21.36	66.57
2MB	0.05	0.33	11.85	21.33	66.44
512KB	0.02	0.1	12.84	21.31	65.72
128KB	0.02	0.05	11.14	21.82	66.96
32KB	0.01	0.02	5.15	16.37	78.46
	0	0.01	2.48	10.4	87.11
512MB	0	0	0.91	7.74	91.35
128MB	0	0	0	3.01	96.99
32MB	0	0	0	1.57	98.43
8MB	0	0	0	0.27	99.73
2MB	0	0	0	0.18	99.81
512KB	0	0	0	0.16	99.84
128KB					
32KB					

Memory Behavior Analysis: SPEC 2017 - nab - 5003B instructions

(a) MPKI over time and cache size (prefetching enabled)



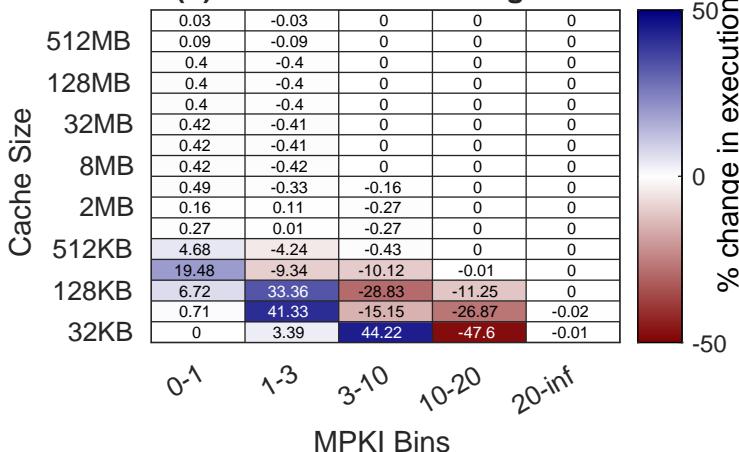
(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	100	0	0	0	0
2MB	99.95	0.05	0	0	0
512KB	99.58	0.42	0	0	0
128KB	99.38	0.62	0	0	0
32KB	93.65	3.54	2.81	0	0
	63.36	25.35	11.29	0	0
0-1	13.64	53.03	33.31	0.02	0
1-3	0.86	44	55.11	0.03	0
3-10	0.08	3.53	96.35	0.02	0.02
10-20					
20-inf					

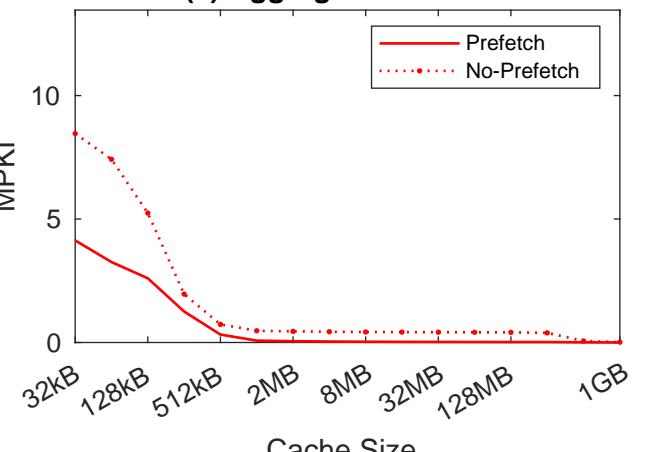
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	99.97	0.03	0	0	0
128MB	99.91	0.09	0	0	0
32MB	99.6	0.4	0	0	0
8MB	99.6	0.4	0	0	0
2MB	99.6	0.4	0	0	0
512KB	99.58	0.41	0	0	0
128KB	99.58	0.42	0	0	0
32KB	99.46	0.38	0.16	0	0
	99.42	0.31	0.27	0	0
0-1	99.11	0.61	0.27	0	0
1-3	88.97	7.78	3.24	0	0
3-10	43.88	34.69	21.41	0.01	0
10-20	6.92	19.67	62.14	11.27	0
20-inf	0.15	2.67	70.26	26.9	0.02
	0.08	0.14	52.13	47.62	0.03

(d) Effects of Prefetching



(e) Aggregate MPKI



(f) Execution with Prefetching

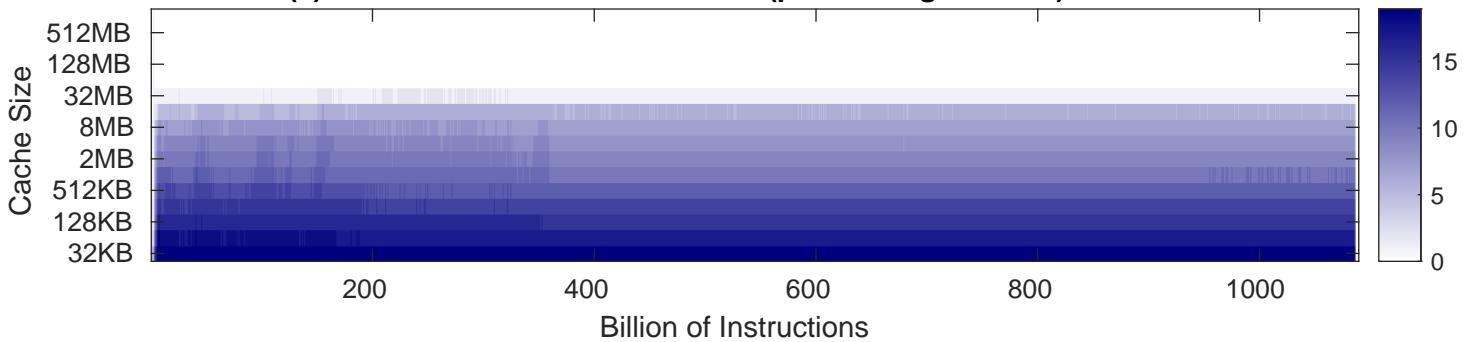
	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	99.88	0.12	0	0	0
2MB	99.88	0.12	0	0	0
512KB	99.85	0.15	0	0	0
128KB	98.42	1.35	0.23	0	0
32KB	88.29	11.53	0.17	0	0
	88.67	11.21	0.12	0	0
0-1	41.2	19.97	38.83	0	0
1-3	16.75	35.2	48.05	0	0
3-10	2.83	40.71	56.37	0.1	0
10-20	0.2	29.45	70.2	0.13	0.03
20-inf	0	2.33	97.49	0.08	0.1

(g) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	97.05	2.95	0	0	0
128MB	98.06	1.94	0	0	0
32MB	98.31	1.69	0	0	0
8MB	98.38	1.62	0	0	0
2MB	98.31	1.69	0	0	0
512KB	98.22	1.76	0.01	0	0
128KB	98.2	1.78	0.02	0	0
32KB	98.01	1.96	0.03	0	0
	97	1.65	1.29	0.06	0
0-1	95.66	1.52	2.75	0.07	0
1-3	94.91	2.24	2.79	0.07	0
3-10	62.85	16.86	20.25	0.04	0
10-20	12.48	30.57	56.88	0.07	0
20-inf	0.7	7.73	68.71	22.85	0.01
	0.01	0.83	58.74	40.36	0.05
0	0	0.04	37.01	62.86	0.1

Memory Behavior Analysis: SPEC 2017 - omnetpp - 1089B instructions

(a) MPKI over time and cache size (prefetching enabled)



(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	99.93	0.05	0.03	0	0
8MB	99.88	0.06	0.05	0.02	0
2MB	4.3	95.64	0.04	0.02	0.01
512KB	0.45	0.31	99.21	0.02	0.01
128KB	0.43	0.14	99.4	0.02	0.01
32KB	0.43	0.11	99.42	0.03	0.01
512MB	0.43	0.11	87.63	11.81	0.02
128MB	0.43	0.11	31.16	68.28	0.02
32MB	0.4	0.14	0.23	99.21	0.02
512KB	0.34	0.2	0.17	99.27	0.02
128KB	0.3	0.24	0.06	99.38	0.02
32KB	0.28	0.17	0.13	99.4	0.02
512MB	0.28	0	0.29	82.17	17.26

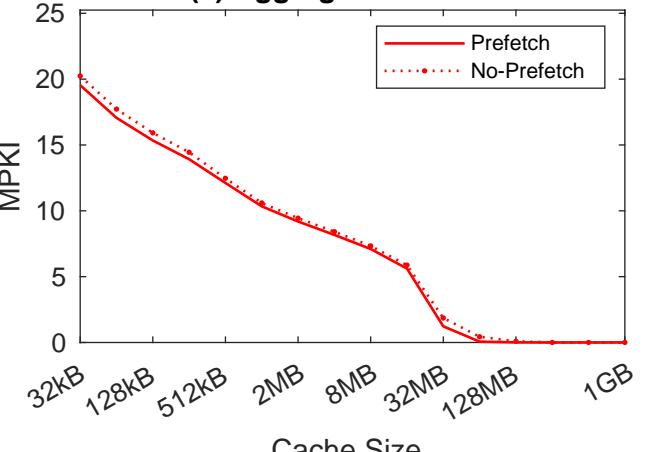
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	99.97	0.03	0	0	0
128MB	99.97	0.03	0	0	0
32MB	99.97	0.03	0	0	0
8MB	99.92	0.02	0.06	0	0
2MB	99.76	0.17	0.06	0.01	0
512KB	0.85	99.06	0.06	0.02	0.01
128KB	0.45	0.24	99.28	0.02	0.01
32KB	0.16	0.13	99.72	0	0
512MB	0.16	0.11	99.7	0.04	0
128MB	0.16	0.11	85.76	13.97	0
32MB	0.36	0.16	4.47	95.26	0
512KB	0.31	0.15	0.19	99.33	0.02
128KB	0.28	0.17	0.17	99.36	0.02
32KB	0.28	0.12	0.18	99.28	0.14
512MB	0.28	0	0.28	8.21	91.23

(d) Effects of Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	0.03	-0.03	0	0	0
128MB	0.03	-0.03	0	0	0
32MB	0.01	0.03	-0.03	0	0
8MB	0.12	-0.11	-0.01	0.01	0
2MB	3.45	-3.42	-0.02	0	0
512KB	0	0.07	-0.07	0	0
128KB	0.27	0.01	-0.32	0.02	0.01
32KB	0.27	0	-0.28	-0.01	0.01
512MB	0.27	0	1.87	-2.16	0.02
128MB	0.27	0	26.69	-26.98	0.02
32MB	0.04	-0.02	0	-0.03	0
512KB	0.03	0.05	-0.02	-0.06	0
128KB	0.02	0.07	-0.11	0.02	0
32KB	0	0.05	-0.05	0.12	-0.12

(e) Aggregate MPKI



(f) Execution with Prefetching

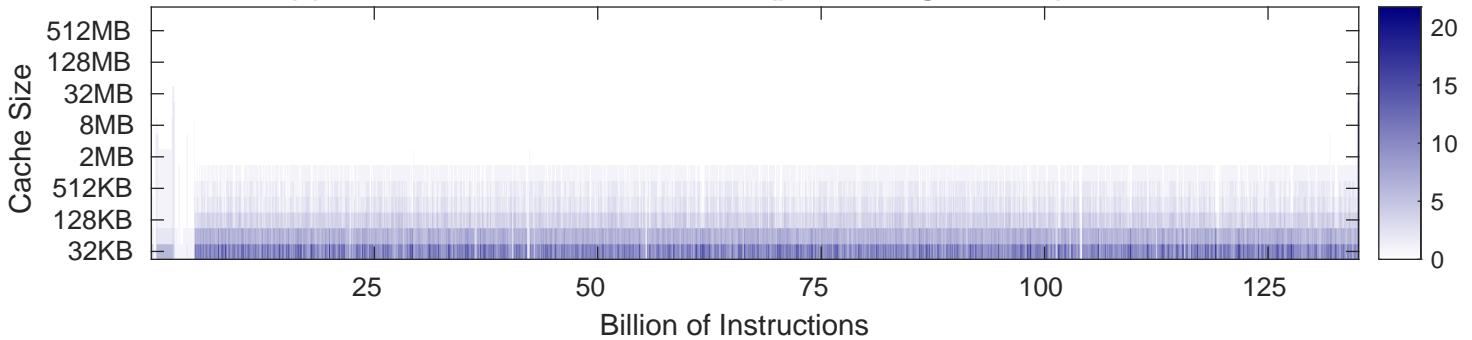
	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	71.92	8.45	19.63	0	0
8MB	92.08	0.85	3.56	3.52	0
2MB	3.03	96.46	0.14	0.16	0.2
512KB	0.01	0.11	99.77	0.04	0.06
128KB	0.01	0.03	99.86	0.04	0.06
32KB	0.01	0.02	99.87	0.04	0.07
512MB	0.01	0.01	86.56	13.36	0.06
128MB	0.01	0.01	29.58	70.34	0.06
32MB	0.01	0.01	0.15	99.78	0.05
512KB	0.01	0.02	0.1	99.83	0.04
128KB	0.01	0.02	0.02	99.91	0.04
32KB	0	0.02	0.03	99.91	0.04
512MB	0.01	0	0.08	81.77	18.14

(g) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	92.31	7.69	0	0	0
128MB	92.31	7.69	0	0	0
32MB	97.01	0.21	2.78	0	0
8MB	98.76	0.49	0.75	0	0
2MB	0.25	99.5	0.14	0.11	0
512KB	0.02	0.09	99.85	0.04	0
128KB	0.01	0.03	99.96	0	0
32KB	0.01	0.02	99.93	0.04	0
512MB	0.01	0.02	84.63	15.35	0
128MB	0.01	0.02	4.16	95.82	0
32MB	0.01	0.02	0.14	99.8	0.03
512KB	0.01	0.02	0.08	99.87	0.03
128KB	0.01	0.02	0.06	99.89	0.03
32KB	0	0.01	0.05	99.78	0.15
512MB	0.01	0	0.09	8.02	91.88

Memory Behavior Analysis: SPEC 2017 - perlbench i.p. 1 - 135B instructions

(a) MPKI over time and cache size (prefetching enabled)



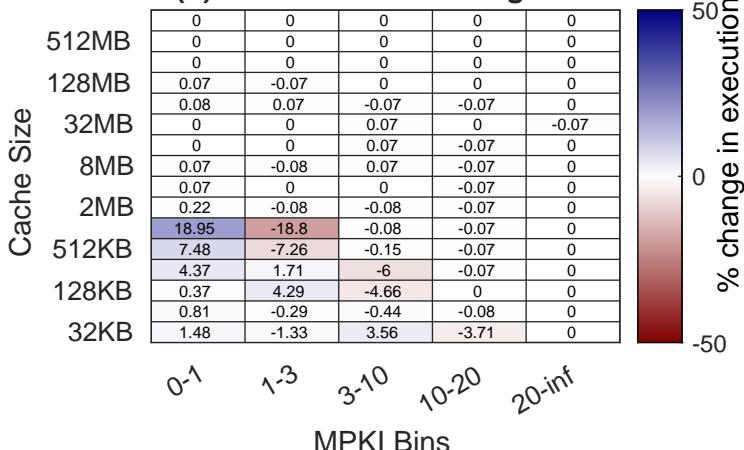
(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	99.93	0.07	0	0	0
2MB	99.7	0.15	0.07	0.07	0
512KB	99.7	0.15	0.07	0	0.07
128KB	99.63	0.22	0.07	0	0.07
32KB	99.63	0.22	0.07	0	0.07
	76.31	23.54	0.07	0	0.07
	27.24	72.61	0.07	0	0.07
	15.62	81.5	2.81	0	0.07
	2.29	25.39	72.17	0.07	0.07
	1.92	2.37	95.41	0.22	0.07
	1.63	0.67	50.04	47.59	0.07

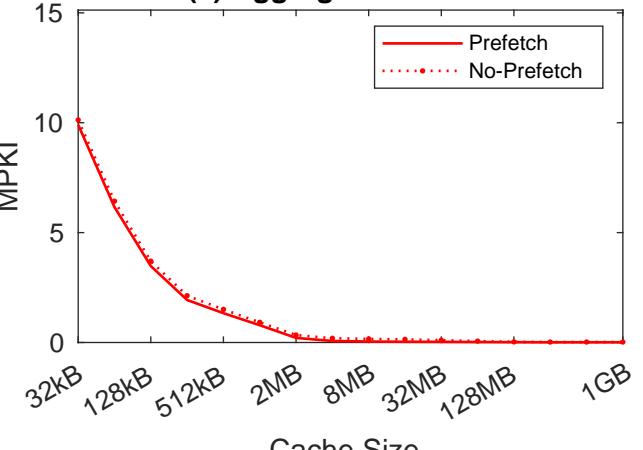
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
100	100	0	0	0	0
100	100	0	0	0	0
100	100	0	0	0	0
99.93	99.93	0.07	0	0	0
99.85	99.85	0	0.07	0.07	0
99.7	99.7	0.15	0	0.07	0.07
99.56	99.56	0.22	0.07	0.07	0.07
99.41	99.41	0.3	0.15	0.07	0.07
57.36	57.36	42.34	0.15	0.07	0.07
19.76	19.76	79.87	0.22	0.07	0.07
11.25	11.25	79.79	8.81	0.07	0.07
1.92	1.92	21.1	76.83	0.07	0.07
1.11	1.11	2.66	95.85	0.3	0.07
0.15	0.15	2	46.48	51.3	0.07

(d) Effects of Prefetching



(e) Aggregate MPKI



(f) Execution with Prefetching

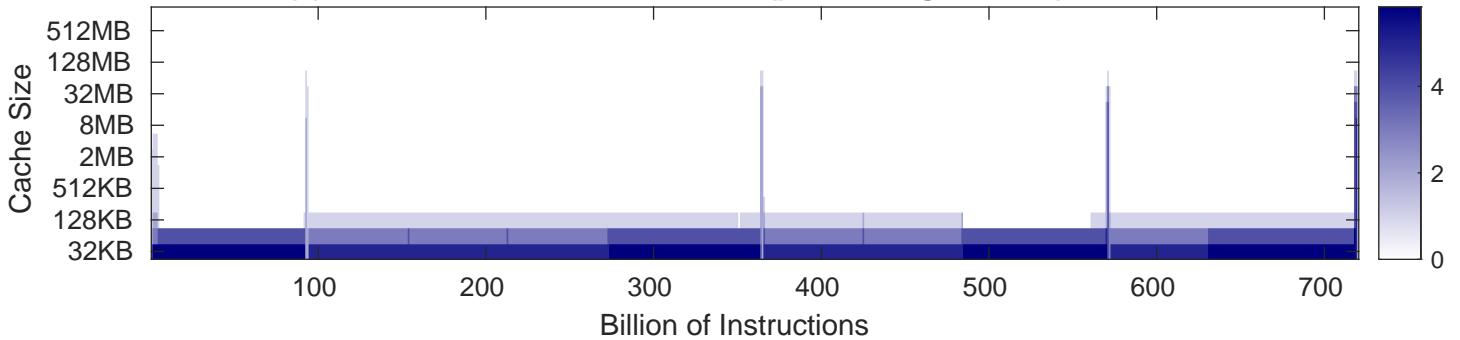
	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	91.38	8.62	0	0	0
8MB	77.76	8.34	13.89	0	0
2MB	75.5	8.18	16.31	0	0
512KB	77.84	8.9	13.26	0	0
128KB	85.57	6.06	8.37	0	0
32KB	95.14	2.06	2.8	0	0
	66.22	32.99	0.79	0	0
	12.63	86.9	0.47	0	0
	5.36	89.89	4.75	0	0
	0.31	17.31	82.16	0.21	0
	0.17	0.83	98.62	0.38	0
	0.14	0.11	42.59	57.17	0

(g) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
100	100	0	0	0	0
100	100	0	0	0	0
100	100	0	0	0	0
95.97	95.97	4.03	0	0	0
92.91	92.91	0	7.09	0	0
88.55	88.55	2.89	0	8.56	0
90.74	90.74	2.47	0	6.79	0
90.63	90.63	3.7	0	5.67	0
91.18	91.18	2.6	1.33	4.88	0
94.09	94.09	1.57	1.54	2.8	0
44.52	44.52	53.79	0.61	1.08	0
8.88	8.88	89.88	0.53	0.72	0
3.99	3.99	82.36	13.12	0.53	0
0.39	0.39	13.67	85.61	0.33	0
0.14	0.14	0.86	98.45	0.55	0
0.01	0.01	0.36	39.52	60.11	0

Memory Behavior Analysis: SPEC 2017 - perlbench i.p. 2 - 720B instructions

(a) MPKI over time and cache size (prefetching enabled)



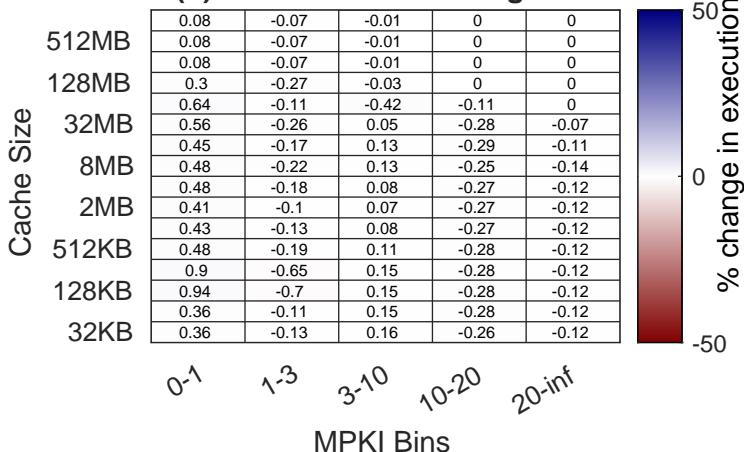
(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	99.99	0.01	0	0	0
8MB	99.67	0.32	0.01	0	0
2MB	99.46	0.24	0.26	0.04	0
512KB	99.28	0.36	0.32	0.04	0
128KB	99.26	0.32	0.35	0.07	0
32KB	99.25	0.32	0.36	0.04	0.03
	99.18	0.39	0.36	0.04	0.03
	99.15	0.4	0.37	0.04	0.03
	99.15	0.39	0.4	0.03	0.03
	99.14	0.36	0.44	0.03	0.03
	49.3	50.17	0.46	0.04	0.03
	0.58	0.75	98.6	0.04	0.03
	0.57	0.29	99.06	0.06	0.03

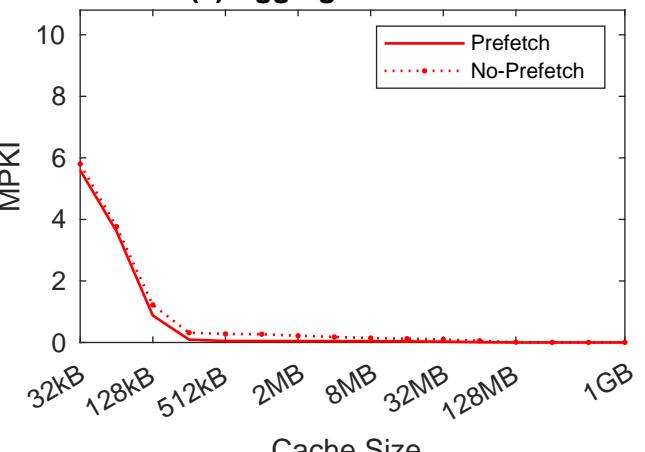
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	99.92	0.07	0.01	0	0
128MB	99.92	0.07	0.01	0	0
32MB	99.69	0.28	0.03	0	0
8MB	99.03	0.43	0.43	0.11	0
2MB	98.9	0.5	0.21	0.32	0.07
512KB	98.83	0.53	0.19	0.33	0.11
128KB	98.78	0.54	0.22	0.32	0.14
32KB	98.77	0.5	0.28	0.31	0.15
	98.77	0.49	0.29	0.31	0.15
	98.72	0.53	0.29	0.31	0.15
	98.67	0.58	0.29	0.31	0.15
	98.24	1.01	0.29	0.31	0.15
	48.36	50.87	0.31	0.32	0.15
	0.22	0.86	98.45	0.32	0.15
	0.21	0.42	98.9	0.32	0.15

(d) Effects of Prefetching



(e) Aggregate MPKI



(f) Execution with Prefetching

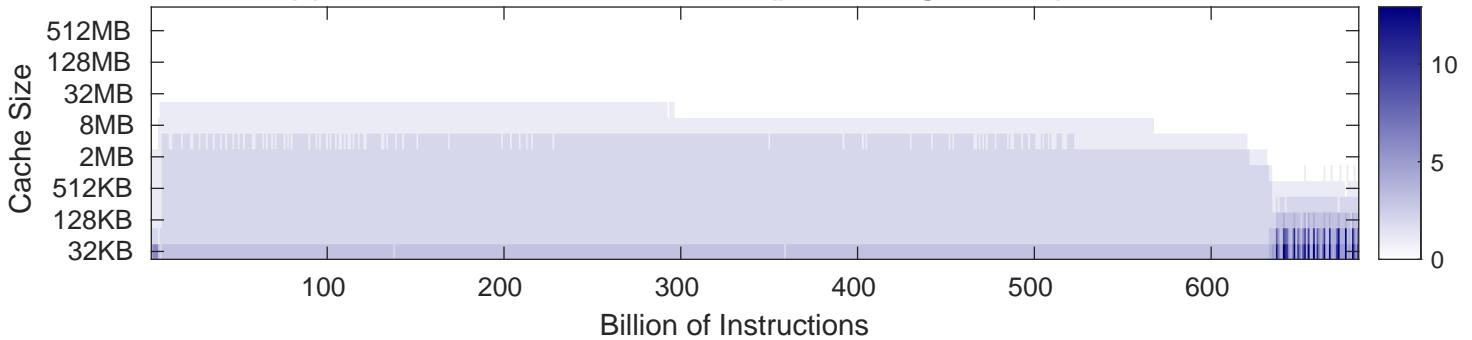
	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	81.04	18.96	0	0	0
8MB	56.62	43.38	0	0	0
2MB	23.73	17.96	46.36	11.95	0
512KB	19.88	18.24	49.22	12.67	0
128KB	19.69	14.37	45.1	20.84	0
32KB	21.62	13.46	44.51	7.24	13.17
	22.93	14.99	42.62	6.91	12.54
	23.66	15.85	41.92	6.61	11.97
	25.12	15.3	44.51	3.46	11.61
	59.34	7.21	25.44	1.84	6.17
	28.76	67.47	2.76	0.35	0.65
	0.05	0.44	99.26	0.09	0.16
	0.03	0.09	99.68	0.09	0.11

(g) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	58.52	27.04	14.45	0	0
128MB	58.43	27.04	14.53	0	0
32MB	50.61	37.32	12.07	0	0
8MB	19.48	12.49	43.24	24.79	0
2MB	18.97	8.76	13.13	44.54	14.59
512KB	23.86	7.96	8.41	38.8	20.97
128KB	30.58	7.28	7.36	32.16	22.62
32KB	42.01	5.5	7.34	24.99	20.17
	51.94	4.41	6.57	20.55	16.53
	60.38	3.8	5.52	16.8	13.5
	61.28	3.91	5.45	16.34	13.01
	64.35	4.99	4.84	14.38	11.44
	33.77	58.1	1.31	3.84	2.98
	0.03	0.51	97.22	1.26	0.99
	0.02	0.15	98.36	0.82	0.65

Memory Behavior Analysis: SPEC 2017 - perlbench i.p. 3 - 683B instructions

(a) MPKI over time and cache size (prefetching enabled)



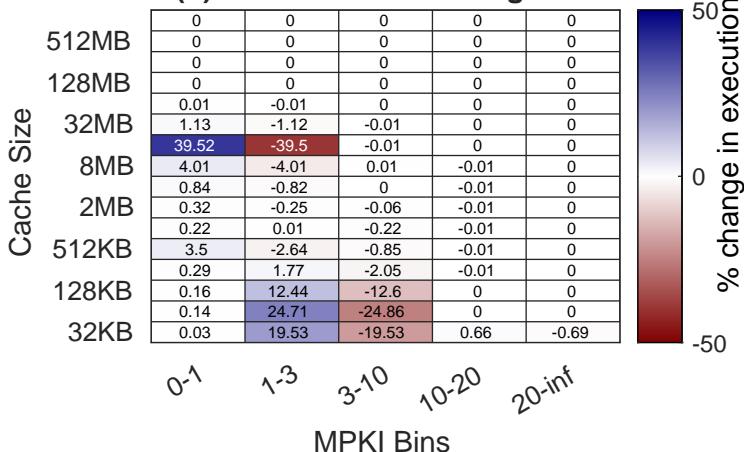
(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	99.99	0.01	0	0	0
2MB	99.94	0.06	0	0	0
512KB	25.63	74.35	0.01	0	0
128KB	11.59	88.4	0.01	0	0
32KB	8.56	91.43	0.01	0	0
	7.78	92.2	0.01	0	0
512MB	6.67	93.28	0.04	0	0
128MB	1.11	98.79	0.1	0	0
32MB	0.23	97.6	2.15	0.01	0
512KB	0.2	92.8	5.24	1.76	0
128KB	0.03	67.27	30.83	1.65	0.22
32KB					

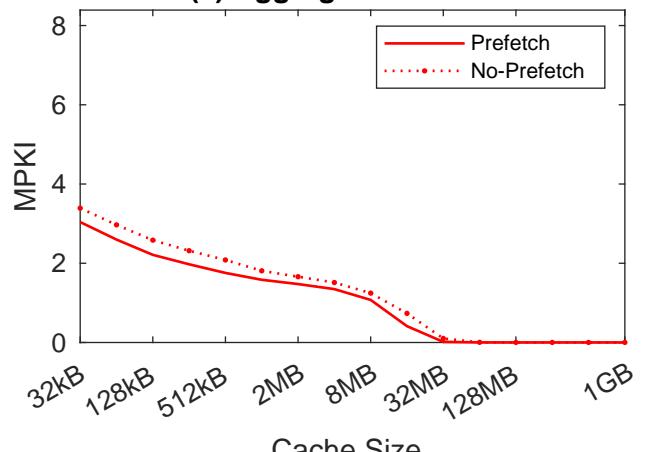
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
100	0	0	0	0	0
100	0	0	0	0	0
100	0	0	0	0	0
100	0	0	0	0	0
99.99	0.01	0	0	0	0
98.86	1.13	0.01	0	0	0
60.42	39.56	0.01	0	0	0
21.62	78.36	0	0.01	0	0
10.75	89.22	0.01	0.01	0	0
8.24	91.68	0.07	0.01	0	0
7.56	92.19	0.23	0.01	0	0
3.17	95.92	0.89	0.01	0	0
0.82	97.02	2.15	0.01	0	0
0.07	85.16	14.75	0.01	0	0
0.06	68.09	30.1	1.76	0	0
0	47.74	50.36	0.99	0.91	0

(d) Effects of Prefetching



(e) Aggregate MPKI



(f) Execution with Prefetching

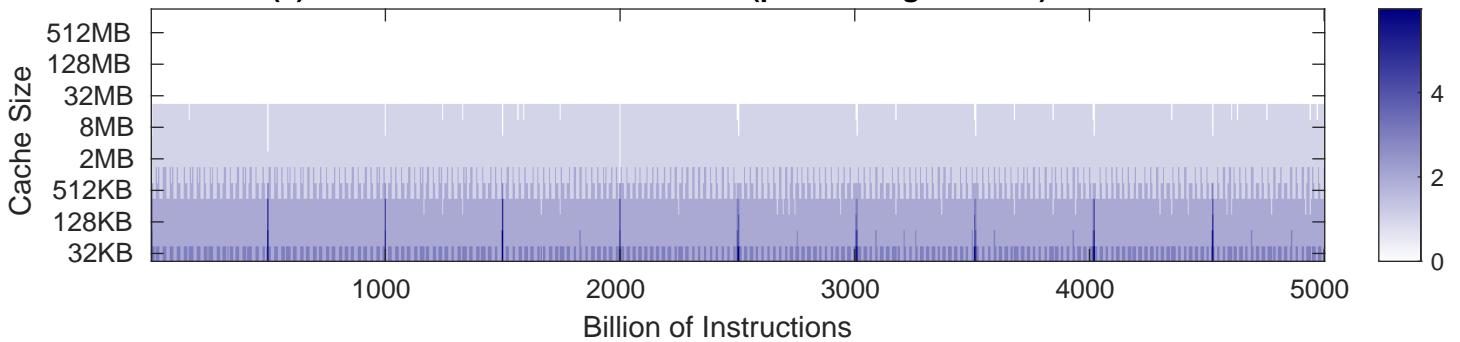
	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	99.89	0.11	0	0	0
2MB	8.28	91.72	0	0	0
512KB	2.17	97.83	0	0	0
128KB	1.3	98.7	0	0	0
32KB	1.45	98.55	0	0	0
	2.81	97.14	0.05	0	0
512MB	0.35	99.5	0.15	0	0
128MB	0.06	95.77	4.17	0	0
32MB	0.05	83.96	7.35	8.64	0
512KB	0	53.64	35.19	9.69	1.47
128KB					
32KB					

(g) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
100	0	0	0	0	0
100	0	0	0	0	0
100	0	0	0	0	0
100	0	0	0	0	0
87.94	12.06	0	0	0	0
32.06	67.94	0	0	0	0
6.52	93.48	0	0	0	0
2.13	97.82	0.05	0	0	0
1.51	98.29	0.2	0	0	0
2	97.56	0.44	0	0	0
1.12	97.37	1.51	0	0	0
0.29	96.26	3.45	0	0	0
0.02	79.6	20.38	0	0	0
0.02	56.47	35.14	8.38	0	0
0	34.88	54.36	5.23	5.53	0

Memory Behavior Analysis: SPEC 2017 - wrf - 5003B instructions

(a) MPKI over time and cache size (prefetching enabled)



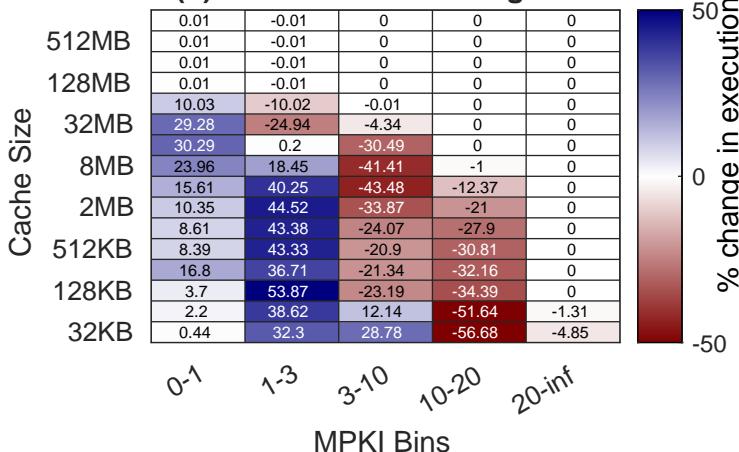
(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	99.99	0.01	0	0	0
8MB	91.89	8.11	0	0	0
2MB	74.72	25.28	0	0	0
512KB	60.53	38.99	0.48	0	0
128KB	50.13	48.24	1.63	0	0
32KB	44.56	51.67	3.77	0	0
512MB	42.54	50.61	6.86	0	0
128MB	40.35	51.62	8.04	0	0
32MB	38.37	52.61	9.02	0	0
8MB	25.27	55.84	18.88	0	0
2MB	23.74	39.67	36.59	0	0
512KB	21.92	32.9	44.61	0.57	0

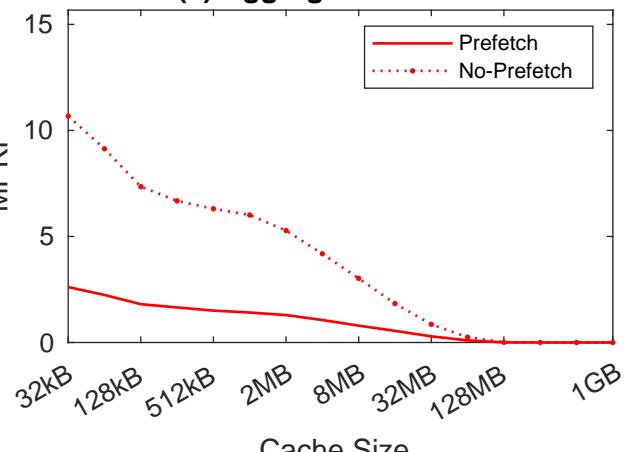
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	99.99	0.01	0	0	0
128MB	99.99	0.01	0	0	0
32MB	99.99	0.01	0	0	0
8MB	89.96	10.03	0.01	0	0
2MB	62.61	33.05	4.34	0	0
512KB	44.43	25.08	30.49	0	0
128KB	36.57	20.54	41.89	1	0
32KB	34.52	7.99	45.11	12.37	0
512MB	34.21	7.15	37.64	21	0
128MB	33.93	7.23	30.93	27.9	0
32MB	31.96	8.29	28.94	30.81	0
8MB	21.57	15.9	30.36	32.16	0
2MB	21.57	1.97	42.07	34.39	0
512KB	21.54	1.05	24.45	51.64	1.31
128KB	21.48	0.6	15.83	57.25	4.85

(d) Effects of Prefetching



(e) Aggregate MPKI



(f) Execution with Prefetching

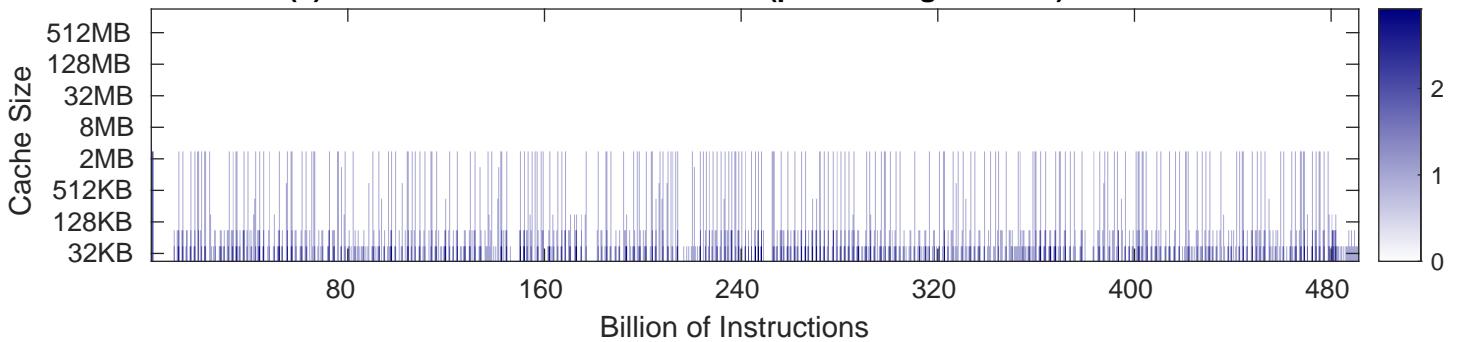
	0-1	1-3	3-10	10-20	20-inf
512MB	88.14	11.86	0	0	0
128MB	98.98	1.02	0	0	0
32MB	99.9	0.1	0	0	0
8MB	60.5	39.5	0	0	0
2MB	35.01	64.97	0.02	0	0
512KB	17.1	81.03	1.88	0	0
128KB	10.73	84.33	4.93	0	0
32KB	4.54	79.41	16.05	0	0
512MB	5.69	76.22	18.08	0	0
128MB	8.17	72.38	19.45	0	0
32MB	1.93	61.64	36.43	0	0
8MB	1.05	35.2	63.74	0.01	0
2MB	0.59	26.4	70.47	2.55	0

(g) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	35.37	16.72	20.43	27.48	0
128MB	35.37	16.72	20.43	27.48	0
32MB	94.18	1.22	2.33	2.27	0
8MB	45.52	54.27	0.12	0.09	0
2MB	17.44	63.5	19.04	0.03	0
512KB	4.02	27.37	68.6	0.01	0
128KB	1.6	13.15	81.77	3.48	0
32KB	1.05	3.66	62.65	32.64	0
8MB	0.85	2.49	48.64	48.03	0
2MB	0.74	2.23	39.07	57.96	0
512KB	1.24	2.52	34.43	61.81	0
128KB	0.15	4.93	33.61	61.32	0
32KB	0.13	0.63	36.21	63.03	0
8MB	0.11	0.24	15.13	81.45	3.07
2MB	0.13	0.11	8.2	81.72	9.83

Memory Behavior Analysis: SPEC 2017 - x264 i.p 1 - 491B instructions

(a) MPKI over time and cache size (prefetching enabled)



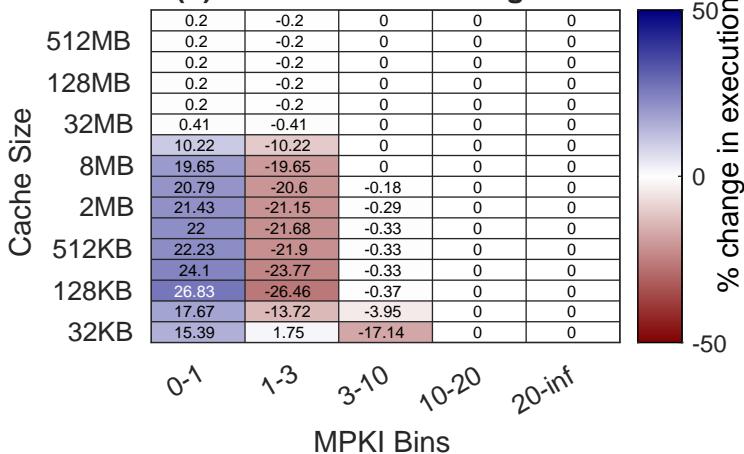
(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	100	0	0	0	0
2MB	99.67	0.33	0	0	0
512KB	99.67	0.33	0	0	0
128KB	99.67	0.33	0	0	0
32KB	98.49	1.51	0	0	0
	82.23	17.77	0	0	0
	59.1	38.15	2.75	0	0

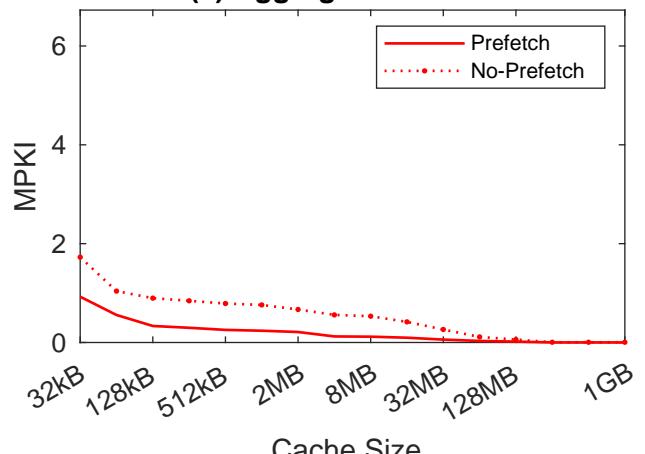
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	99.8	0.2	0	0	0
128MB	99.8	0.2	0	0	0
32MB	99.8	0.2	0	0	0
8MB	99.8	0.2	0	0	0
2MB	99.8	0.2	0	0	0
512KB	99.59	0.41	0	0	0
128KB	89.78	10.22	0	0	0
32KB	80.35	19.65	0	0	0
	79.21	20.6	0.18	0	0
	78.24	21.48	0.29	0	0
	77.67	22.01	0.33	0	0
	77.44	22.23	0.33	0	0
	75.57	24.1	0.33	0	0
	71.66	27.97	0.37	0	0
	64.56	31.49	3.95	0	0
	43.71	36.4	19.89	0	0

(d) Effects of Prefetching



(e) Aggregate MPKI



(f) Execution with Prefetching

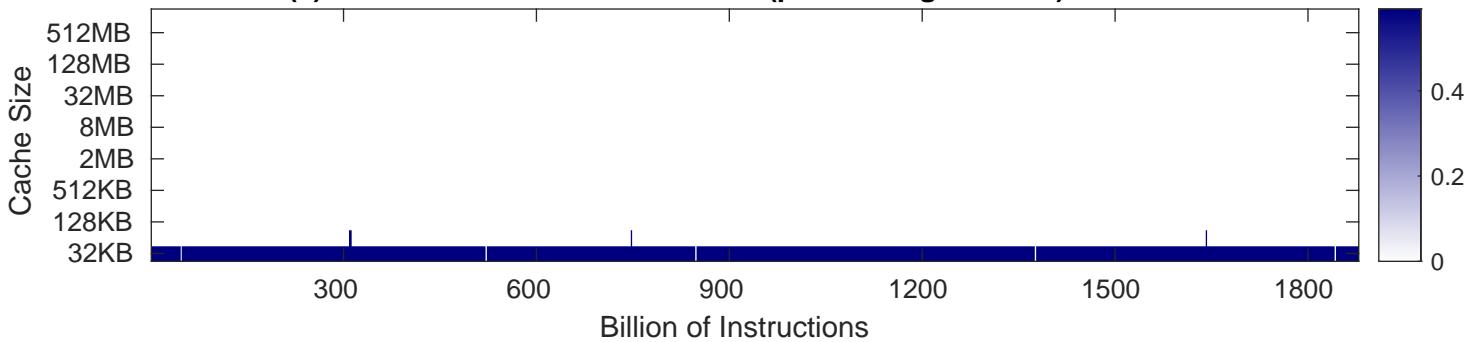
	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	100	0	0	0	0
2MB	100	0	0	0	0
512KB	97.56	2.44	0	0	0
128KB	97.67	2.33	0	0	0
32KB	97.81	2.19	0	0	0
	98.11	1.89	0	0	0
	94.67	5.33	0	0	0
	53.58	46.42	0	0	0
	23.32	66.91	9.77	0	0

(g) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	30.29	69.71	0	0	0
128MB	32.92	67.08	0	0	0
32MB	93.7	6.3	0	0	0
8MB	96.67	3.33	0	0	0
2MB	97.76	2.24	0	0	0
512KB	71.17	28.83	0	0	0
128KB	49.31	50.69	0	0	0
32KB	46.58	52.35	1.07	0	0
	40.72	57.31	1.97	0	0
	39.91	57.87	2.23	0	0
	40.49	57.31	2.2	0	0
	40.55	57.39	2.06	0	0
	37.05	60.86	2.09	0	0
	29.82	57.06	13.12	0	0
	10.23	40.34	49.43	0	0

Memory Behavior Analysis: SPEC 2017 - x264 i.p 2 - 1878B instructions

(a) MPKI over time and cache size (prefetching enabled)

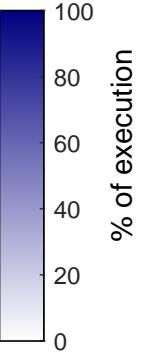


(b) Execution with Prefetching

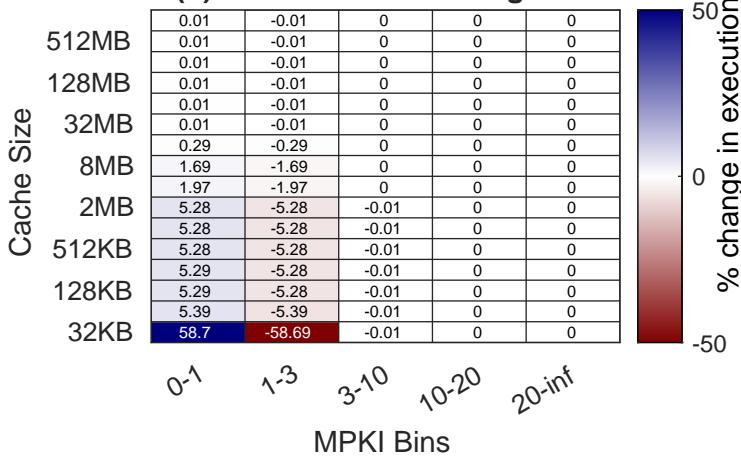
	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	100	0	0	0	0
2MB	99.99	0.01	0	0	0
512KB	99.99	0.01	0	0	0
128KB	99.99	0.01	0	0	0
32KB	95.24	4.76	0	0	0

(c) Execution without Prefetching

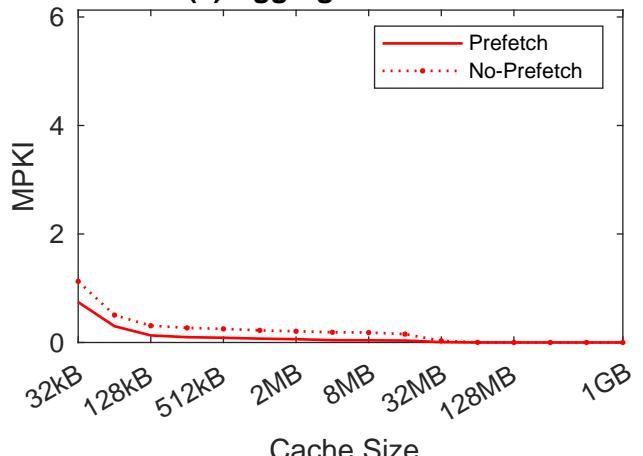
	0-1	1-3	3-10	10-20	20-inf
512MB	99.99	0.01	0	0	0
128MB	99.99	0.01	0	0	0
32MB	99.99	0.01	0	0	0
8MB	99.99	0.01	0	0	0
2MB	99.99	0.01	0	0	0
512KB	99.99	0.01	0	0	0
128KB	99.99	0.01	0	0	0
32KB	94.6	5.4	0.01	0	0



(d) Effects of Prefetching



(e) Aggregate MPKI

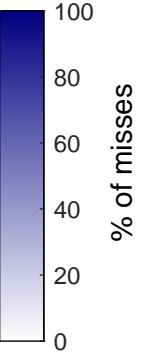


(f) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	100	0	0	0	0
2MB	100	0	0	0	0
512KB	99.88	0.12	0	0	0
128KB	99.89	0.11	0	0	0
32KB	99.91	0.09	0	0	0
	99.91	0.09	0	0	0
	99.96	0.04	0	0	0

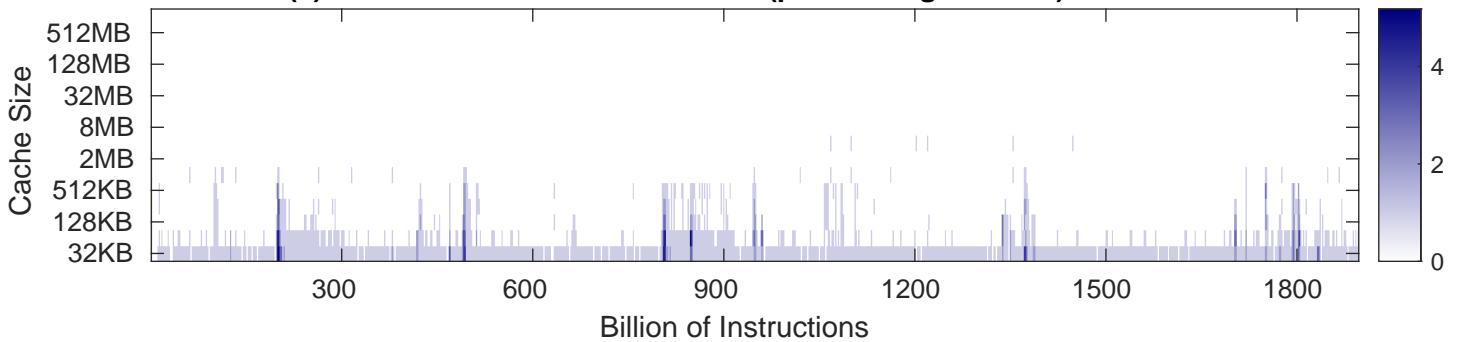
(g) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	89.64	10.36	0	0	0
128MB	89.64	10.36	0	0	0
32MB	89.64	10.36	0	0	0
8MB	96.4	3.6	0	0	0
2MB	99.7	0.3	0	0	0
512KB	97.96	2.04	0	0	0
128KB	89.78	10.22	0	0	0
32KB	87.65	12.35	0	0	0
	68	31.91	0.1	0	0
	69.4	30.51	0.09	0	0
	72.25	27.67	0.08	0	0
	73.76	26.16	0.08	0	0
	76.52	23.38	0.1	0	0
	83.87	16.06	0.07	0	0
	27.96	72.01	0.03	0	0



Memory Behavior Analysis: SPEC 2017 - x264 i.p 3 - 1897B instructions

(a) MPKI over time and cache size (prefetching enabled)



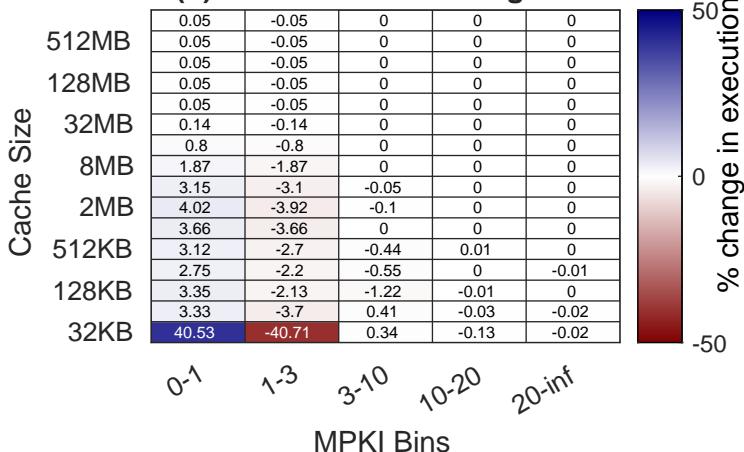
(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	100	0	0	0	0
2MB	99.7	0.25	0.05	0	0
512KB	99.92	0.08	0	0	0
128KB	99.2	0.72	0.08	0	0
32KB	97.46	2.43	0.1	0.01	0
	96.46	3.39	0.14	0.01	0
	96.29	3.41	0.3	0	0
	93.76	4.68	1.54	0.02	0
	82.94	15.59	1.46	0.01	0

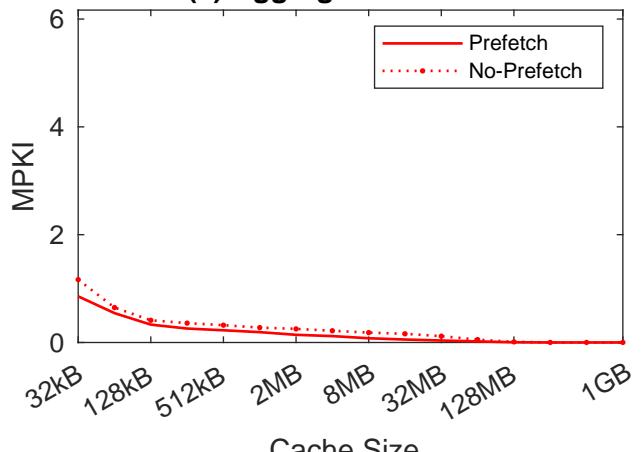
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
	99.95	0.05	0	0	0
	99.95	0.05	0	0	0
	99.95	0.05	0	0	0
	99.95	0.05	0	0	0
	99.86	0.14	0	0	0
	99.2	0.8	0	0	0
	98.13	1.87	0	0	0
	96.55	3.35	0.1	0	0
	95.9	4	0.1	0	0
	95.54	4.38	0.08	0	0
	94.34	5.13	0.54	0	0
	93.71	5.59	0.69	0.01	0.01
	92.94	5.54	1.52	0.01	0
	90.43	8.38	1.13	0.05	0.02
	42.41	56.3	1.12	0.14	0.02

(d) Effects of Prefetching



(e) Aggregate MPKI



(f) Execution with Prefetching

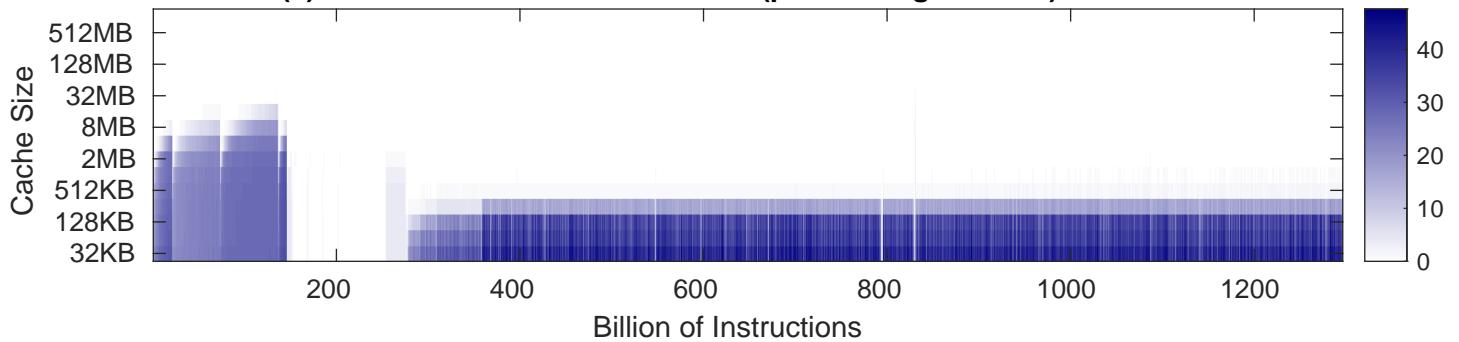
	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	100	0	0	0	0
2MB	94.94	3.61	1.45	0	0
512KB	99.07	0.93	0	0	0
128KB	92.3	6.02	1.68	0	0
32KB	81	16.32	2.02	0.67	0
	77	19.92	2.76	0.32	0
	77.44	19.28	3.28	0	0
	74.96	12.73	11.75	0.55	0
	67.79	24.63	7.51	0.07	0

(g) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
	25.73	74.27	0	0	0
	25.73	74.27	0	0	0
	91.54	8.46	0	0	0
	98.18	1.82	0	0	0
	98.38	1.62	0	0	0
	94.39	5.61	0	0	0
	87.62	12.38	0	0	0
	77.71	20.62	1.68	0	0
	72.97	25.34	1.69	0	0
	71.67	26.74	1.59	0	0
	63.64	28.2	8.16	0	0
	63	27.95	8.59	0.15	0.3
	63.79	22.03	14.05	0.14	0
	66.07	21.15	11.33	0.88	0.58
	27.34	64.28	6.51	1.45	0.41

Memory Behavior Analysis: SPEC 2017 - xalancbmk - 1296B instructions

(a) MPKI over time and cache size (prefetching enabled)



(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	99.94	0.04	0.02	0	0
8MB	99.94	0.04	0.02	0.01	0
2MB	99.94	0.03	0.02	0.01	0
512KB	96.36	1.51	2.04	0.08	0
128KB	91.39	1.47	3.74	2.86	0.53
32KB	89.51	0.49	1.3	4.06	4.64
2MB	88.71	0.37	0.46	1.94	8.52
512KB	86.67	1.3	1.05	0.83	10.16
128KB	19.1	67.55	2.18	0.59	10.58
32KB	8.71	1.66	8.32	63.68	17.63
2MB	8.05	0.47	3.41	11.15	76.92
512KB	7.89	0.52	2.39	8.34	80.85
32KB	7.89	0.19	2.65	5.36	83.91

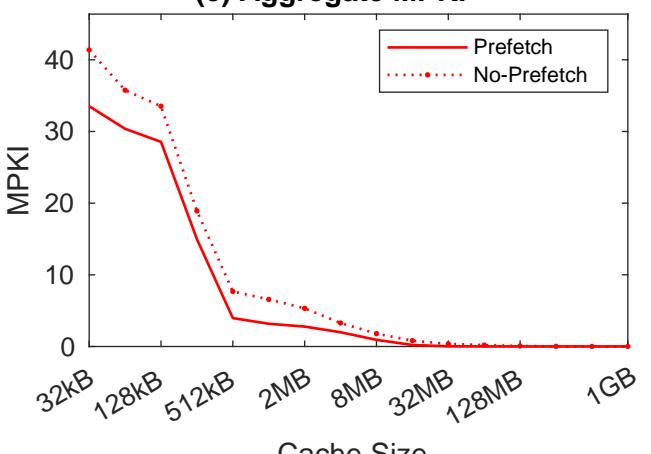
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	99.95	0.05	0	0	0
128MB	99.95	0.05	0	0	0
32MB	99.87	0.11	0.02	0.01	0
8MB	98.4	1.54	0.05	0	0.01
2MB	93.84	5.29	0.85	0.01	0.01
512KB	89.45	7.8	2.73	0.02	0.01
128KB	81.55	11.53	6.19	0.73	0.01
32KB	73.23	15.81	5.52	4	1.43
2MB	57.06	27.76	4.3	4.24	6.64
512KB	38.39	42.86	1.06	2.65	15.04
128KB	15.11	62.41	1.77	2.2	18.51
32KB	1.2	70.1	7.37	2.07	19.26
2MB	0.44	1.38	5.05	58.71	34.42
512KB	0.14	0.08	0.68	7.22	91.88
128KB	0	0.12	0.11	1.45	98.32
32KB	0	0	0.14	0.15	99.71

(d) Effects of Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	0.05	-0.05	0	0	0
128MB	0.07	-0.07	0	-0.01	0
32MB	1.54	-1.5	-0.03	0.01	-0.01
8MB	6.1	-5.26	-0.83	0	-0.01
2MB	10.49	-7.77	-2.71	-0.01	-0.01
512KB	14.81	-10.02	-4.15	-0.65	-0.01
128KB	18.16	-14.34	-1.78	-1.14	-0.9
32KB	32.45	-27.27	-3	-0.18	-2
2MB	50.32	-42.49	-0.6	-0.71	-6.52
512KB	71.56	-61.11	-0.72	-1.37	-8.35
128KB	17.9	-2.55	-5.19	-1.48	-8.68
32KB	8.27	0.28	3.27	4.97	-16.79
2MB	7.91	0.39	2.73	3.93	-14.96
512KB	7.89	0.4	2.28	6.89	-17.47
128KB	7.89	0.19	2.51	5.21	-15.8

(e) Aggregate MPKI



(f) Execution with Prefetching

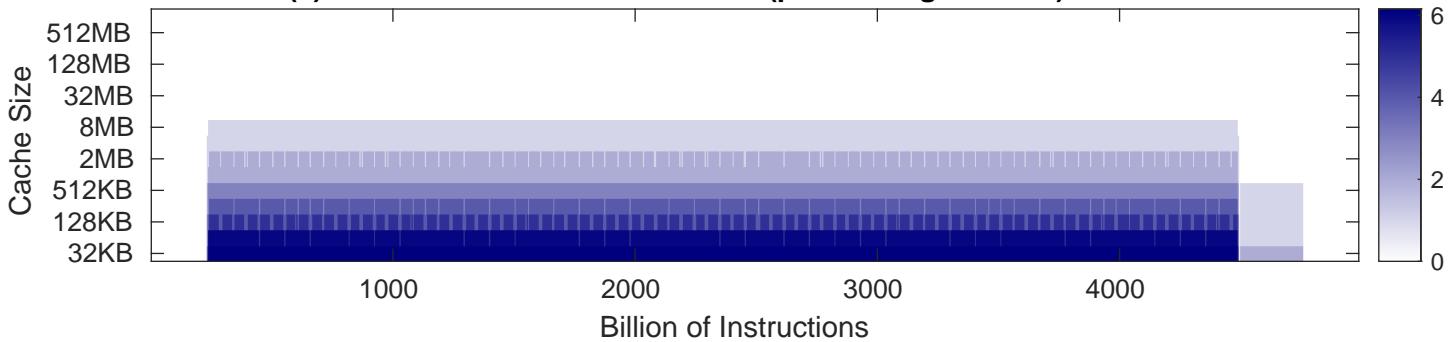
	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	69.12	8.7	22.18	0	0
8MB	64.11	8.85	15.56	11.48	0
2MB	70.08	4.5	15.62	9.79	0
512KB	85.75	1.89	7.8	4.56	0
128KB	27.44	12.42	55.44	4.69	0
32KB	10.9	3.01	24.93	49.15	12
2MB	8.46	0.48	4.34	31.38	55.35
512KB	9.65	0.24	1.02	11.74	77.36
128KB	11.3	1.12	1.27	4.41	81.9
32KB	2.58	23.91	2.04	2.55	68.92
2MB	0.21	0.2	3.03	6.1	28.22
512KB	0.1	0.03	0.64	93.12	0
128KB	0.1	0.04	0.34	4.61	94.92
32KB	0.09	0.01	0.34	2.65	96.92

(g) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	82.65	17.35	0	0	0
128MB	82.65	17.35	0	0	0
32MB	64.82	15.41	7.18	12.59	0
2MB	60.03	33.99	2.67	0	3.31
8MB	32.68	47.52	18.06	0.41	1.34
16MB	28.86	36.81	33.12	0.45	0.75
32MB	19.96	23.96	42.84	12.89	0.35
64MB	14.22	13.62	20.62	33.34	18.2
128MB	8.9	12.57	6.69	20.15	51.7
256MB	5.05	11.88	1.01	8.39	73.66
512MB	1.78	13.55	1.13	5.33	78.21
1GB	0.09	20.13	4.16	4.83	70.79
2GB	0.01	0.16	1.45	52.2	46.19
4GB	0	0.01	0.15	3.6	96.24
8GB	0	0.01	0.02	0.72	99.25
16GB	0	0	0.02	0.06	99.92

Memory Behavior Analysis: SPEC 2017 - xz i.p. 1 - 4985B instructions

(a) MPKI over time and cache size (prefetching enabled)



(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	97.3	2.7	0	0	0
87.41	12.51	0.08	0	0	
2MB	59.56	38.79	1.64	0	0
512KB	40.15	50.21	9.65	0	0
128KB	26.79	51.55	21.66	0	0
32KB	21.7	40.97	37.33	0	0
	15.3	32.88	51.82	0	0
	13.01	23.82	62.97	0.21	0
	11.94	7.64	74.81	5.6	0
	10.17	4.06	74.59	11.18	0
	0-1	1-3	3-10	10-20	20-inf
MPKI Bins					

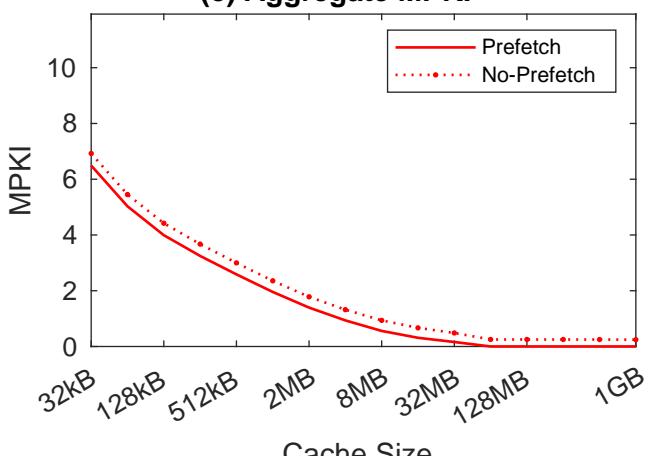
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	99.7	0.01	0.01	0.16	0.13
128MB	99.7	0.01	0.01	0.16	0.13
32MB	99.69	0.01	0.01	0.16	0.13
8MB	99.69	0.01	0.01	0.16	0.13
2MB	99.06	0.64	0.01	0.16	0.13
512KB	91.82	7.88	0.01	0.16	0.13
128KB	77.51	22	0.19	0.16	0.13
32KB	50.74	46.58	2.39	0.16	0.13
	26.94	61.25	11.52	0.16	0.13
	21.23	53.7	24.77	0.16	0.13
	17.06	38.78	43.86	0.16	0.13
	11.24	33.86	54.6	0.16	0.13
	11.02	20.03	67.98	0.83	0.13
	10.61	8.27	73.22	7.77	0.13
	9.38	2.91	75.5	12.07	0.13
	0-1	1-3	3-10	10-20	20-inf
MPKI Bins					

(d) Effects of Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	0.3	-0.01	-0.01	-0.16	-0.13
128MB	0.31	-0.01	-0.01	-0.16	-0.13
32MB	0.31	-0.01	-0.01	-0.16	-0.13
8MB	0.94	-0.64	-0.01	-0.16	-0.13
2MB	5.48	-5.18	-0.01	-0.16	-0.13
512KB	9.9	-9.49	-0.11	-0.16	-0.13
128KB	8.82	-7.79	-0.75	-0.16	-0.13
32KB	13.21	-11.04	-1.87	-0.16	-0.13
	5.56	-2.15	-3.11	-0.16	-0.13
	4.64	2.19	-6.53	-0.16	-0.13
	4.06	-0.98	-2.78	-0.16	-0.13
	1.99	3.79	-5.01	-0.62	-0.13
	1.33	-0.63	1.59	-2.17	-0.13
	0.79	1.15	-0.91	-0.89	-0.13
	0-1	1-3	3-10	10-20	20-inf
MPKI Bins					

(e) Aggregate MPKI



(f) Execution with Prefetching

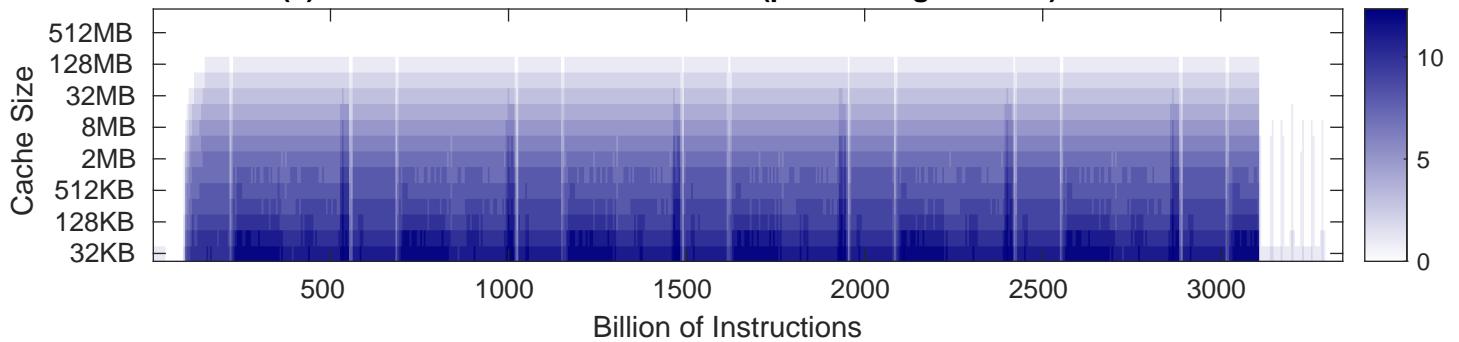
	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	88.72	11.28	0	0	0
68.54	31.01	0.45	0	0	
2MB	31.13	63.02	5.85	0	0
512KB	13.61	61.92	24.47	0	0
128KB	5.21	50.37	44.42	0	0
32KB	3.17	32.38	64.45	0	0
	1.1	20.06	78.84	0	0
	0.47	13.07	85.92	0.54	0
	0.28	3.26	84.57	11.88	0
	0.1	1.29	78.82	19.79	0
	0-1	1-3	3-10	10-20	20-inf
MPKI Bins					

(g) Execution without Prefetching

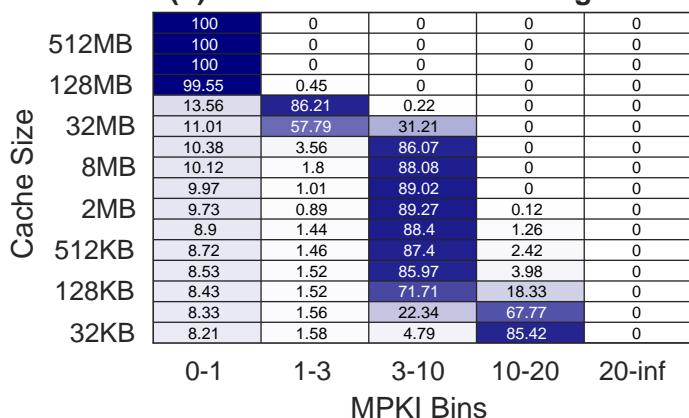
	0-1	1-3	3-10	10-20	20-inf
512MB	37.09	0.05	0.2	9.98	52.67
128MB	37.41	0.07	0.2	9.71	52.61
32MB	37.33	0.07	0.2	9.69	52.72
8MB	37.32	0.07	0.2	9.67	52.75
2MB	65.96	1.49	0.12	5.02	27.41
512KB	60.59	15.72	0.13	3.65	19.92
128KB	48.6	33.81	0.76	2.62	14.22
32KB	25.66	55.84	6.56	1.86	10.08
8MB	8.97	58.34	23.84	1.38	7.47
2MB	5.39	44.85	43.06	1.04	5.65
512KB	3.61	26.23	64.91	0.82	4.44
128KB	1.55	19.06	75.1	0.67	3.63
32KB	1.26	10.06	83.56	2.11	3.01
8MB	0.99	3.58	77.55	15.44	2.44
2MB	0.67	0.84	76.13	20.44	1.92
	0-1	1-3	3-10	10-20	20-inf
MPKI Bins					

Memory Behavior Analysis: SPEC 2017 - xz i.p. 2 - 3341B instructions

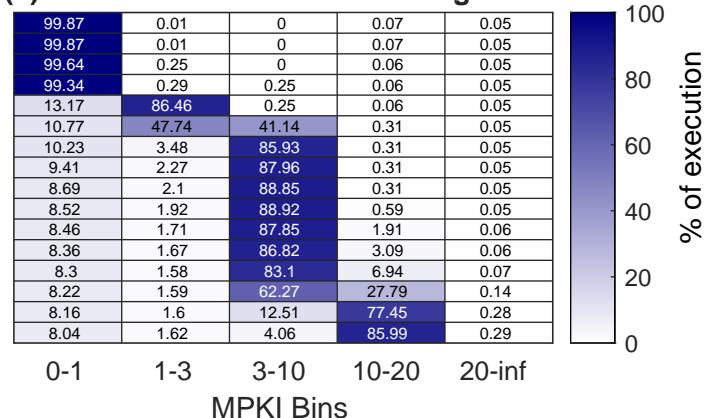
(a) MPKI over time and cache size (prefetching enabled)



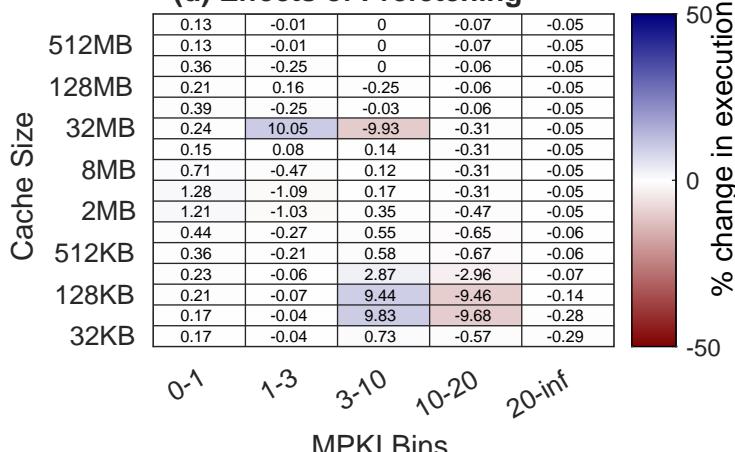
(b) Execution with Prefetching



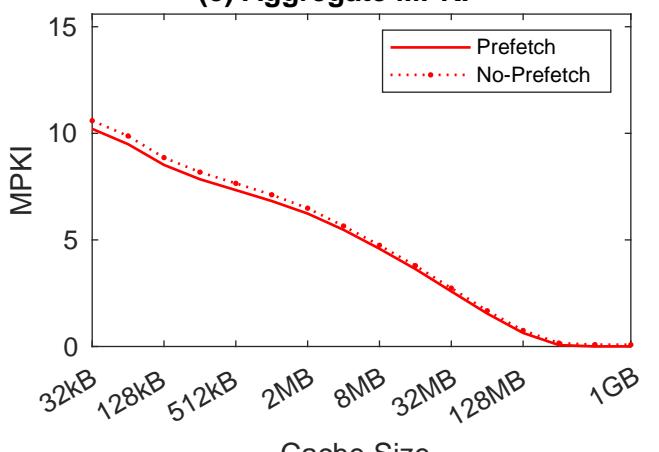
(c) Execution without Prefetching



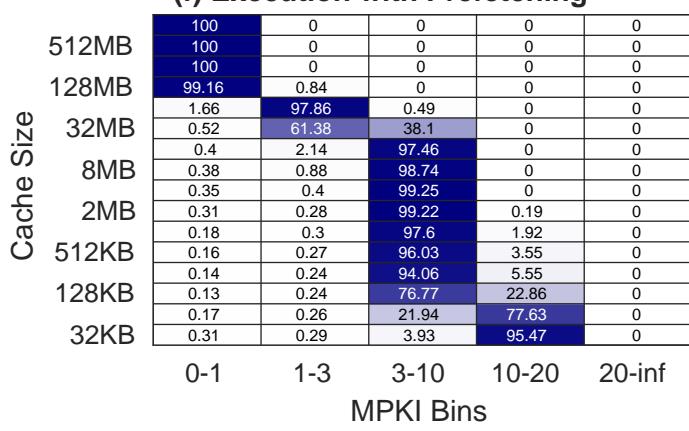
(d) Effects of Prefetching



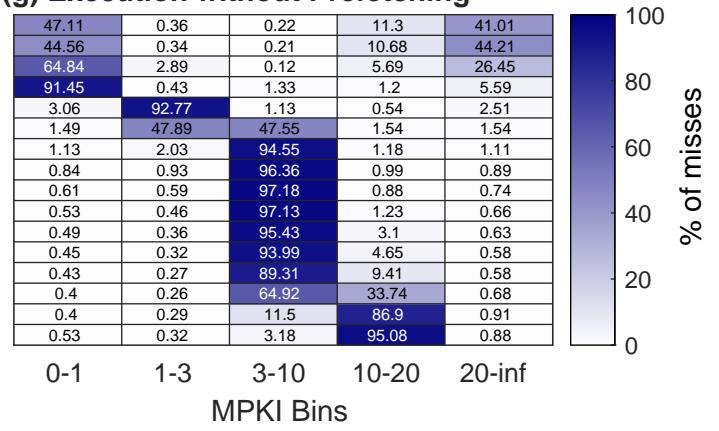
(e) Aggregate MPKI



(f) Execution with Prefetching

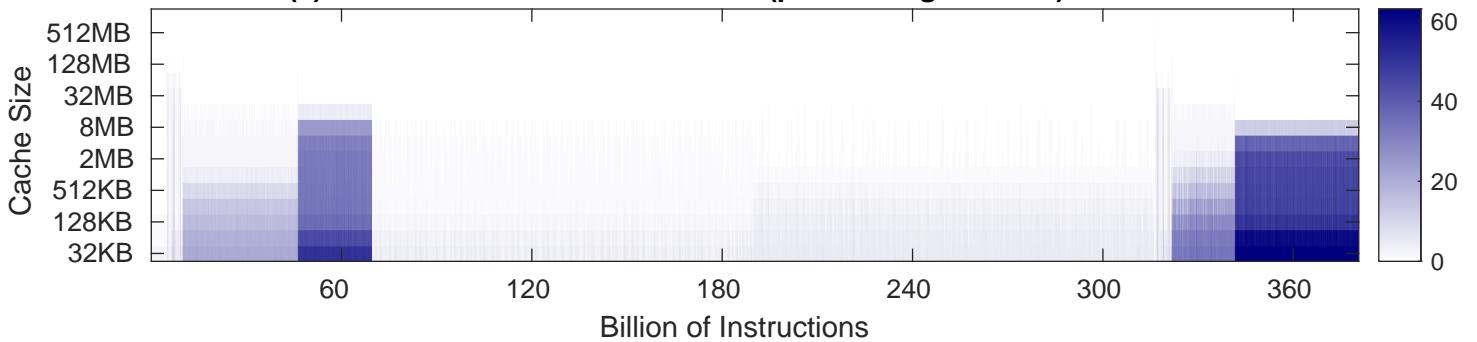


(g) Execution without Prefetching



Memory Behavior Analysis: SPEC 2006 - astar i.p. 1 - 380B instructions

(a) MPKI over time and cache size (prefetching enabled)



(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	99.95	0.05	0	0	0
128MB	99.95	0.05	0	0	0
32MB	99.95	0.05	0	0	0
8MB	98.82	0.18	0	0	0
2MB	98.63	1.16	0.21	0	0
512KB	97.9	0.89	1.21	0	0
128KB	86.5	6.02	7.49	0	0
32KB	67.05	15.21	1.31	10.33	6.1
	59.35	22.83	1.29	0.16	16.37
	54.07	23.28	6.15	0.13	16.37
	40.75	26.9	13.82	2.15	16.37
	18.76	48.08	10.96	5.73	16.47
	11.09	34.87	22.73	11.22	20.1
	2.84	34.63	31.19	9.7	21.65
	0.16	16.68	51.79	8.8	22.57
	0.08	9.49	58.99	0.34	31.11

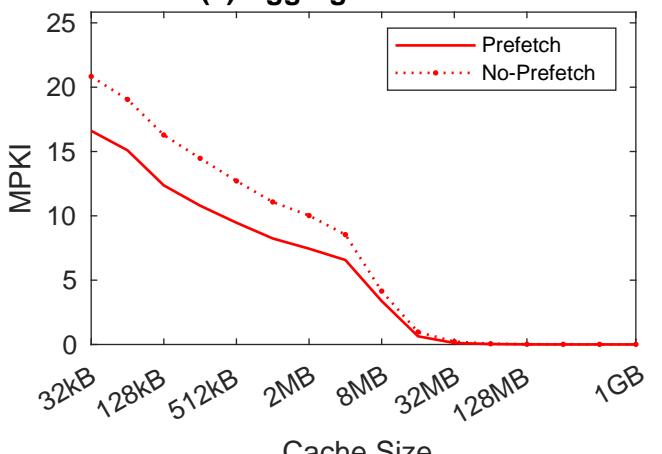
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	99.82	0.13	0.03	0.03	0
128MB	99.82	0.13	0.03	0.03	0
32MB	99.82	0.13	0.03	0.03	0
8MB	99.63	0.26	0.08	0.03	0
2MB	98.37	1.13	0.45	0.05	0
512KB	96.85	1.21	1.66	0.29	0
128KB	74.12	17.71	7.59	0.58	0
32KB	41.49	40.02	1.47	10.88	6.15
	12.69	68.76	1.47	0.5	16.58
	5.23	70.94	6.73	0.45	16.66
	1.66	65.08	13.4	3.18	16.68
	1.18	51.39	15.74	14.56	17.13
	1.1	36.21	30.74	1.31	30.64
	0.05	13.9	54.02	0.58	31.45
	0.05	1.18	66.66	0.66	31.45
	0.05	0.03	67.66	0.79	31.48

(d) Effects of Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	0.13	-0.08	-0.03	-0.03	0
128MB	0.13	-0.08	-0.03	-0.03	0
32MB	0.19	-0.08	-0.08	-0.03	0
8MB	0.26	0.03	-0.24	-0.05	0
2MB	1.05	-0.32	-0.45	-0.29	0
512KB	12.38	-11.69	-0.1	-0.58	0
128KB	25.56	-24.81	-0.16	-0.55	-0.05
32KB	46.66	-45.93	-0.18	-0.34	-0.21
	48.84	-47.66	-0.58	-0.32	-0.29
	39.09	-38.18	0.42	-1.03	-0.31
	17.58	-3.31	-4.78	-8.83	-0.66
	9.99	-1.34	-8.01	9.91	-10.54
	2.79	20.73	-22.83	9.12	-9.8
	0.11	15.5	-14.87	8.14	-8.88
	0.03	9.46	-8.67	-0.45	-0.37

(e) Aggregate MPKI



(f) Execution with Prefetching

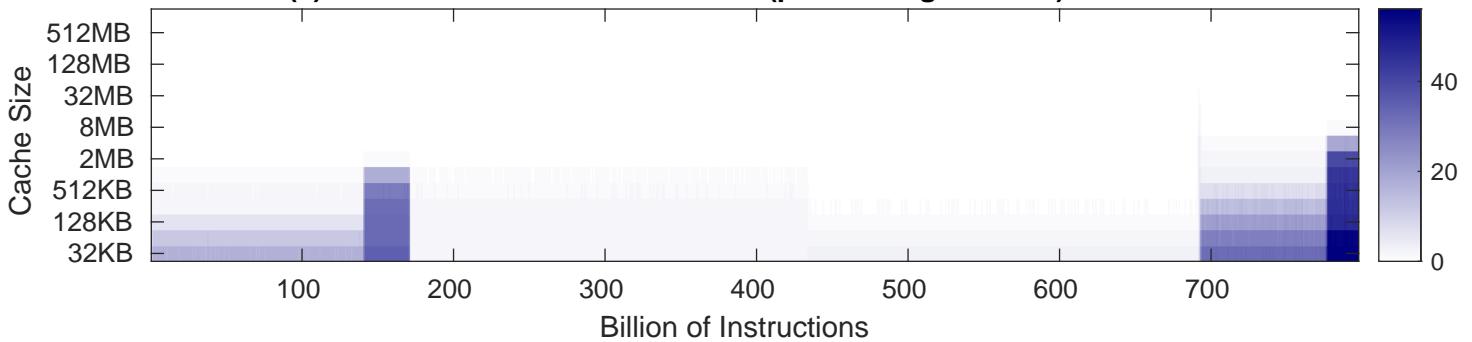
	0-1	1-3	3-10	10-20	20-inf
512MB	85.33	14.67	0	0	0
128MB	85.33	14.67	0	0	0
32MB	85.64	14.36	0	0	0
8MB	73.06	26.94	0	0	0
2MB	26.49	54.78	18.74	0	0
512KB	38.46	13.49	48.05	0	0
128KB	32.47	13.71	53.82	0	0
32KB	7.4	7.6	2.19	37.87	44.94
	4.37	5.73	1.05	0.3	88.55
	3.86	4.72	3.74	0.24	87.43
	3.44	4.07	8.55	2.99	80.95
	1.39	8.84	9.49	8.89	71.39
	0.77	5.51	7.72	14.97	71.03
	0.18	5.37	10.59	12.99	70.88
	0.01	2.46	15.11	11.2	71.24
	0	1.45	16.61	0.29	81.65

(g) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	48.88	18.6	7.83	24.69	0
128MB	48.88	18.6	7.83	24.69	0
32MB	49.54	19.26	7.51	23.69	0
8MB	46.07	22.6	15.56	15.77	0
2MB	20.54	33.4	36.07	9.99	0
512KB	29.8	8.42	46.54	15.25	0
128KB	30.21	23.69	38.45	7.66	0
32KB	6	15.25	2.31	33.15	43.28
	1.09	13.51	1.12	0.83	83.45
	0.39	12.53	3.25	0.63	83.2
	0.07	11.15	7.72	3.43	77.62
	0.03	9.11	4.67	17.22	68.96
	0.04	6.06	9.62	1.45	82.83
	0	2.18	15.56	0.47	81.79
	0	0.18	18.62	0.45	80.75
	0	0	19.34	0.49	80.16

Memory Behavior Analysis: SPEC 2006 - astar i.p. 2 - 797B instructions

(a) MPKI over time and cache size (prefetching enabled)



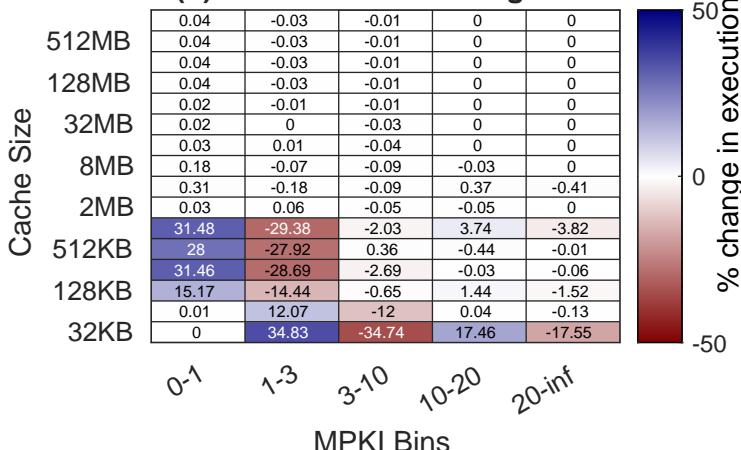
(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	99.99	0.01	0	0	0
128MB	99.99	0.01	0	0	0
32MB	99.99	0.01	0	0	0
8MB	99.97	0.03	0	0	0
2MB	99.92	0.08	0	0	0
512KB	99.84	0.1	0.06	0	0
128KB	97.78	2.13	0.09	0	0
32KB	87.14	10.08	0.11	2.67	0
512MB	86.62	10.54	0.16	0	2.67
128MB	77.82	12.23	3.45	3.83	2.67
32MB	32.38	50.49	10.45	0.19	6.49
8MB	32.28	50.59	0.21	10.41	6.5
2MB	15.17	50.15	17.72	1.98	14.98
512KB	0.01	65.27	0.2	17.57	16.95
128KB	0	46.94	18.52	17.59	16.95
32KB	0	46.94	18.52	17.59	16.95

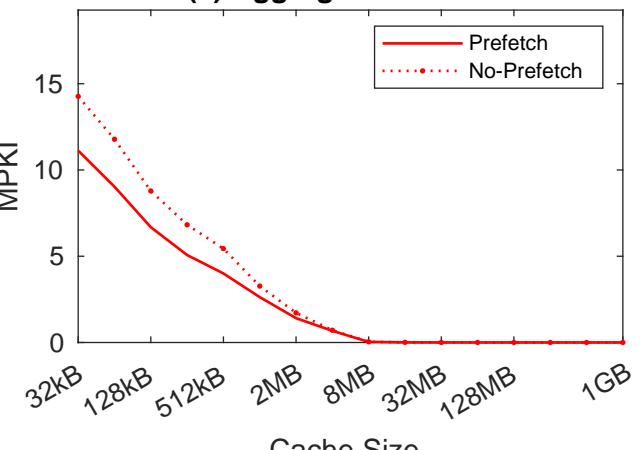
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	99.95	0.04	0.01	0	0
128MB	99.95	0.04	0.01	0	0
32MB	99.95	0.04	0.01	0	0
8MB	99.95	0.04	0.01	0	0
2MB	99.95	0.04	0.01	0	0
512KB	99.95	0.04	0.01	0	0
128KB	99.95	0.04	0.01	0	0
32KB	99.95	0.04	0.01	0	0

(d) Effects of Prefetching



(e) Aggregate MPKI



(f) Execution with Prefetching

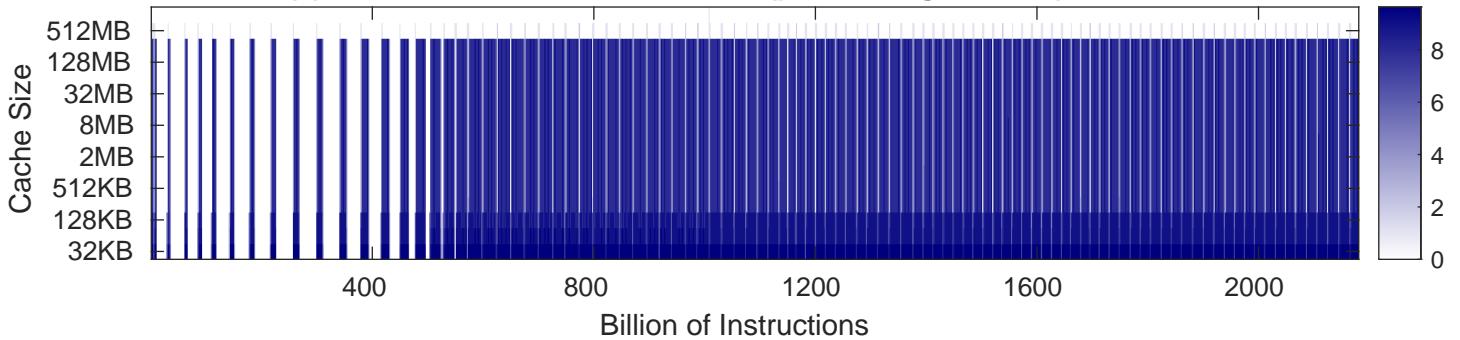
	0-1	1-3	3-10	10-20	20-inf
512MB	68.59	31.41	0	0	0
128MB	68.59	31.41	0	0	0
32MB	56.21	43.79	0	0	0
8MB	37.14	62.86	0	0	0
2MB	13.97	35.26	50.78	0	0
512KB	19.84	67.12	13.05	0	0
128KB	1.95	20.54	0.93	76.59	0
32KB	7.92	16.01	0.62	0	75.45

(g) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	29.44	41.78	28.78	0	0
128MB	29.44	41.78	28.78	0	0
32MB	29.45	41.77	28.78	0	0
8MB	34.03	39.69	26.28	0	0
2MB	23.43	44.1	32.47	0	0
512KB	8.77	21.18	70.05	0	0
128KB	13.11	55.31	24.47	7.11	0
32KB	2.31	20.96	1.73	63.3	11.7

Memory Behavior Analysis: SPEC 2006 - bwaves - 2181B instructions

(a) MPKI over time and cache size (prefetching enabled)



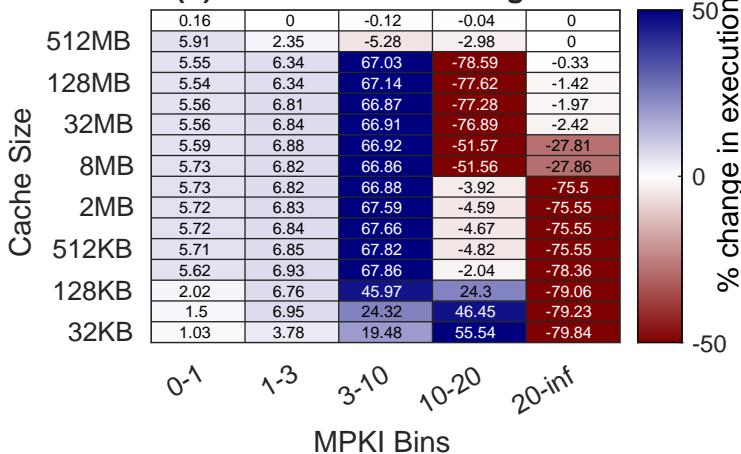
(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	99.93	0.07	0	0	0
128MB	94.89	3.74	1.37	0	0
32MB	20.81	7.3	71.89	0	0
8MB	20.8	7.3	71.89	0	0
2MB	20.79	7.31	71.89	0	0
512KB	20.79	7.32	71.89	0	0
128KB	20.79	7.32	71.89	0	0
32KB	20.79	7.32	71.89	0	0

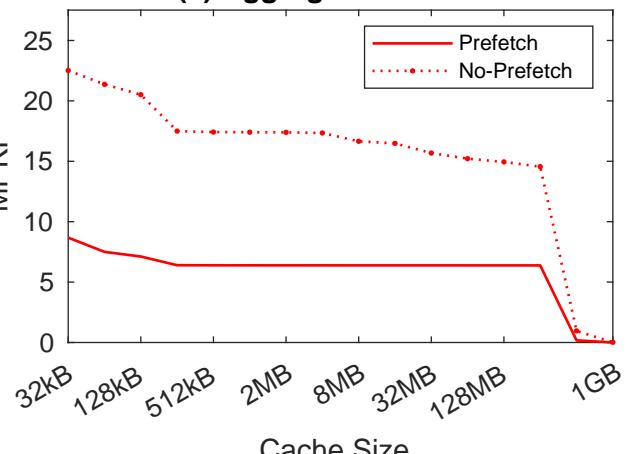
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	99.77	0.07	0.12	0.04	0
128MB	88.98	1.39	6.65	2.98	0
32MB	15.26	0.96	4.86	78.59	0.33
8MB	15.26	0.96	4.75	77.62	1.42
2MB	15.23	0.5	5.02	77.28	1.97
512KB	15.23	0.48	4.98	76.89	2.42
128KB	15.2	0.44	4.97	51.57	27.81
32KB	15.05	0.5	5.03	51.56	27.86

(d) Effects of Prefetching



(e) Aggregate MPKI



(f) Execution with Prefetching

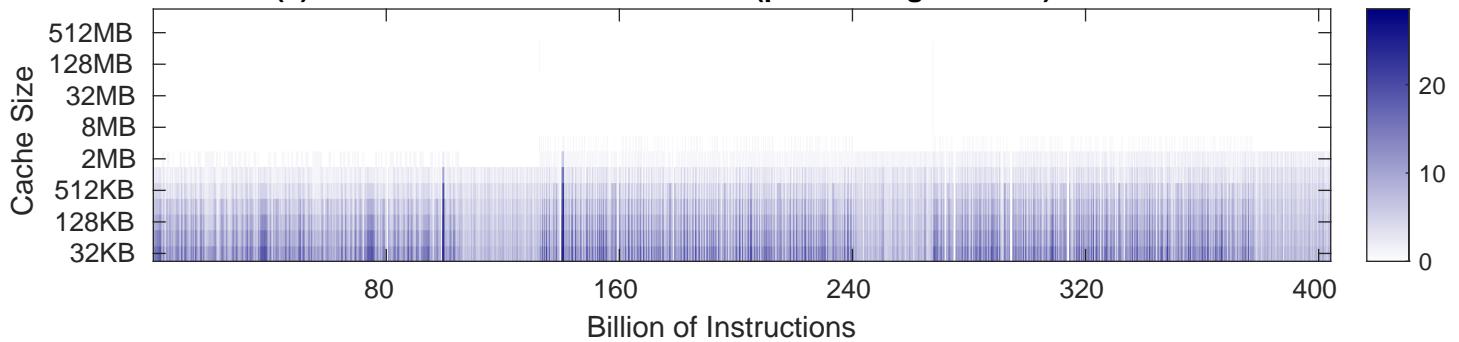
	0-1	1-3	3-10	10-20	20-inf
512MB	17.57	82.43	0	0	0
128MB	12.6	31.44	55.96	0	0
32MB	0.29	2.21	97.5	0	0
8MB	0.29	2.21	97.5	0	0
2MB	0.3	2.21	97.49	0	0
512KB	0.3	2.22	97.48	0	0
128KB	0.3	2.22	97.48	0	0
32KB	0.3	2.22	97.48	0	0

(g) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	0.55	6.8	42.61	32.17	17.88
128MB	3.69	2.68	46.91	46.42	0.3
32MB	0.21	0.13	1.97	97.2	0.5
8MB	0.2	0.13	1.87	95.84	1.96
2MB	0.21	0.06	2.11	94.93	2.69
512KB	0.21	0.06	2.19	94.24	3.3
128KB	0.2	0.05	2.07	60.94	36.73
32KB	0.2	0.06	2.07	60.52	37.16

Memory Behavior Analysis: SPEC 2006 - bzip2 i.p. 1 - 404B instructions

(a) MPKI over time and cache size (prefetching enabled)



(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	100	0	0	0	0
2MB	99.88	0.12	0	0	0
512KB	64.12	35.39	0.49	0	0
128KB	13.34	59.27	27.17	0.22	0
32KB	3.98	30.39	64.91	0.59	0.12
2MB	2.67	11.53	77.06	8.46	0.27
512KB	2.05	6.56	68.7	22.4	0.3
128KB	1.36	3.86	56.69	37.24	0.84
32KB	1.24	1.61	44.35	49.57	3.24

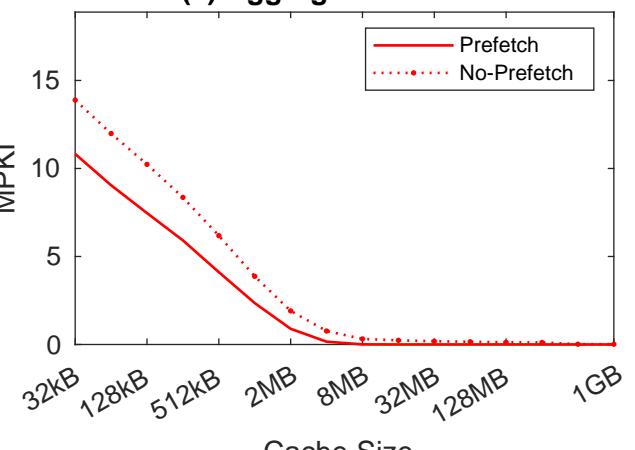
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
99.98	0	0	0	0.02	
99.98	0	0	0	0.02	
99.8	0	0.07	0.02	0.1	
99.8	0	0.07	0.02	0.1	
99.8	0	0	0.07	0.12	
99.78	0.02	0	0.07	0.12	
99.51	0.3	0	0.07	0.12	
76.27	23.39	0.15	0.07	0.12	
14.13	74.21	11.43	0.1	0.12	
1.39	32.71	64.79	0.97	0.15	
0.4	7.72	82.75	8.59	0.54	
0	2.13	69.59	27.62	0.67	
0	0.67	53.08	44.74	1.51	
0	0.25	40.09	55.09	4.58	
0	0.2	28.24	59.07	12.5	

(d) Effects of Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	0.02	0	0	0	-0.02
128MB	0.2	0	-0.07	-0.02	-0.1
32MB	0.2	0	-0.07	-0.02	-0.12
8MB	0.22	-0.02	0	-0.07	-0.12
2MB	0.49	-0.3	0	-0.07	-0.12
512KB	23.61	-23.27	-0.15	-0.07	-0.12
128KB	49.99	-38.82	-10.94	-0.1	-0.12
32KB	11.95	26.56	-37.62	-0.75	-0.15
2MB	3.58	22.67	-17.84	-8	-0.42
512KB	2.67	9.4	7.47	-19.16	-0.4
128KB	2.05	5.89	15.62	-22.34	-1.21
32KB	1.36	3.61	16.6	-17.85	-3.74
2MB	1.24	1.41	16.11	-9.5	-9.26

(e) Aggregate MPKI



(f) Execution with Prefetching

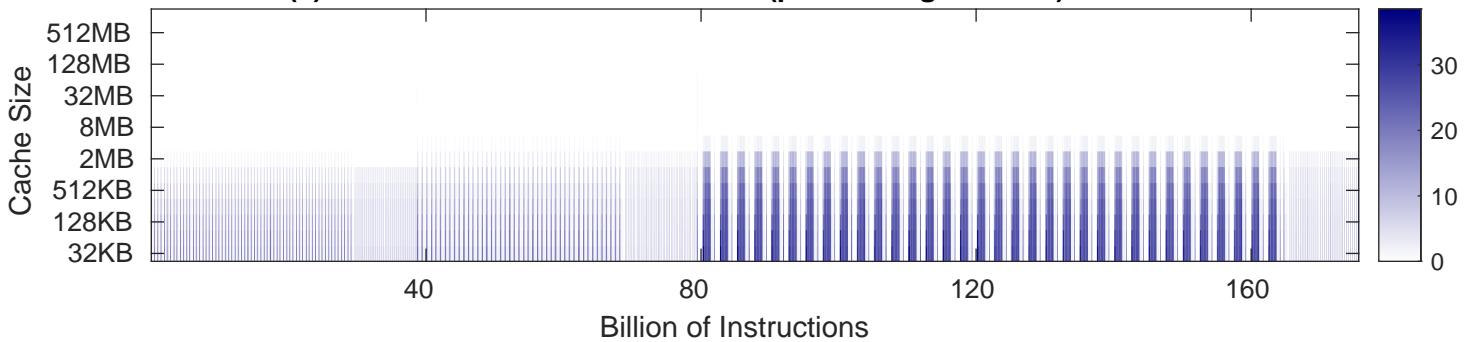
	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	100	0	0	0	0
2MB	99.21	0.79	0	0	0
512KB	34.34	63.26	2.4	0	0
128KB	3.4	49.56	45.71	1.33	0
32KB	0.49	16.04	80.89	1.94	0.65
2MB	0.21	4.31	77.73	16.74	1.02
512KB	0.12	1.9	59.7	37.36	0.92
128KB	0.04	0.92	42.67	54.31	2.05
32KB	0.03	0.33	29.51	63.61	6.52

(g) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
16.73	0	0	0	83.27	
16.67	0	0	0	83.33	
60.16	0	1.85	2.69	35.3	
60.51	0	5.07	0	34.42	
63.43	0	0	5.03	31.55	
68.09	0	0	4.65	27.26	
74.14	0.11	0	3.79	21.95	
79.33	1.15	0	2.94	16.58	
51.41	39.77	0.67	1.26	6.89	
5.05	69	22.48	0.68	2.78	
0.19	19.7	75.3	3.25	1.57	
0.04	3.06	77.26	17.11	2.53	
0	0.6	55.34	41.74	2.32	
0	0.15	37.45	58.66	3.74	
0	0.04	25.46	65.7	8.79	
0	0.03	16.36	63.36	20.25	

Memory Behavior Analysis: SPEC 2006 - bzip2 i.p. 2 - 175B instructions

(a) MPKI over time and cache size (prefetching enabled)



(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	100	0	0	0	0
2MB	79.73	20.27	0	0	0
512KB	60.82	9.91	17.71	11.56	0
128KB	54.5	6.15	18.51	20.56	0.28
32KB	48.92	6.83	16.46	14.41	13.38
16KB	37.59	17.71	11.9	16.74	16.06
8KB	26.99	27.85	11.05	10.88	23.23
4KB	26.25	28.19	11.1	7.86	26.59
2KB	25.8	28.53	9.51	8.71	27.45

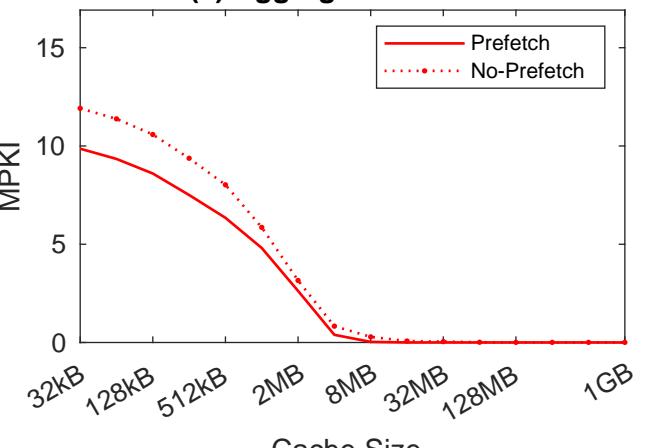
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	99.94	0	0.06	0	0
128MB	99.94	0	0.06	0	0
32MB	99.94	0	0.06	0	0
8MB	99.83	0.11	0.06	0	0
2MB	99.49	0.23	0.23	0.06	0
512KB	91.34	0.11	0.34	0.06	0
128KB	73.92	8.26	0.28	0.06	0.06
32KB	59.05	13.84	12.13	0.06	0.06
16KB	36.9	7.97	17.94	14.98	0.06
8KB	26.65	13.21	27.62	15.15	7.12
4KB	16.12	25.46	24.2	15.89	18.34
2KB	7.69	33.09	22.67	9.23	27.33
1KB	7.69	32.92	22.38	6.72	30.3
512B	7.69	32.86	22.27	5.92	31.26

(d) Effects of Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	0.06	0	-0.06	0	0
128MB	0.06	0	-0.06	0	0
32MB	0.06	0	-0.06	0	0
8MB	0.17	-0.11	-0.06	0	0
2MB	0.51	-0.23	-0.23	-0.06	0
512KB	8.66	-8.26	-0.28	-0.06	-0.06
128KB	5.81	6.43	-12.13	-0.06	-0.06
32KB	1.77	1.94	-0.23	-3.42	-0.06
16KB	17.6	7.06	-9.11	5.41	-6.84
8KB	22.27	-8.6	-10.7	-1.25	-1.71
4KB	21.47	-7.75	-12.3	0.85	-2.28
2KB	19.3	-5.24	-11.62	1.65	-4.1
1KB	18.56	-4.73	-11.28	1.14	-3.71
512B	18.11	-4.33	-12.76	2.79	-3.81

(e) Aggregate MPKI



(f) Execution with Prefetching

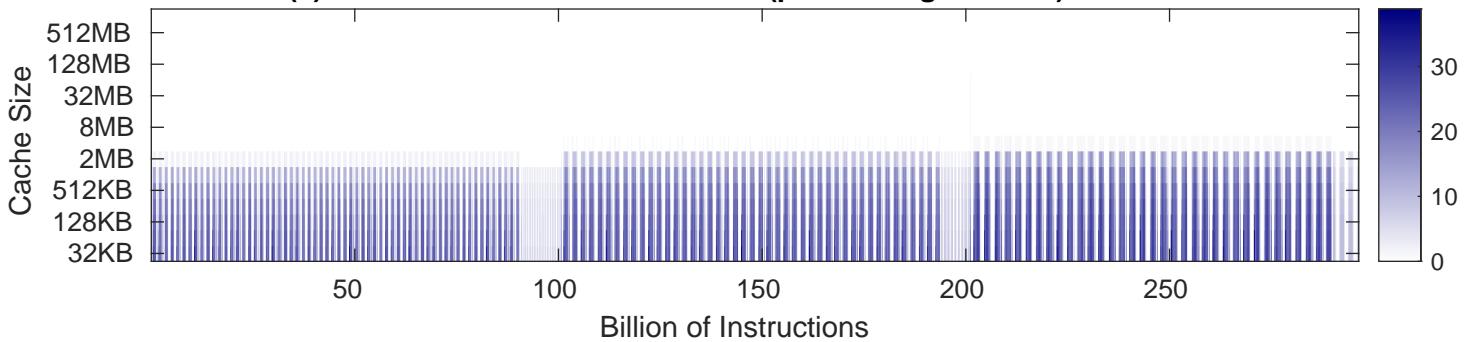
	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	100	0	0	0	0
2MB	17.17	82.83	0	0	0
512KB	1.23	7.35	43.63	47.8	0
128KB	0.65	2.99	24.4	70.99	0.97
32KB	1.87	1.39	16.68	32.92	47.13
16KB	1.55	3.17	10.11	33.89	51.28
8KB	0.46	4.61	8.36	20.6	65.98
4KB	0.38	4.65	7.85	13.79	73.33
2KB	0.39	4.65	6.09	13.86	75.01

(g) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	51.43	0	48.57	0	0
128MB	51.43	0	48.57	0	0
32MB	67.27	4.44	28.29	0	0
8MB	67.24	11.82	20.94	0	0
2MB	74.83	3.83	21.34	0	0
512KB	45.08	48.53	4.35	2.04	0
128KB	13.47	34.91	50.87	0.75	0
32KB	3.4	5.33	34.15	57.12	0
16KB	1.7	4.56	27.44	41.88	24.41
8KB	1.59	2.7	22.95	28.72	44.04
4KB	1.08	4.12	18.98	27.4	48.43
2KB	0.21	5	15.71	13.46	65.62
1KB	0.2	4.97	14.59	8.65	71.59
512B	0.23	4.93	14.05	7.14	73.65

Memory Behavior Analysis: SPEC 2006 - bzip2 i.p. 3 - 296B instructions

(a) MPKI over time and cache size (prefetching enabled)



(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	100	0	0	0	0
2MB	84.21	15.79	0	0	0
512KB	40.32	21.46	24.33	13.9	0
128KB	34.85	4.96	14.51	39.57	6.11
32KB	29.89	5.74	14.51	27.77	22.1
1-3	26.45	6.98	12.31	19.8	34.45
3-10	25.64	7.25	9.45	12.15	45.51
10-20	25.47	5.8	10.39	7.86	50.47
20-inf	25.4	5.6	9.75	7.93	51.32

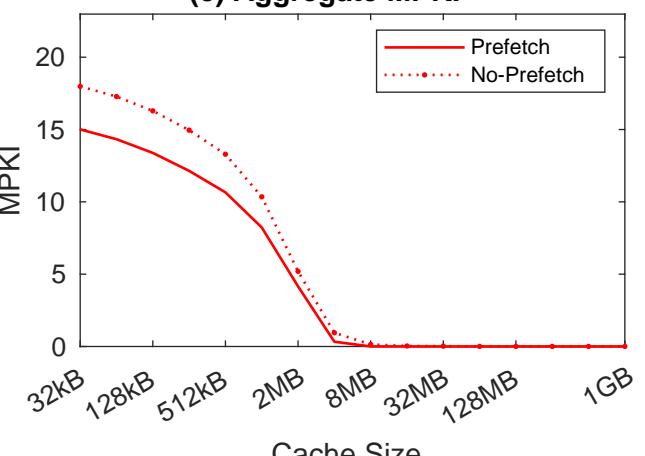
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	99.97	0	0.03	0	0
128MB	99.97	0	0.03	0	0
32MB	99.97	0	0.03	0	0
8MB	99.97	0	0.03	0	0
2MB	99.76	0.17	0.07	0	0
512KB	99.73	0.03	0.24	0	0
128KB	96.22	3.54	0.24	0	0
32KB	55.09	42.41	2.46	0.03	0
1-3	26.38	16.84	35.05	21.73	0
3-10	10.7	8.47	31.01	43.02	6.82
10-20	4.52	8.06	31.61	26.38	29.42
20-inf	2.23	8.27	30.67	20.38	38.46

(d) Effects of Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	0.03	0	-0.03	0	0
128MB	0.03	0	-0.03	0	0
32MB	0.24	-0.17	-0.07	0	0
8MB	0.27	-0.03	-0.24	0	0
2MB	3.78	-3.54	-0.24	0	0
512KB	29.12	-26.62	-2.46	-0.03	0
128KB	13.94	4.62	-10.72	-7.83	0
32KB	24.15	-3.51	-16.5	-3.45	-0.71
1-3	25.37	-2.32	-17.1	1.39	-7.32
3-10	24.22	-1.29	-18.36	-0.58	-4.01
10-20	23.48	1.21	-21.89	2.47	-5.27
20-inf	23.31	0.13	-21.16	0.67	-2.97

(e) Aggregate MPKI



(f) Execution with Prefetching

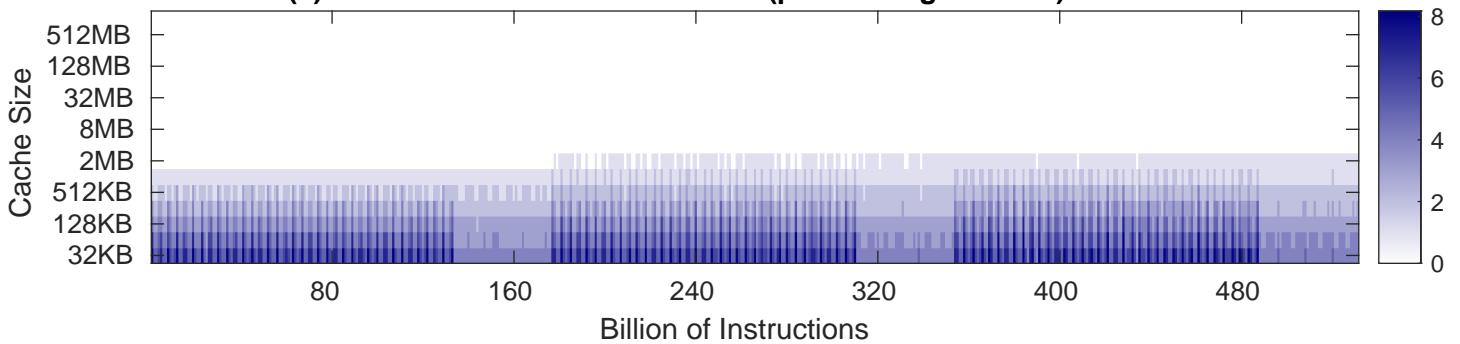
	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	100	0	0	0	0
2MB	38.2	61.8	0	0	0
512KB	0.81	10.66	43.31	45.22	0
128KB	0.27	1.47	10.78	71.1	16.38
32KB	0.27	1.08	8.77	43.51	46.38
1-3	0.17	1.05	6.36	26.72	65.7
3-10	0.12	1.13	4.27	14.25	80.23
10-20	0.1	0.82	4.13	8.38	86.57
20-inf	0.11	0.78	3.59	8.11	87.41

(g) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	46.39	0	53.61	0	0
128MB	46.39	0	53.61	0	0
32MB	59.31	0	40.69	0	0
8MB	66.7	17.75	15.55	0	0
2MB	71.66	1.06	27.28	0	0
512KB	52.99	39.5	7.51	0	0
128KB	9.2	81.34	9.08	0.38	0
32KB	0.92	7.08	39.69	52.31	0
1-3	0.46	1.52	19.37	63.97	14.68
3-10	0.17	1.08	17.28	31.55	49.92
10-20	0.06	1.11	15.32	22.16	61.34
20-inf	0.05	0.8	14.01	9.06	76.07

Memory Behavior Analysis: SPEC 2006 - bzip2 i.p. 4 - 531B instructions

(a) MPKI over time and cache size (prefetching enabled)



(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	99.96	0.04	0	0	0
8MB	99.96	0.04	0	0	0
2MB	100	0	0	0	0
512KB	100	0	0	0	0
128KB	100	0	0	0	0
32KB	99.53	0.47	0	0	0
	83.37	16.63	0	0	0
	49.49	43.94	6.57	0	0
	29.3	47.76	22.94	0	0
	18.08	40.41	41.45	0.06	0
	10.7	32.24	56.06	1	0
	7.36	25.86	62.37	4.41	0
	5.61	21.05	59.83	13.5	0

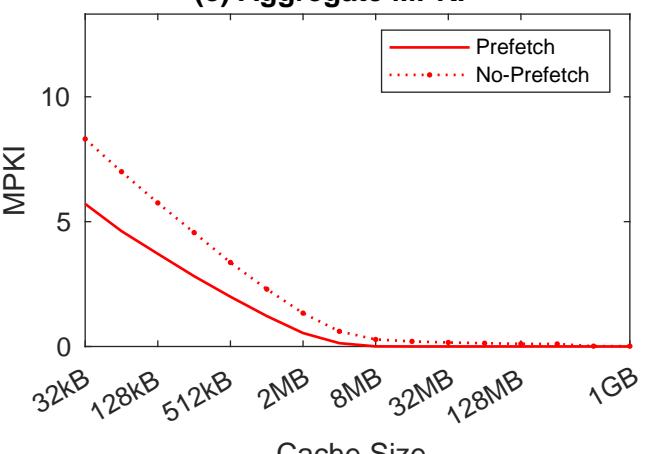
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	99.98	0	0	0	0.02
128MB	99.98	0	0	0	0.02
32MB	99.85	0	0.06	0	0.09
8MB	99.85	0	0.02	0.04	0.09
2MB	99.85	0	0.02	0.04	0.09
512KB	99.83	0.02	0.02	0.04	0.09
128KB	99.51	0.34	0.02	0.04	0.09
32KB	81.85	18	0.02	0.02	0.11
	42.94	52.79	4.14	0.02	0.11
	17.55	56.85	25.46	0	0.13
	5.22	44.11	50.3	0.24	0.13
	1.81	29.6	65.93	2.52	0.13
	1	20.73	69.34	8.79	0.13
	0.87	15.95	60.96	22.07	0.15
	0.72	11.73	52.34	34.5	0.72

(d) Effects of Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	0.02	0	0	0	-0.02
128MB	0.11	0.04	-0.06	0	-0.09
32MB	0.11	0.04	-0.02	-0.04	-0.09
8MB	0.15	0	-0.02	-0.04	-0.09
2MB	0.15	0	-0.02	-0.04	-0.09
	0.17	-0.02	-0.02	-0.04	-0.09
	0.49	-0.34	-0.02	-0.04	-0.09
	17.68	-17.53	-0.02	-0.02	-0.11
	40.43	-36.16	-4.14	-0.02	-0.11
	31.94	-12.91	-18.89	0	-0.13
	24.08	3.65	-27.36	-0.24	-0.13
	16.27	10.81	-24.48	-2.46	-0.13
	9.7	11.51	-13.28	-7.79	-0.13
	6.49	9.91	1.41	-17.66	-0.15
	4.89	9.32	7.49	-21	-0.72

(e) Aggregate MPKI



(f) Execution with Prefetching

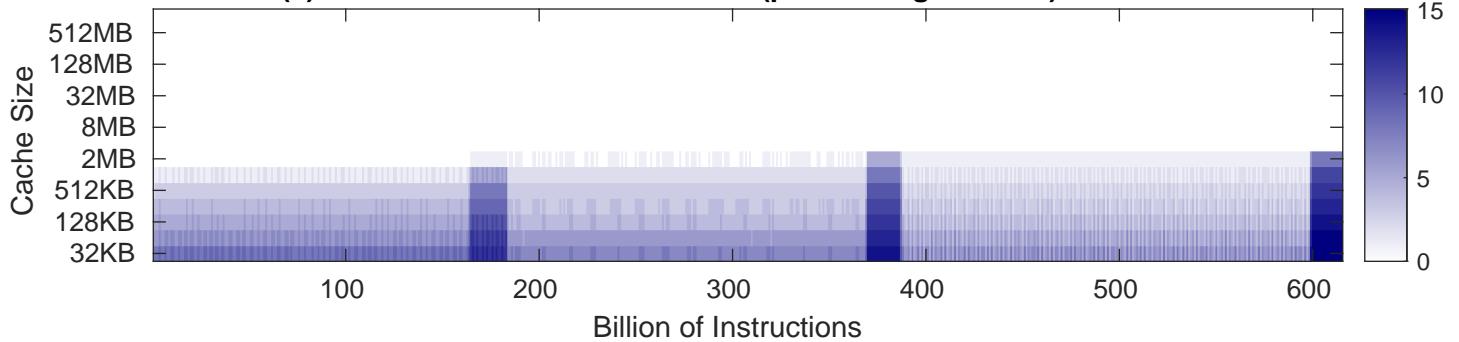
	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	73.82	26.18	0	0	0
8MB	69.57	30.43	0	0	0
2MB	100	0	0	0	0
	100	0	0	0	0
	100	0	0	0	0
	96.37	3.63	0	0	0
	55.42	44.58	0	0	0
	17.49	63.09	19.42	0	0
	7.01	46.02	46.97	0	0
	3.53	28.76	67.5	0.21	0
	1.64	17.5	77.97	2.89	0
	0.87	11.29	77.03	10.8	0
	0.53	7.65	63.66	28.15	0

(g) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	25.19	0	0	0	74.81
128MB	25.23	0	0	0	74.77
32MB	61.22	0	4.56	0	34.22
8MB	62.56	0	1.03	5.23	31.19
2MB	65.14	0	0.95	4.86	29.04
	69.53	0	0.87	4.22	25.38
	74.77	0.1	0.72	3.49	20.92
	80.08	1.47	0.53	2.57	15.35
	52.33	39.05	0.25	0.59	7.79
	18.75	66.45	10.97	0.28	3.55
	4.88	47.85	45.02	0	2.24
	1.05	26.38	70.26	0.77	1.54
	0.27	13.27	79.24	6.06	1.15
	0.12	7.87	73.34	17.74	0.93
	0.09	5.22	55.05	38.82	0.83
	0.07	3.28	39.01	55.5	2.14

Memory Behavior Analysis: SPEC 2006 - bzip2 i.p. 5 - 615B instructions

(a) MPKI over time and cache size (prefetching enabled)



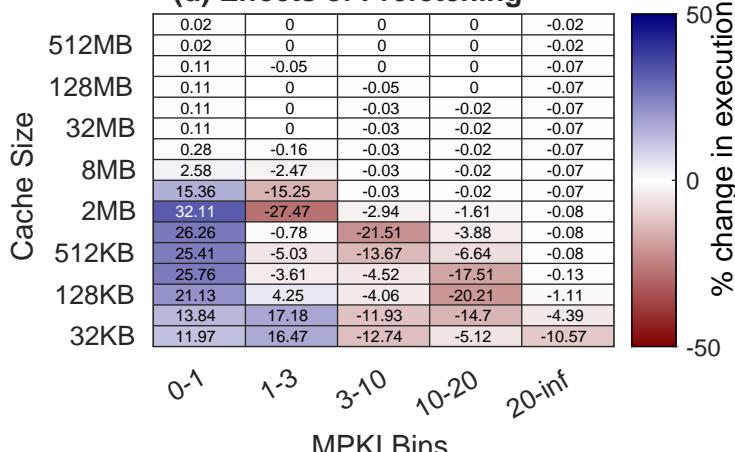
(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	100	0	0	0	0
2MB	79.63	14.73	5.64	0	0
512KB	36.94	42.87	18.4	1.79	0
128KB	29.05	23.26	43.57	4.11	0
32KB	25.78	16.73	51.19	6.29	0
0-1	21.13	16.49	48.4	13.98	0
1-3	13.84	20.97	37.57	27.62	0
3-10	11.97	16.47	29.77	41.8	0
10-20					
20-inf					

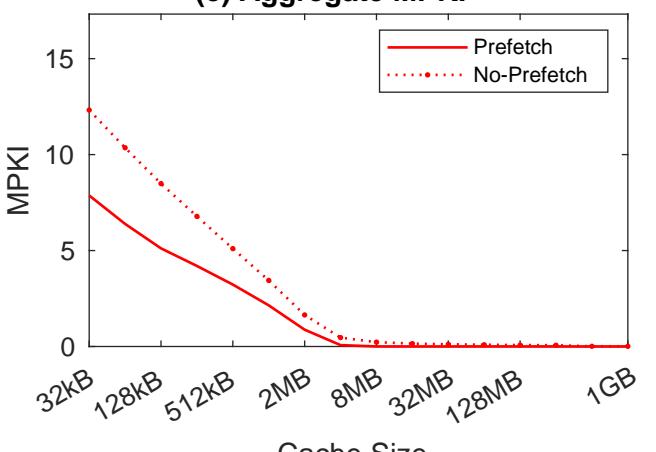
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
99.98	0	0	0	0.02	
99.98	0	0	0	0.02	
99.89	0.05	0	0	0.07	
99.89	0	0.05	0	0.07	
99.89	0	0.03	0.02	0.07	
99.72	0.16	0.03	0.02	0.07	
97.42	2.47	0.03	0.02	0.07	
84.64	15.25	0.03	0.02	0.07	
47.52	42.2	8.58	1.61	0.08	
10.68	43.65	39.91	5.67	0.08	
3.64	28.29	57.24	10.75	0.08	
0.02	20.34	55.71	23.8	0.13	
0	12.24	52.46	34.19	1.11	
0	3.79	49.5	42.32	4.39	
0	0	42.51	46.92	10.57	

(d) Effects of Prefetching



(e) Aggregate MPKI



(f) Execution with Prefetching

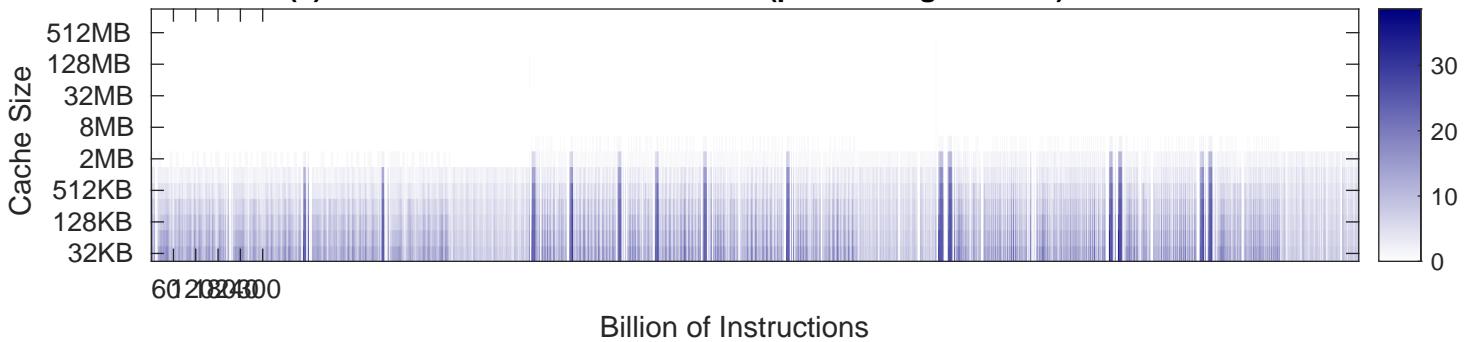
	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	100	0	0	0	0
2MB	32.18	25.11	42.71	0	0
512KB	7.56	40.52	42.26	9.67	0
128KB	4.01	14.97	66.22	14.81	0
32KB	3.13	7.9	71.09	17.88	0
0-1	2.15	5.53	59.98	32.34	0
1-3	0.96	5.56	40.09	53.4	0
3-10	0.73	4.44	23.82	71.02	0
10-20					
20-inf					

(g) Execution without Prefetching

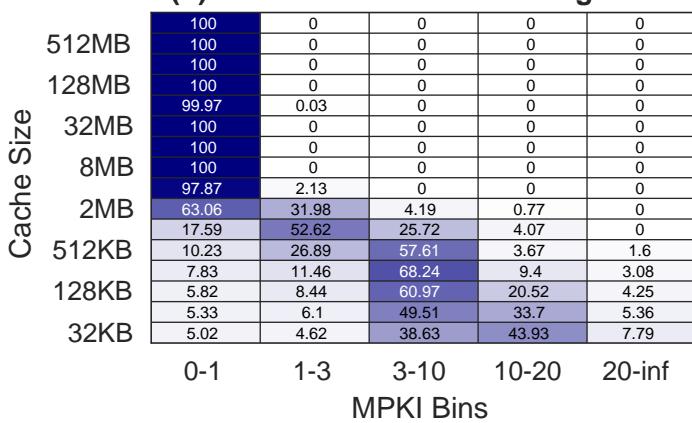
	0-1	1-3	3-10	10-20	20-inf	
9.76	0	0	0	0	0	90.24
9.62	0	0	0	0	0	90.38
56.92	0.88	0	0	0	0	42.2
60.47	0	2.01	0	0	0	37.52
61.97	0	2.03	0	0	0	36.01
66.63	0	1.82	0	0	0	31.55
71.86	1.25	1.48	0	0	0	25.42
68.7	13.14	1.01	0	0	0	17.15
45.04	46.01	0.5	0	0	0	8.45
13.86	44.55	28.42	10.69	2.48		
2.45	24.9	51.74	19.7	1.21		
0.62	11.05	61.35	26.15	0.83		
0	6.06	47.47	45.68	0.78		
0	3.37	37.56	56.02	3.04		
0	1	30.12	59.33	9.54		
0	0	23.13	57.38	19.49		

Memory Behavior Analysis: SPEC 2006 - bzip2 i.p. 6 - 324B instructions

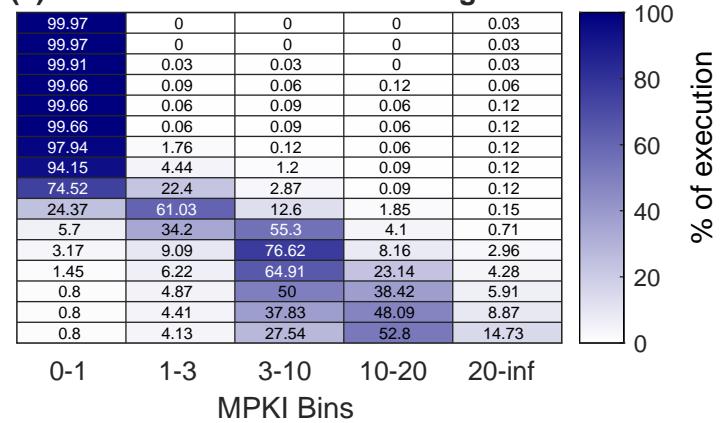
(a) MPKI over time and cache size (prefetching enabled)



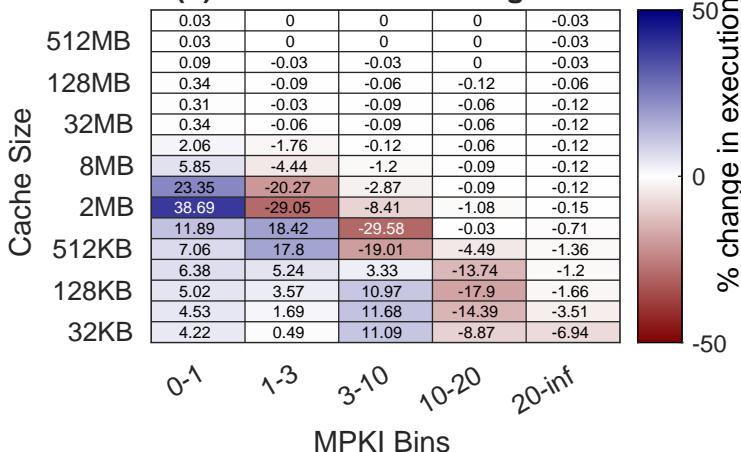
(b) Execution with Prefetching



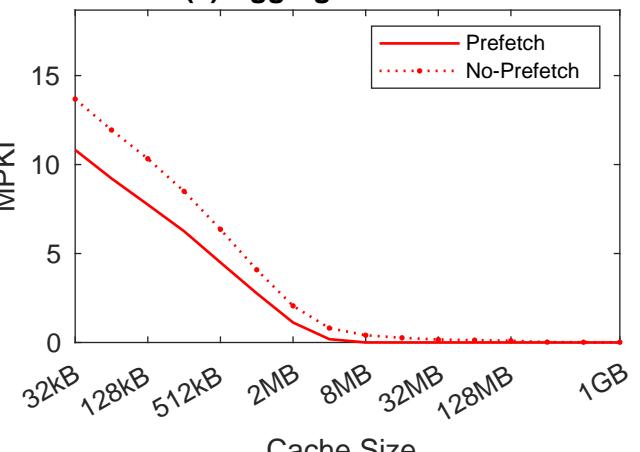
(c) Execution without Prefetching



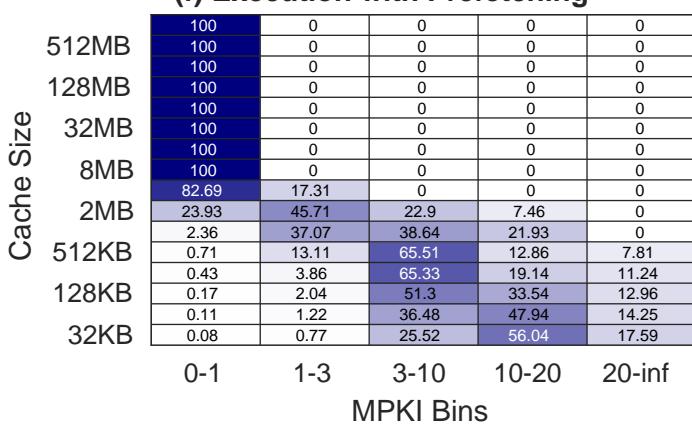
(d) Effects of Prefetching



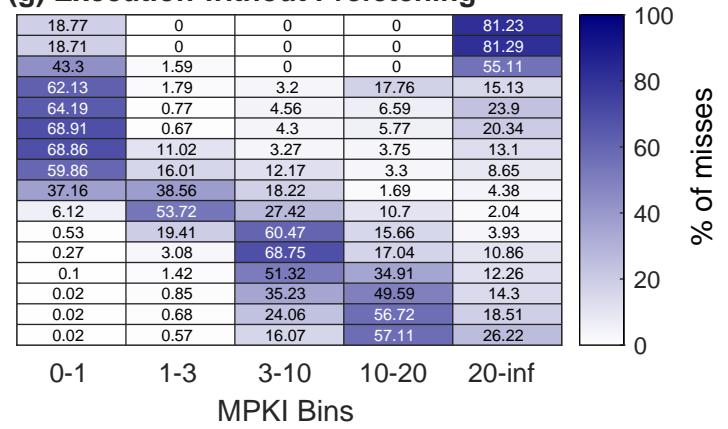
(e) Aggregate MPKI



(f) Execution with Prefetching

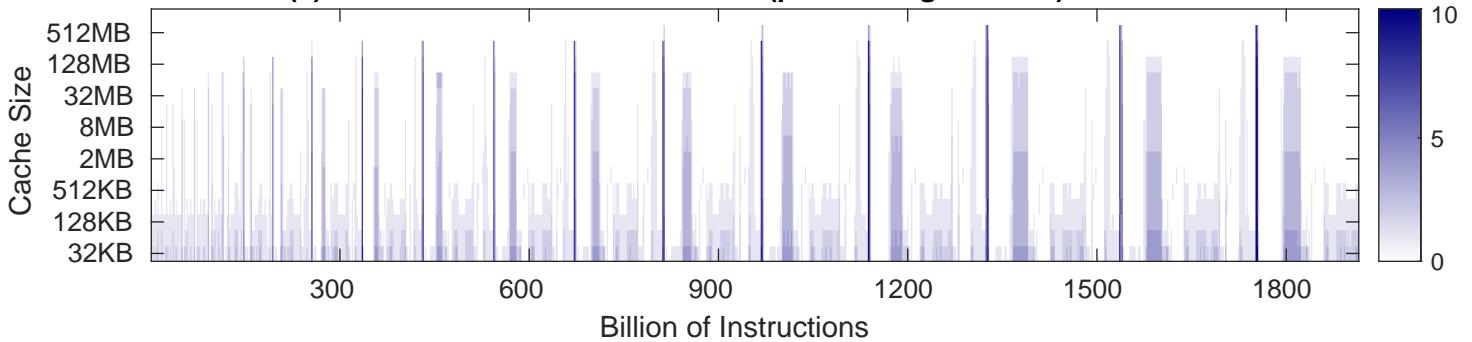


(g) Execution without Prefetching



Memory Behavior Analysis: SPEC 2006 - dealII - 1915B instructions

(a) MPKI over time and cache size (prefetching enabled)



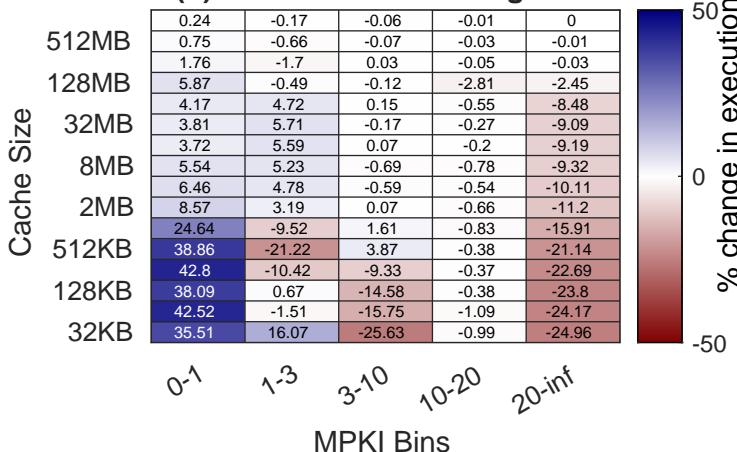
(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
	99.39	0.08	0.43	0.02	0.07
	98.96	0.07	0.65	0.15	0.17
128MB	94.72	4.17	0.69	0.22	0.2
	90.69	7.78	1.06	0.25	0.22
32MB	89.66	9.03	0.81	0.27	0.22
	89.1	9.28	1.09	0.3	0.23
8MB	88.57	9.67	1.21	0.31	0.23
	88.01	9.95	1.48	0.33	0.23
2MB	87.31	10.1	2.01	0.34	0.23
	86.82	9.02	3.56	0.35	0.23
512KB	86.11	7.71	5.58	0.36	0.23
	78.17	14.03	7.21	0.35	0.23
128KB	67.17	23.9	8.32	0.37	0.24
	64.25	25.89	9.25	0.37	0.24
32KB	46.36	40.2	12.83	0.37	0.24

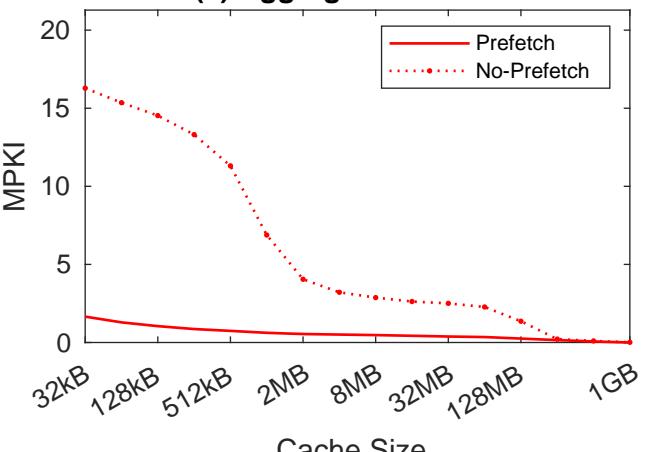
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
	99.76	0.17	0.06	0.01	0
	98.64	0.74	0.5	0.05	0.08
	97.2	1.77	0.62	0.2	0.2
	88.85	4.66	0.81	3.03	2.65
	86.52	3.06	0.91	0.8	8.7
	85.85	3.32	0.98	0.54	9.31
	85.38	3.69	1.02	0.5	9.42
	83.03	4.44	1.9	1.09	9.55
	81.55	5.17	2.07	0.87	10.34
	78.74	6.91	1.94	1	11.43
	62.18	18.54	1.95	1.18	16.14
	47.25	28.93	1.71	0.74	21.37
	35.37	24.45	16.54	0.72	22.92
	29.08	23.23	22.9	0.75	24.04
	21.73	27.4	25	1.46	24.41
	10.85	24.13	38.46	1.36	25.2

(d) Effects of Prefetching



(e) Aggregate MPKI



(f) Execution with Prefetching

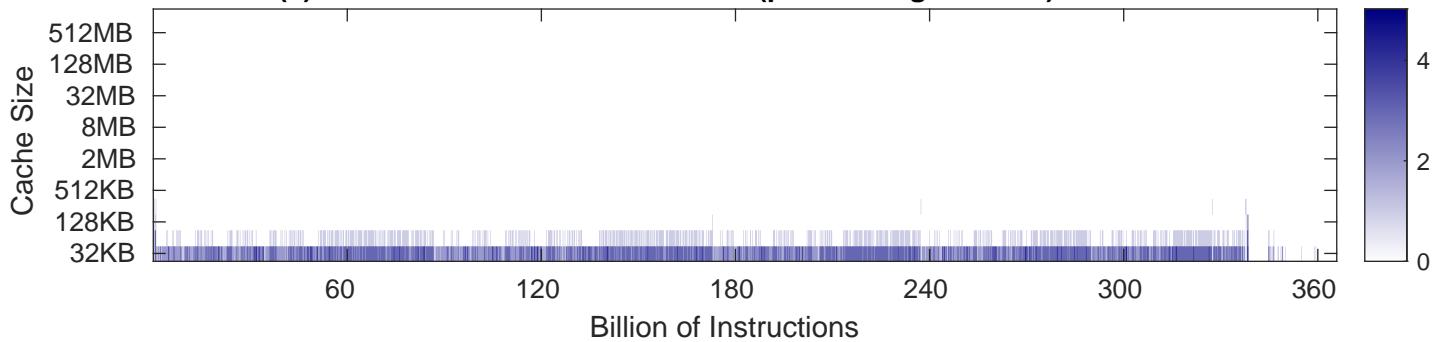
	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
	18.06	2.05	39.08	5.18	35.62
	24.62	0.84	25.47	13.45	35.62
128MB	21.15	23.6	16.98	13.01	25.27
	17.69	35.52	16.24	10.69	19.87
32MB	17.26	40.14	13.19	10.87	18.55
	16.97	41.37	14.25	10.58	16.82
8MB	17.32	43.11	14.14	9.87	15.56
	17.06	43.7	15.08	9.62	14.55
2MB	16.53	42.97	17.53	9.29	13.67
	22.82	33.51	23.29	8.42	11.96
512KB	31.71	22.68	28.49	7.13	9.99
	29.14	24.51	31.61	6.13	8.62
128KB	22.85	34.36	30.34	5.19	7.27
	24.53	36.79	28.37	4.36	5.95
32KB	14.17	45.19	32.48	3.49	4.66

(g) Execution without Prefetching

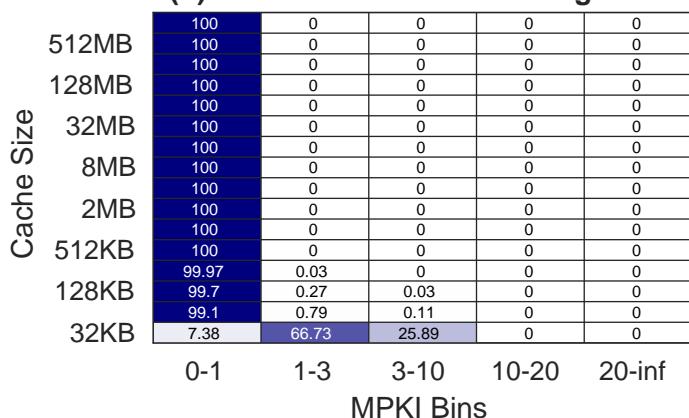
	0-1	1-3	3-10	10-20	20-inf
	37.03	21.51	31.31	10.15	0
	20.61	11	32.89	7.39	28.11
	22.68	13.51	18.81	13.47	31.53
	4.59	7.08	3.82	39.05	45.45
	3.06	2.4	2.53	4.93	87.07
	3.05	2.48	2.54	3.32	88.62
	3.18	2.67	2.57	3.09	88.48
	3.29	3.02	4.19	5.19	84.3
	3.34	3.01	4.1	4.02	85.54
	3.07	2.99	2.83	3.8	87.3
	1.97	3.85	1.76	2.63	89.79
	1.46	4.15	0.89	1.01	92.49
	0.86	3.79	4.7	0.84	89.81
	0.92	3.41	6.72	0.8	88.16
	0.91	3.56	7.92	1.44	86.17
	0.58	2.44	11.16	1.12	84.7

Memory Behavior Analysis: SPEC 2006 - gamess i.p. 1 - 365B instructions

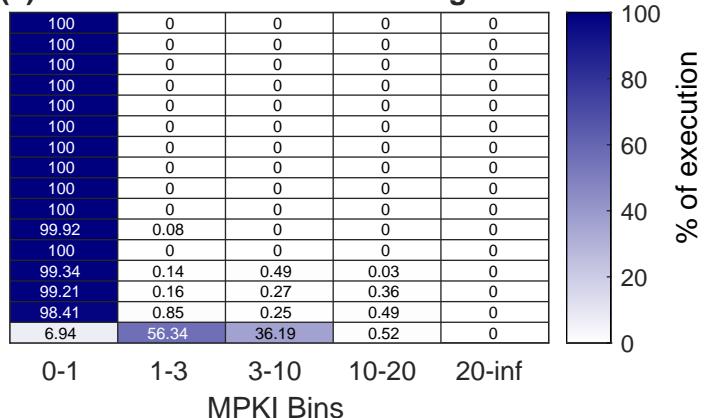
(a) MPKI over time and cache size (prefetching enabled)



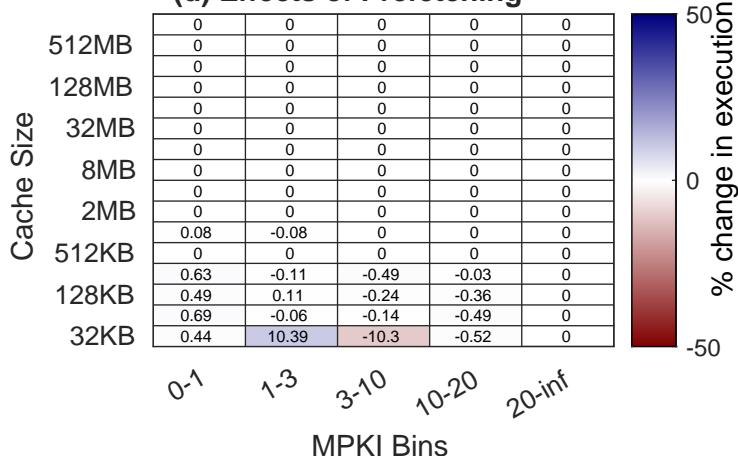
(b) Execution with Prefetching



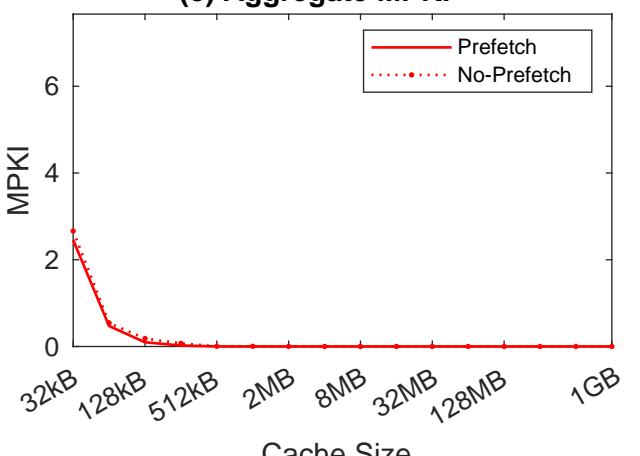
(c) Execution without Prefetching



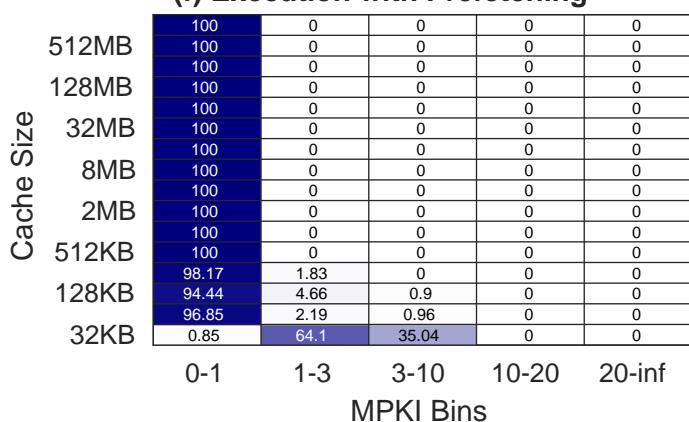
(d) Effects of Prefetching



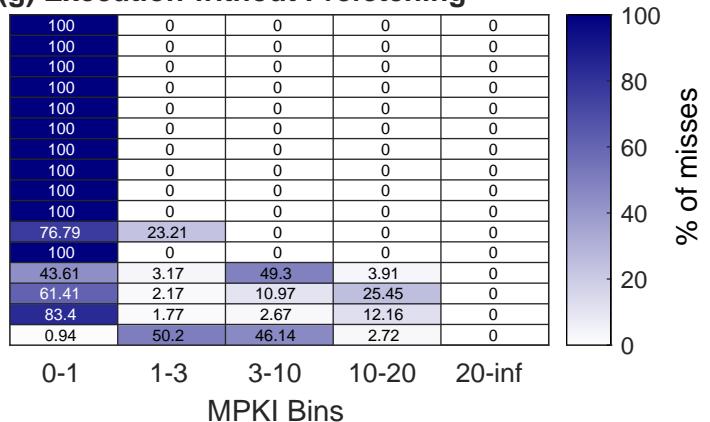
(e) Aggregate MPKI



(f) Execution with Prefetching

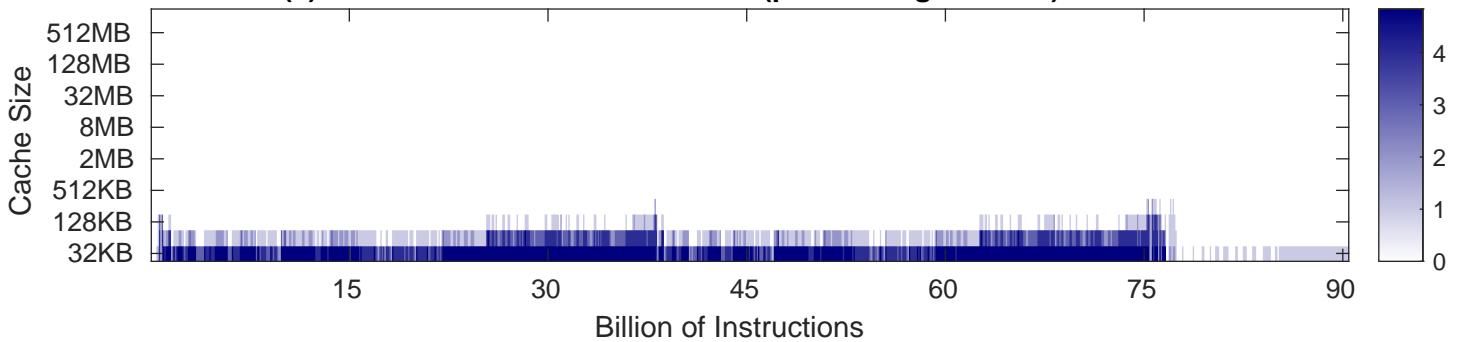


(g) Execution without Prefetching

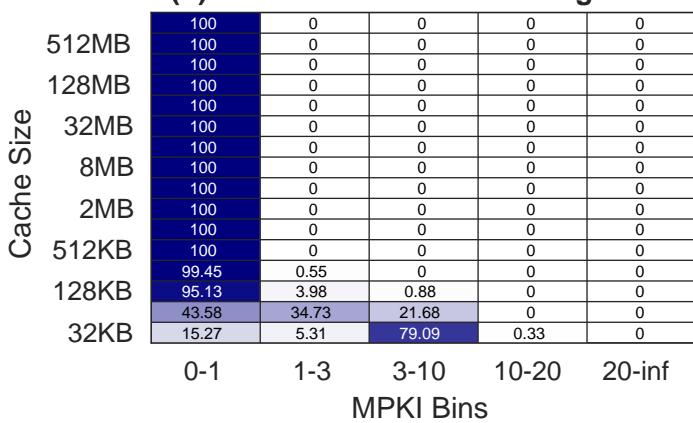


Memory Behavior Analysis: SPEC 2006 - gamess i.p. 2 - 90B instructions

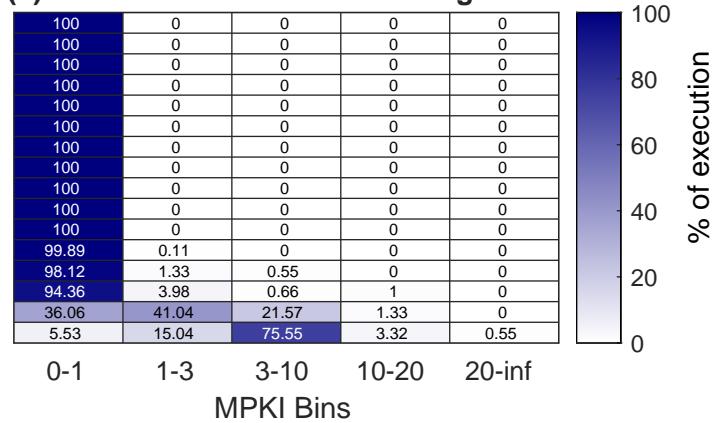
(a) MPKI over time and cache size (prefetching enabled)



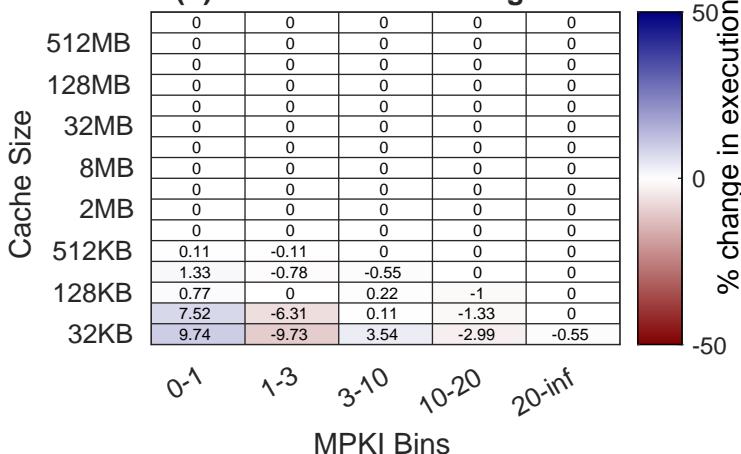
(b) Execution with Prefetching



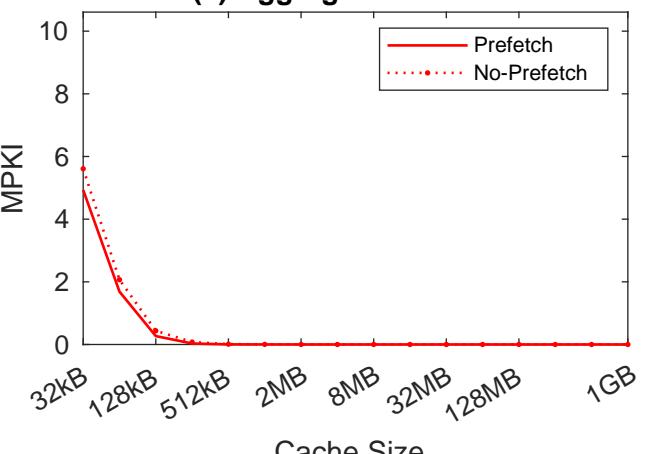
(c) Execution without Prefetching



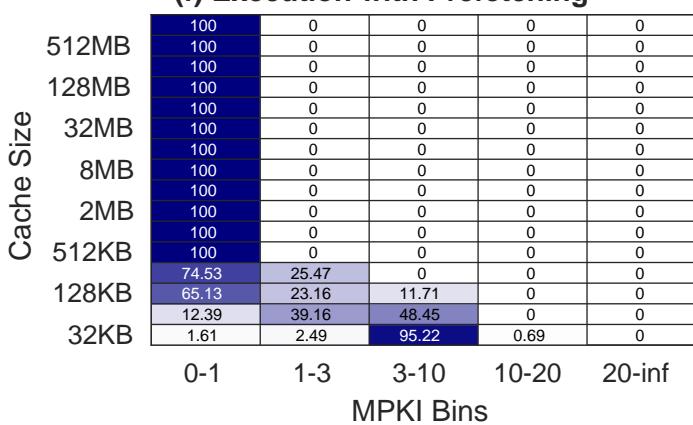
(d) Effects of Prefetching



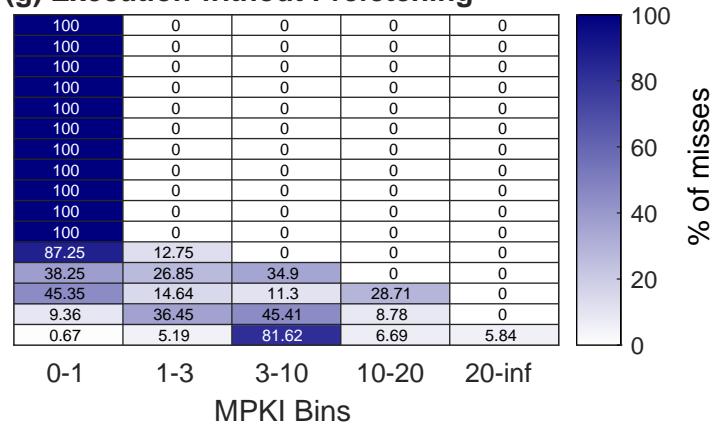
(e) Aggregate MPKI



(f) Execution with Prefetching

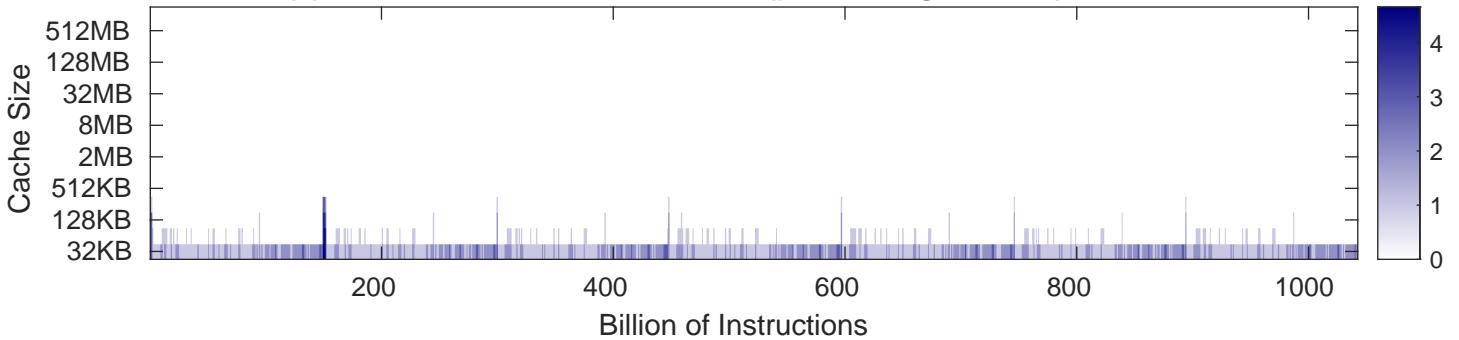


(g) Execution without Prefetching



Memory Behavior Analysis: SPEC 2006 - gamess i.p. 3 - 1042B instructions

(a) MPKI over time and cache size (prefetching enabled)



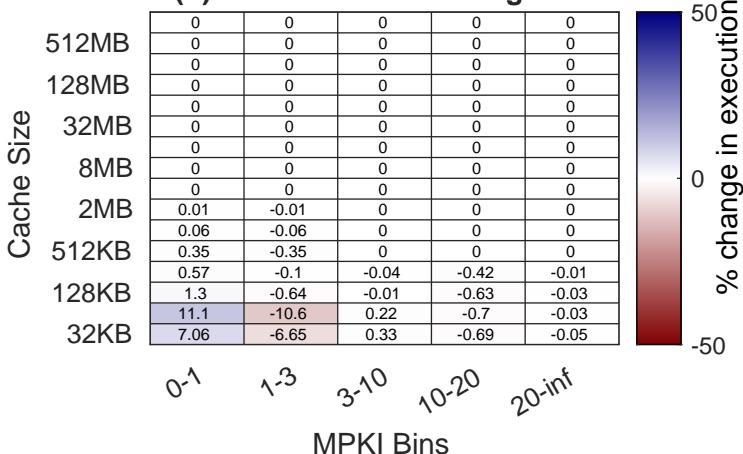
(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	100	0	0	0	0
2MB	100	0	0	0	0
512KB	100	0	0	0	0
128KB	99.57	0.18	0.25	0	0
32KB	99.24	0.37	0.38	0	0
	99.06	0.39	0.55	0	0
	9.62	87.31	3.07	0	0

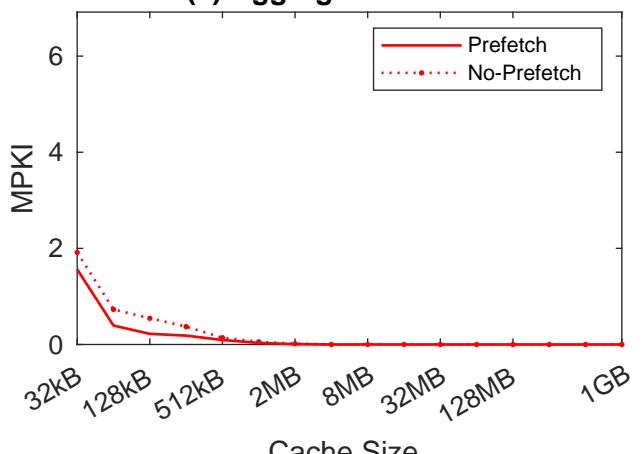
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
100	0	0	0	0	0
100	0	0	0	0	0
100	0	0	0	0	0
100	0	0	0	0	0
100	0	0	0	0	0
100	0	0	0	0	0
100	0	0	0	0	0
100	0	0	0	0	0
99.99	0.01	0	0	0	0
99.94	0.06	0	0	0	0
99.65	0.35	0	0	0	0
99	0.28	0.29	0.42	0.01	0
97.94	1.01	0.39	0.63	0.03	0
87.96	10.99	0.33	0.7	0.03	0
2.56	93.96	2.74	0.69	0.05	0

(d) Effects of Prefetching



(e) Aggregate MPKI



(f) Execution with Prefetching

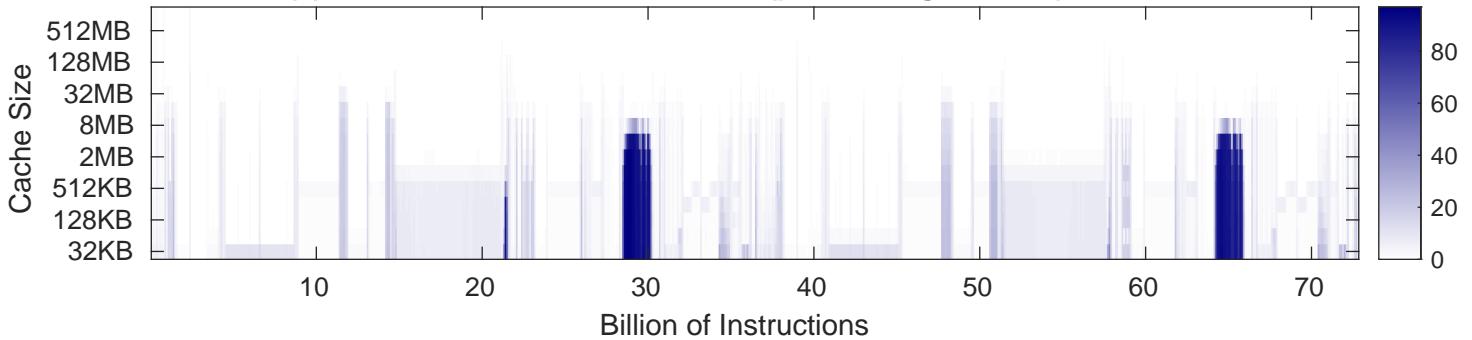
	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	100	0	0	0	0
2MB	100	0	0	0	0
512KB	100	0	0	0	0
128KB	92.47	2.02	5.52	0	0
32KB	88.15	3.83	8.02	0	0
	91.74	1.72	6.54	0	0
	5.55	87.23	7.22	0	0

(g) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
100	0	0	0	0	0
100	0	0	0	0	0
100	0	0	0	0	0
100	0	0	0	0	0
100	0	0	0	0	0
100	0	0	0	0	0
100	0	0	0	0	0
100	0	0	0	0	0
98.93	1.07	0	0	0	0
96.34	3.66	0	0	0	0
79.5	1.39	5.15	13.96	0	0
76.34	2.13	4.24	16.54	0.75	0
65.76	16.86	2.96	13.85	0.57	0
1.2	87.68	5.4	5.3	0.42	0

Memory Behavior Analysis: SPEC 2006 - gcc i.p. 1 - 72B instructions

(a) MPKI over time and cache size (prefetching enabled)



(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	99.86	0.14	0	0	0
128MB	99.86	0.14	0	0	0
32MB	99.86	0.14	0	0	0
8MB	98.18	0.82	0	0	0
2MB	90.93	7.01	2.06	0	0
512KB	77.34	12.77	8.79	1.1	0
128KB	68.54	9.2	14.42	5.77	2.06
32KB	66.21	9.2	14.84	5.22	4.53
0-1	64.7	8.79	15.11	6.59	4.81
1-3	48.08	7.28	32.42	5.63	6.59
3-10	27.47	21.43	37.23	6.59	7.28
10-20	37.09	13.74	34.34	7.28	7.55
20-inf	34.89	17.58	32.01	7.97	7.55
0-1	28.71	22.94	31.73	8.1	8.52
1-3	14.29	23.21	32.83	19.23	10.44

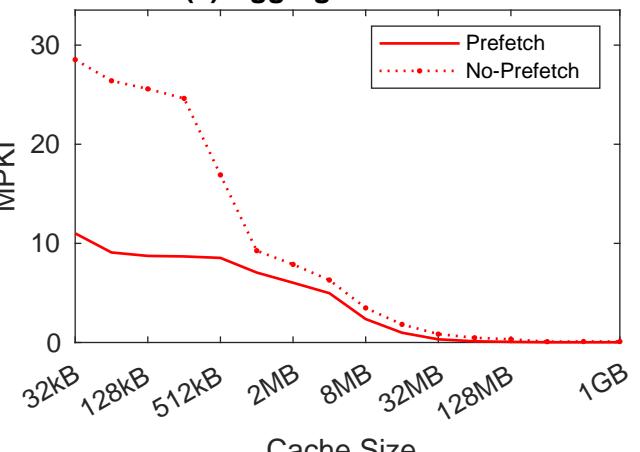
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	97.39	2.2	0.41	0	0
128MB	97.53	2.06	0.41	0	0
32MB	98.21	1.37	0.41	0	0
8MB	92.58	5.77	1.24	0.41	0
2MB	89.01	7.83	2.06	0.82	0.27
512KB	81.87	10.58	6.32	0.96	0.27
128KB	70.05	13.32	12.23	3.02	1.37
32KB	64.15	10.44	14.7	5.22	5.49
0-1	61.68	9.89	14.84	5.49	8.1
1-3	60.03	9.89	13.87	5.77	10.44
3-10	41.9	10.71	30.22	5.91	11.26
10-20	23.9	8.65	33.1	6.04	28.3
20-inf	21.29	7.69	26.92	9.89	34.2
0-1	20.88	7.28	26.79	7.69	37.36
1-3	14.15	13.46	26.65	6.59	39.15
3-10	0.55	9.2	33.93	15.11	41.21

(d) Effects of Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	2.47	-2.06	-0.41	0	0
128MB	2.33	-1.92	-0.41	0	0
32MB	1.65	-1.23	-0.41	0	0
8MB	6.6	-4.95	-1.24	-0.41	0
2MB	9.2	-6.73	-1.37	-0.82	-0.27
512KB	9.06	-3.57	-4.26	-0.96	-0.27
128KB	7.29	-0.55	-3.44	-1.92	-1.37
32KB	4.39	-1.24	-0.28	0.55	-3.43
0-1	4.53	-0.69	0	-0.27	-3.57
1-3	4.67	-1.1	1.24	0.82	-5.63
3-10	6.18	-3.43	2.2	-0.28	-4.67
10-20	3.57	12.78	4.13	0.55	-21.02
20-inf	15.8	6.05	7.42	-2.61	-26.65
0-1	14.01	10.3	5.22	0.28	-29.81
1-3	14.56	9.48	5.08	1.51	-30.63
3-10	13.74	14.01	-1.1	4.12	-30.77

(e) Aggregate MPKI



(f) Execution with Prefetching

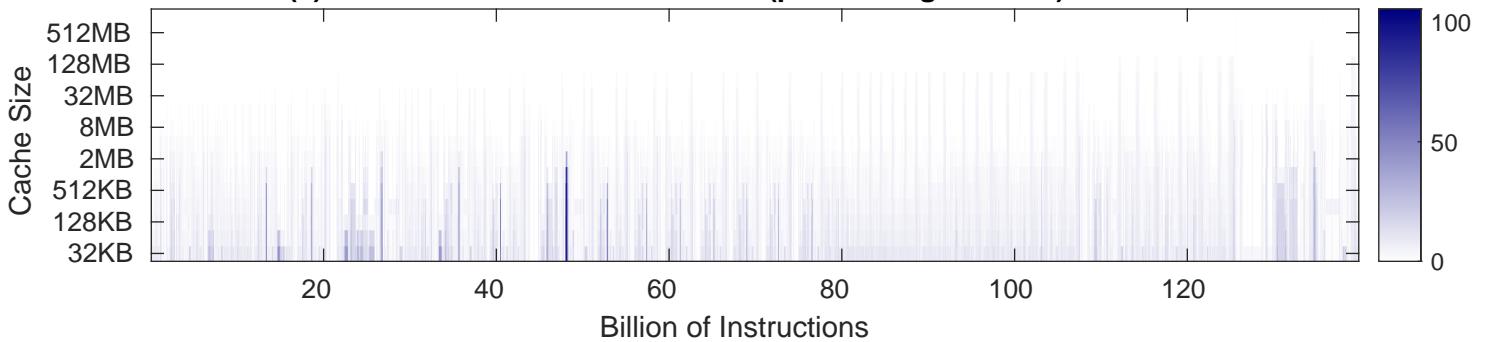
	0-1	1-3	3-10	10-20	20-inf
512MB	84.94	15.06	0	0	0
128MB	85.16	14.84	0	0	0
32MB	85.84	14.16	0	0	0
8MB	71.56	28.44	0	0	0
2MB	59.41	16.31	24.28	0	0
512KB	34.23	37.24	28.52	0	0
128KB	12.46	25.22	46.96	15.36	0
32KB	4.98	6.88	30.74	32.25	25.15
0-1	2.53	3.41	16.46	15.16	62.44
1-3	3.31	2.56	13.72	16.2	64.21
3-10	1.86	1.79	21	11.94	63.4
10-20	0.99	4.51	27.72	11.06	55.72
20-inf	2.22	2.55	26.2	12.28	56.75
0-1	2.07	3.05	24.72	13.45	56.71
1-3	1.96	3.94	23.71	13.22	57.17
3-10	1.1	3.33	20.83	22.42	52.33

(g) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	24.51	36.86	38.63	0	0
128MB	25.51	35.29	39.2	0	0
32MB	32.54	31.32	36.14	0	0
8MB	26.19	34.3	21.59	17.92	0
2MB	18.73	27.81	19.11	22.32	12.04
512KB	14.06	23.89	38.42	16.08	7.54
128KB	6.83	13.9	33.92	27.38	17.98
32KB	3.88	5.87	24.4	20.39	45.46
0-1	2.23	3.16	13.93	12.34	68.33
1-3	2.9	2.41	10.4	10.19	74.1
3-10	1.53	2.25	15.93	8.62	71.67
10-20	0.54	1.03	14.16	4.93	79.35
20-inf	0.35	0.62	8.07	5.4	85.57
0-1	0.35	0.55	7.71	4.18	87.21
1-3	0.3	0.91	7.63	3.56	87.6
3-10	0.02	0.61	8.95	6.55	83.87

Memory Behavior Analysis: SPEC 2006 - gcc i.p. 2 - 139B instructions

(a) MPKI over time and cache size (prefetching enabled)



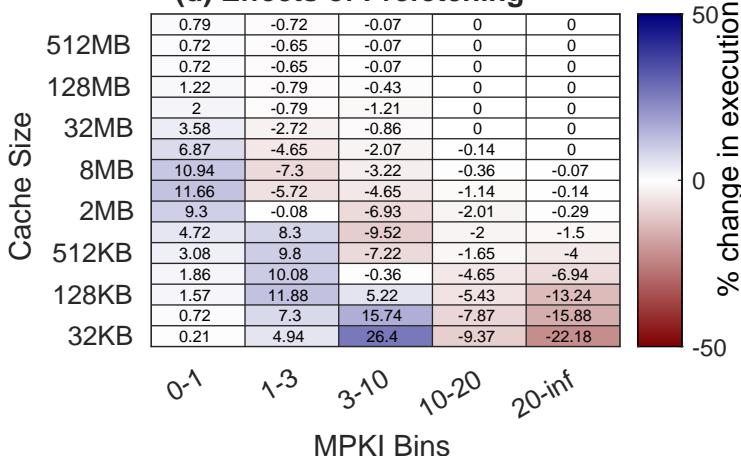
(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	99.93	0.07	0	0	0
128MB	99.93	0.07	0	0	0
32MB	99.93	0.07	0	0	0
8MB	97.07	2.43	0.5	0	0
2MB	90.7	4.72	4.58	0	0
512KB	87.63	4.58	7.8	0	0
128KB	83.62	7.22	9.16	0	0
32KB	74.39	12.73	12.8	0.07	0
	57.65	22.32	19.6	0.43	0
512MB	32.76	36.19	29.69	1.14	0.21
128MB	20.53	35.84	40.34	2.79	0.5
32MB	15.38	29.04	48.57	5.72	1.29
8MB	10.01	21.24	58.15	8.8	1.79
2MB	7.94	20.46	59.01	10.59	2
512KB	5.15	14.52	62.09	14.95	3.29
128KB	3	8.73	57.37	25.68	5.22

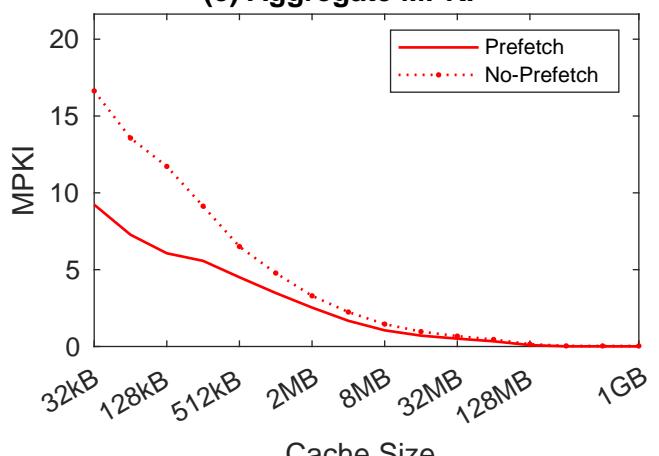
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	99.14	0.79	0.07	0	0
128MB	99.21	0.72	0.07	0	0
32MB	99.21	0.72	0.07	0	0
8MB	95.85	3.22	0.93	0	0
2MB	88.7	5.51	5.79	0	0
512KB	84.05	7.3	8.66	0	0
128KB	76.75	11.87	11.23	0.14	0
32KB	63.45	20.03	16.02	0.43	0.07
	45.99	28.04	24.25	1.57	0.14
512MB	23.46	36.27	36.62	3.15	0.5
128MB	15.81	27.54	49.86	4.79	2
32MB	12.3	19.24	55.79	7.37	5.29
8MB	8.15	11.16	58.51	13.45	8.73
2MB	6.37	8.58	53.79	16.02	15.24
512KB	4.43	7.22	46.35	22.82	19.17
128KB	2.79	3.79	30.97	35.05	27.4

(d) Effects of Prefetching



(e) Aggregate MPKI



(f) Execution with Prefetching

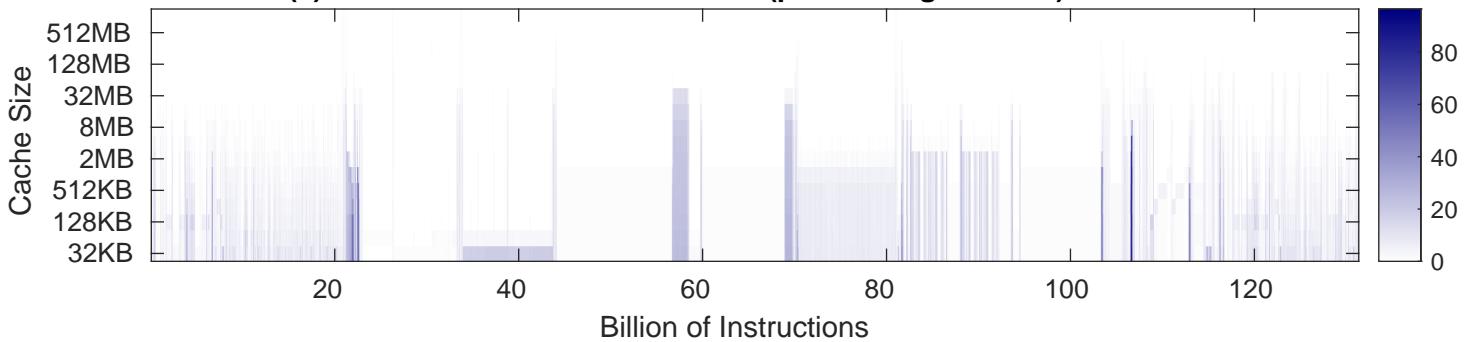
	0-1	1-3	3-10	10-20	20-inf
512MB	89.56	10.44	0	0	0
128MB	90.31	9.69	0	0	0
32MB	91.91	8.09	0	0	0
8MB	27.19	52.48	20.33	0	0
2MB	21.26	28.67	50.08	0	0
512KB	20.08	16.65	63.27	0	0
128KB	21.28	19.49	59.23	0	0
32KB	19.46	21.43	58.22	0.89	0
	14.03	24.02	58.99	2.97	0
512MB	5.87	25.48	60.61	5.49	2.54
128MB	2.41	20	61.27	10.05	6.28
32MB	1.34	13.1	58.58	16.05	10.93
8MB	0.76	8.23	57.44	21.17	12.39
2MB	0.63	6.86	56.59	23.25	12.67
512KB	0.31	3.98	52.65	27.87	15.19
128KB	0.15	1.82	43.09	36.38	18.56

(g) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	63.28	30.31	6.42	0	0
128MB	65.29	28.32	6.39	0	0
32MB	67.86	26.07	6.07	0	0
8MB	39.24	39.48	21.28	0	0
2MB	28.37	22.53	49.1	0	0
512KB	25.26	18.87	55.87	0	0
128KB	22	21.15	54.85	2	0
32KB	15.87	23.26	55.79	3.74	1.34
	10.08	22.38	57.2	8.89	1.45
512MB	3.23	20.57	59.99	12.42	3.78
128MB	1.32	11.74	58.3	13.97	14.67
32MB	0.69	6.37	48.86	15.97	28.1
8MB	0.37	2.63	38.07	20.59	38.34
2MB	0.28	1.58	28.75	19.61	49.78
512KB	0.15	1.1	23.2	24.04	51.51
128KB	0.09	0.52	13.53	29.32	56.54

Memory Behavior Analysis: SPEC 2006 - gcc i.p. 3 - 131B instructions

(a) MPKI over time and cache size (prefetching enabled)



(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	99.92	0.08	0	0	0
128MB	99.92	0.08	0	0	0
32MB	99.54	0.46	0	0	0
8MB	98.93	0.69	0.38	0	0
2MB	96.73	2.36	0.91	0	0
512KB	91.24	4.49	3.05	1.22	0
128KB	86.98	4.95	6.02	2.06	0
32KB	82.1	7.77	7.16	2.06	0.91
	75.93	11.2	9.06	1.83	1.98
512MB	59.94	18.35	14.32	5.1	2.28
128MB	31.3	34.35	25.89	5.48	2.97
32MB	50.19	10.66	29.63	5.94	3.58
8MB	49.66	8.76	31.15	6.7	3.73
2MB	47.22	7.84	32.67	8.23	4.04
512KB	37.85	16.68	32.6	8.68	4.19
128KB	34.12	12.03	30.16	18.51	5.18

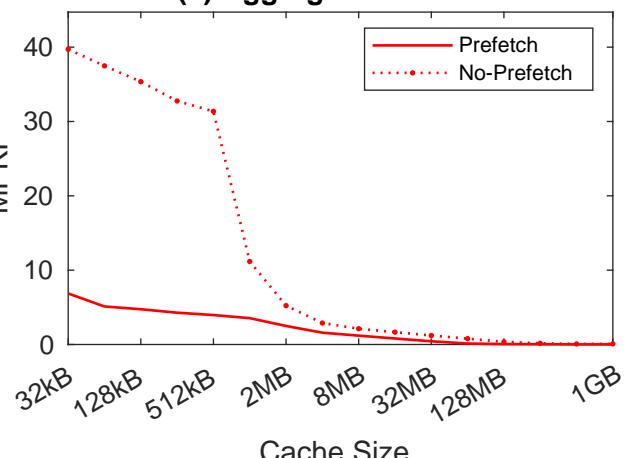
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	98.86	0.84	0.08	0.08	0.15
128MB	98.93	0.76	0.15	0.08	0.08
32MB	96.65	2.36	0.69	0.15	0.15
8MB	90.33	6.85	2.36	0.23	0.23
2MB	87.36	7.16	2.89	1.75	0.84
512KB	84.69	7.84	4.49	0.53	2.44
128KB	80.05	9.44	6.55	1.45	2.51
32KB	74.26	12.72	7.39	2.89	2.74
	64.66	13.79	14.09	4.57	2.89
512MB	47.68	20.49	19.65	5.64	6.55
128MB	26.05	11.5	26.35	24.22	11.88
32MB	18.81	8.76	27.57	5.33	39.53
8MB	15.99	6.78	28.03	7.16	42.04
2MB	9.82	11.2	25.06	6.09	47.83
512KB	3.2	7.84	28.1	10.97	49.89
128KB	0.15	5.41	20.94	20.41	53.08

(d) Effects of Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	1.06	-0.76	-0.08	-0.08	-0.15
128MB	0.99	-0.68	-0.15	-0.08	-0.08
32MB	2.89	-1.9	-0.69	-0.15	-0.15
8MB	8.6	-6.16	-1.98	-0.23	-0.23
2MB	9.37	-4.8	-1.98	-1.75	-0.84
512KB	6.55	-3.35	-1.44	0.69	-2.44
128KB	6.93	-4.49	-0.53	0.61	-2.51
32KB	7.84	-4.95	-0.23	-0.83	-1.83
	11.27	-2.59	-5.03	-2.74	-0.91
512MB	12.26	-2.14	-5.33	-0.54	-4.27
128MB	5.25	22.85	-0.46	-18.74	-8.91
32MB	31.38	1.9	2.06	0.61	-35.95
8MB	33.67	1.98	3.12	-0.46	-38.31
2MB	37.4	-3.36	7.61	2.14	-43.79
512KB	34.65	8.84	4.5	-2.29	-45.7
128KB	33.97	6.62	9.22	-1.9	-47.9

(e) Aggregate MPKI



(f) Execution with Prefetching

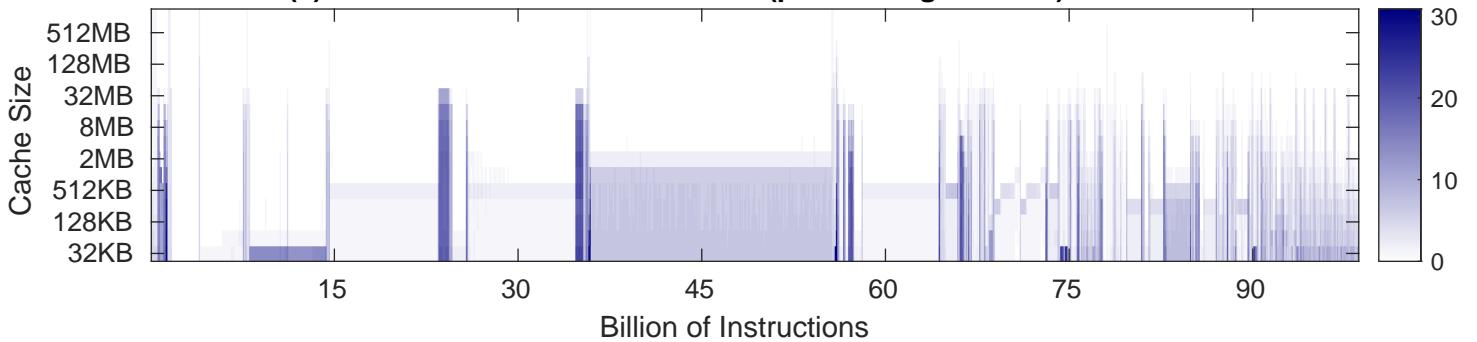
	0-1	1-3	3-10	10-20	20-inf
512MB	93.94	6.06	0	0	0
128MB	94.53	5.47	0	0	0
32MB	75.63	24.37	0	0	0
8MB	58.05	18.26	23.69	0	0
2MB	38.08	38.06	23.86	0	0
512KB	14.75	19.53	29.4	36.32	0
128KB	12.24	11.45	36.14	40.17	0
32KB	9.84	11.6	34.03	27.64	16.9
8MB	9.87	12.88	30.98	15.09	31.17
2MB	4.72	12.86	30.84	27.85	23.73
512KB	2.02	14.68	38.88	21.34	23.08
128KB	5.14	5.37	43.65	20.37	25.47
32KB	5.25	3.89	43.8	21.35	25.71
8MB	4.45	3.09	42.33	23.97	26.16
2MB	4.24	7.18	40.41	22.53	25.62
512KB	3	3.24	29.77	41.27	22.72

(g) Execution without Prefetching

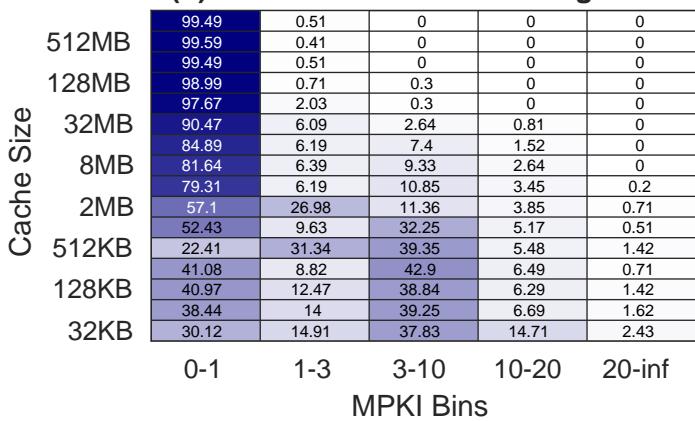
	0-1	1-3	3-10	10-20	20-inf
512MB	32.17	14.14	4.14	10.09	39.46
128MB	41.01	16.12	9.72	12.21	20.94
32MB	23.62	20.77	19.24	15.11	21.26
8MB	17.87	26.6	30.93	9.12	15.47
2MB	8.9	13.83	18.25	35.41	23.61
512KB	8.17	10.48	19.88	6.18	55.29
128KB	8.35	9.25	21.15	11.74	49.51
32KB	7.32	10.02	19.16	18.14	45.36
8MB	5.88	8.51	26.29	21.55	37.76
2MB	2.74	7.36	20.01	16.4	53.48
512KB	0.65	2.01	13.39	31.57	52.38
128KB	0.18	0.52	5.71	2.3	91.29
32KB	0.16	0.36	5.73	2.94	90.8
8MB	0.11	0.53	5.04	2.37	91.94
2MB	0.06	0.45	5.2	3.84	90.46
512KB	0	0.27	3.91	7.73	88.08

Memory Behavior Analysis: SPEC 2006 - gcc i.p. 4 - 98B instructions

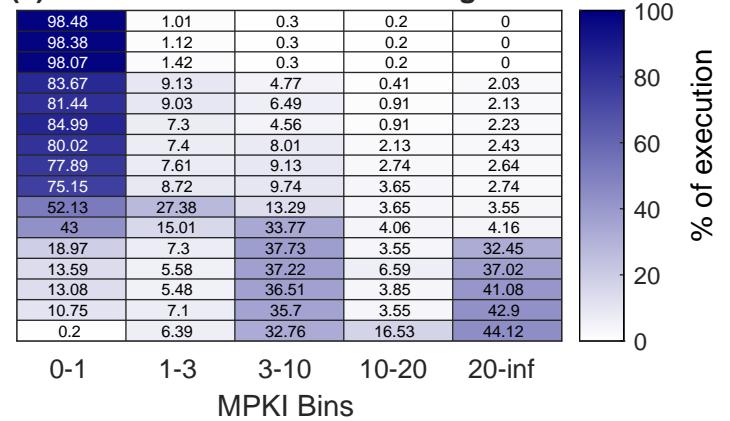
(a) MPKI over time and cache size (prefetching enabled)



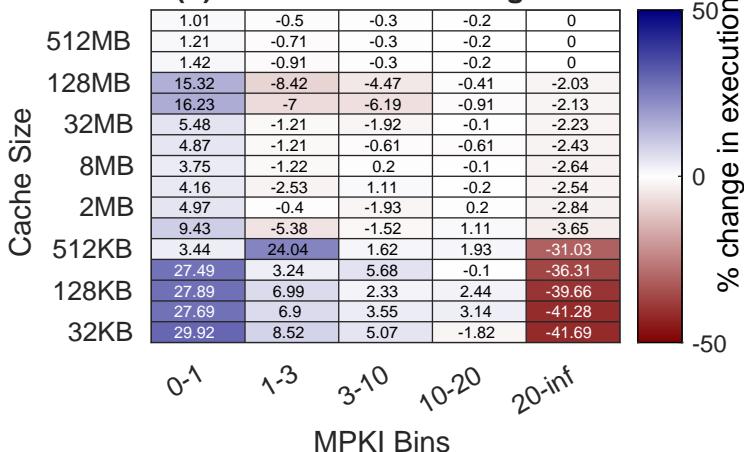
(b) Execution with Prefetching



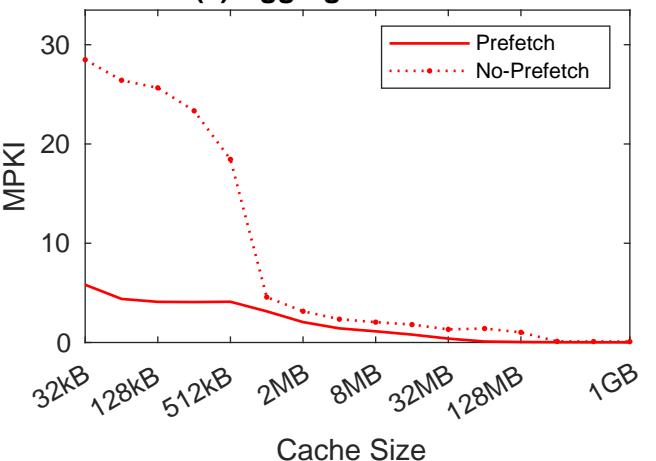
(c) Execution without Prefetching



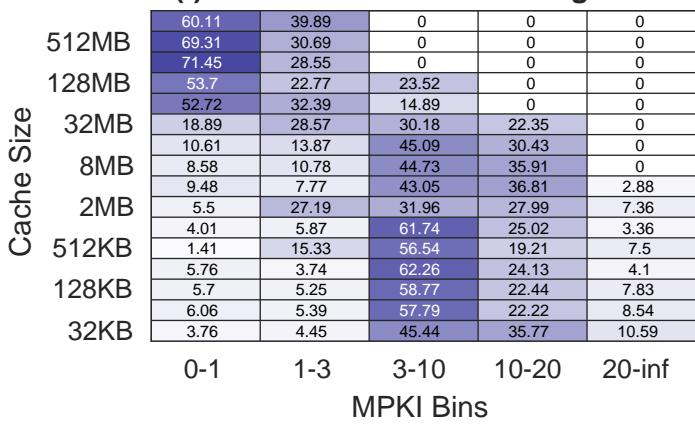
(d) Effects of Prefetching



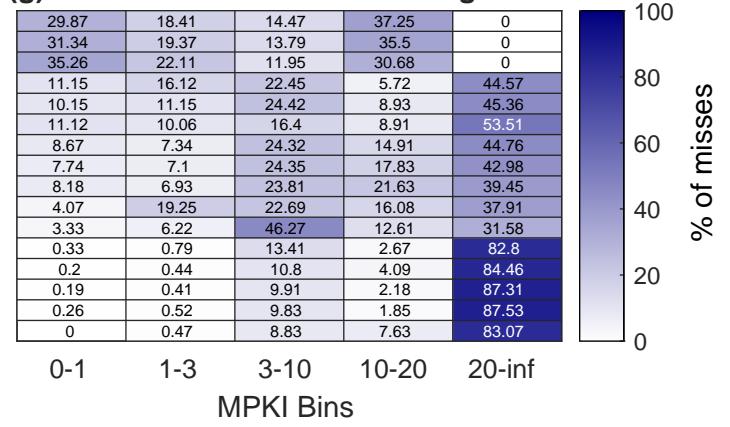
(e) Aggregate MPKI



(f) Execution with Prefetching

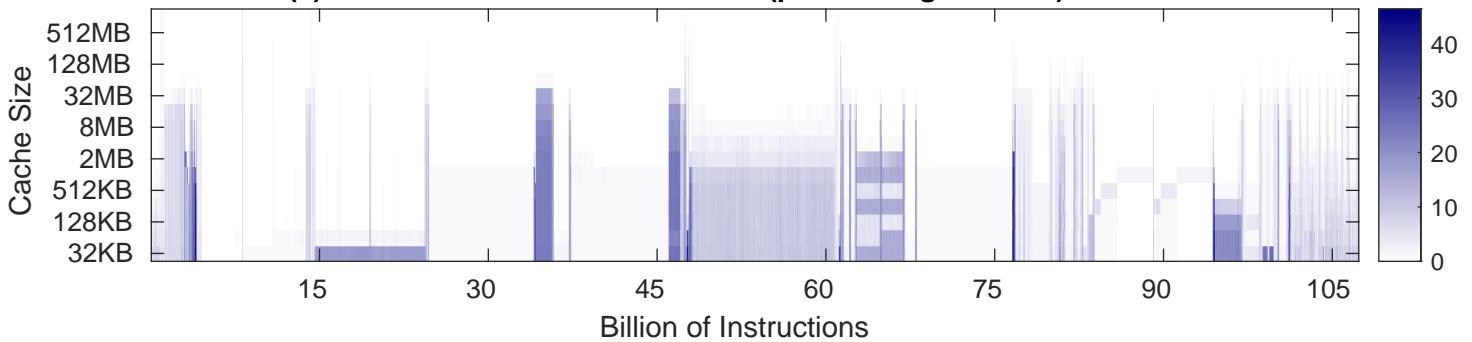


(g) Execution without Prefetching



Memory Behavior Analysis: SPEC 2006 - gcc i.p. 5 - 107B instructions

(a) MPKI over time and cache size (prefetching enabled)



(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	99.81	0.19	0	0	0
128MB	99.63	0.37	0	0	0
32MB	99.25	0.65	0.09	0	0
8MB	98.79	0.84	0.37	0	0
2MB	96.74	2.7	0.56	0	0
512KB	84.53	8.95	4.19	2.33	0
128KB	81.08	6.52	8.76	3.63	0
32KB	75.21	11.37	8.48	3.08	1.86
	68.03	13.23	13.51	2.89	2.33
	61.23	7.92	21.9	6.15	2.8
	36.44	31.22	21.9	6.99	3.45
	52.38	11.37	26.47	6.06	3.73
	52	9.32	24.6	10.16	3.91
	51.82	8.39	26.37	9.32	4.1
	40.91	19.48	22.46	10.81	6.34
	38.4	10.16	19.48	24.79	7.18

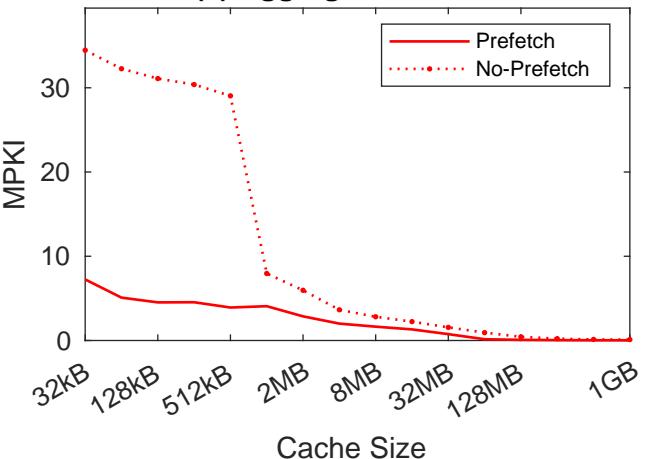
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	98.6	1.03	0.19	0	0.19
128MB	98.23	1.12	0.47	0	0.19
32MB	95.99	2.98	0.75	0	0.28
8MB	91.33	7.08	0.65	0.37	0.56
2MB	86.21	9.32	1.21	2.52	0.75
512KB	79.96	8.57	7.92	0.47	3.08
128KB	74.74	9.23	10.44	2.33	3.26
32KB	66.92	13.98	12.02	3.45	3.63
	60.21	9.88	20.22	5.59	4.1
	56.57	9.13	22.18	3.82	8.29
	26.37	25.63	28.42	10.25	9.32
	19.2	7.74	15	14.45	43.62
	16.78	6.43	14.82	15.75	46.23
	14.45	7.74	12.4	18.08	47.34
	2.05	13.33	18.27	15.84	50.51
	0	4.01	13.33	30.66	52

(d) Effects of Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	1.21	-0.84	-0.19	0	-0.19
128MB	1.4	-0.75	-0.47	0	-0.19
32MB	3.26	-2.33	-0.66	0	-0.28
8MB	7.46	-6.24	-0.28	-0.37	-0.56
2MB	10.53	-6.62	-0.65	-2.52	-0.75
512KB	4.57	0.38	-3.73	1.86	-3.08
128KB	6.34	-2.71	-1.68	1.3	-3.26
32KB	8.29	-2.61	-3.54	-0.37	-1.77
	7.82	3.35	-6.71	-2.7	-1.77
	4.66	-1.21	-0.28	2.33	-5.49
	10.07	5.59	-6.52	-3.26	-5.87
	33.18	3.63	11.47	-8.39	-39.89
	35.22	2.89	9.78	-5.59	-42.32
	37.37	0.65	13.97	-8.76	-43.24
	38.86	6.15	4.19	-5.03	-44.17
	38.4	6.15	6.15	-5.87	-44.82

(e) Aggregate MPKI



(f) Execution with Prefetching

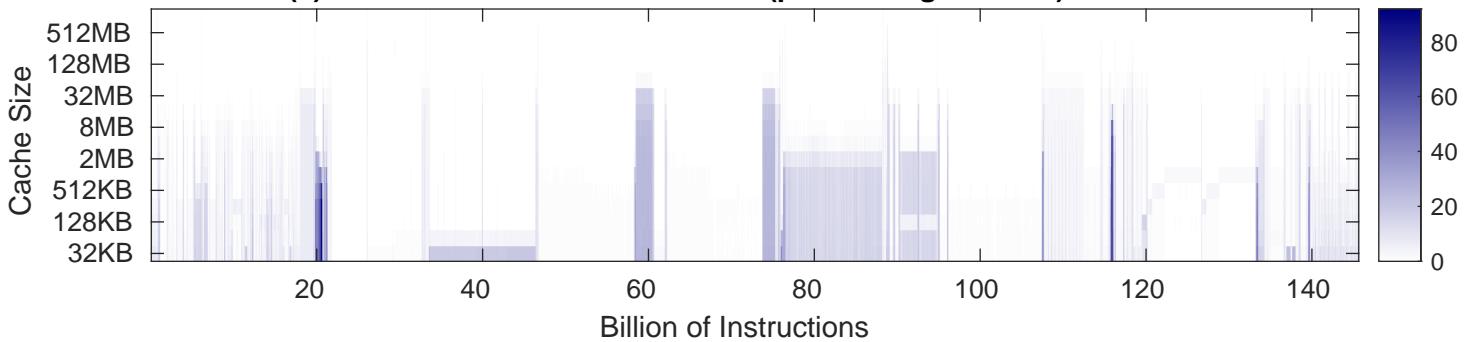
	0-1	1-3	3-10	10-20	20-inf
512MB	80.68	19.32	0	0	0
128MB	75.57	24.43	0	0	0
32MB	72.1	21.28	6.62	0	0
8MB	56.45	14.78	28.77	0	0
2MB	52.05	27.86	20.09	0	0
512KB	9.6	23.03	23.01	44.36	0
128KB	8.56	9.84	36.21	45.39	0
32KB	8.43	11.52	29.09	26.83	24.13
	5.92	15.12	33.07	20.33	25.57
	3.22	12.15	38.82	25.22	20.6
	5.73	5.32	44.87	19.79	24.3
	5.06	3.67	39.03	29.89	22.35
	5.23	3.16	39.84	28.29	23.48
	4.43	7.26	31.25	26.73	30.33
	3.06	2.24	19.29	50.22	25.19

(g) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	37.66	13.27	8.4	0	40.66
128MB	36.66	11.41	15.43	0	36.5
32MB	24.56	18.91	21.79	0	34.73
8MB	16.3	27.76	7.95	12.6	35.4
2MB	8.94	17.44	7.51	43.99	22.12
512KB	6.26	10.8	23.83	3.7	55.42
128KB	6.34	7.1	26.47	13.93	46.15
32KB	5.12	8.86	22.71	17.34	45.97
	3.53	5.46	30.48	20.52	40.02
	2.15	2.69	22.77	8.95	63.44
	1	6.07	20.1	17.14	55.67
	0.22	0.45	2.95	6.63	89.75
	0.2	0.37	3.13	6.86	89.44
	0.16	0.44	2.47	8.13	88.8
	0.04	0.94	3.7	6.62	88.7
	0	0.21	2.52	12.79	84.49

Memory Behavior Analysis: SPEC 2006 - gcc i.p. 6 - 145B instructions

(a) MPKI over time and cache size (prefetching enabled)



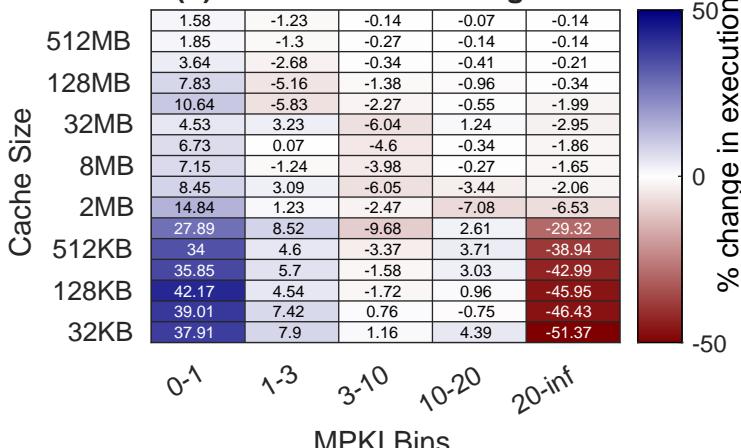
(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	99.86	0.14	0	0	0
128MB	99.38	0.55	0.07	0	0
32MB	99.11	0.69	0.21	0	0
8MB	98.42	1.3	0.27	0	0
2MB	94.23	4.95	0.82	0	0
512KB	82.69	9.89	4.81	2.61	0
128KB	80.01	8.79	7.01	2.27	1.92
32KB	75.69	10.92	8.52	2.13	2.75
512MB	65.66	17.79	11.33	2.47	2.75
128MB	60.1	11.26	18.96	6.18	3.5
32MB	52.27	17.93	11.54	13.94	4.33
8MB	52.82	13.19	14.9	14.22	4.88
2MB	51.3	12.77	15.73	15.32	4.88
512KB	51.1	12.71	18.13	12.91	5.15
128KB	40.45	13.74	24.18	16.35	5.29
32KB	38.05	12.23	16.96	25.96	6.8

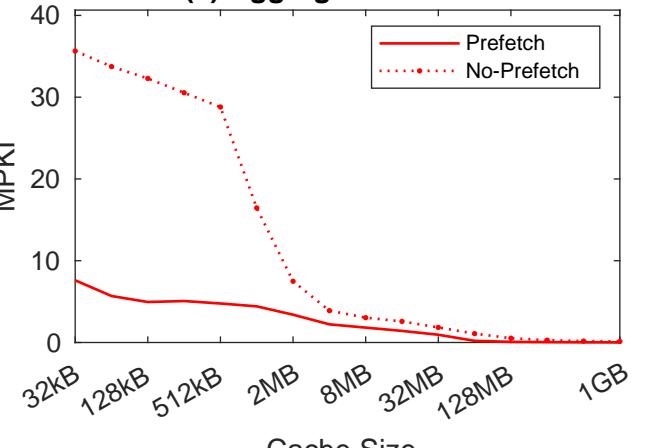
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	98.28	1.37	0.14	0.07	0.14
128MB	97.53	1.85	0.34	0.14	0.14
32MB	95.47	3.37	0.55	0.41	0.21
8MB	90.59	6.46	1.65	0.96	0.34
2MB	83.59	10.78	3.09	0.55	1.99
512KB	78.16	6.66	10.85	1.37	2.95
128KB	73.28	8.72	11.61	2.61	3.78
32KB	68.54	12.16	12.5	2.4	4.4
512MB	57.21	14.7	17.38	5.91	4.81
128MB	45.26	10.03	21.43	13.26	10.03
32MB	24.38	9.41	21.22	11.33	33.65
8MB	18.82	8.59	18.27	10.51	43.82
2MB	15.45	7.07	17.31	12.29	47.87
512KB	8.93	8.17	19.85	11.95	51.1
128KB	1.44	6.32	23.42	17.1	51.72
32KB	0.14	4.33	15.8	21.57	58.17

(d) Effects of Prefetching



(e) Aggregate MPKI



(f) Execution with Prefetching

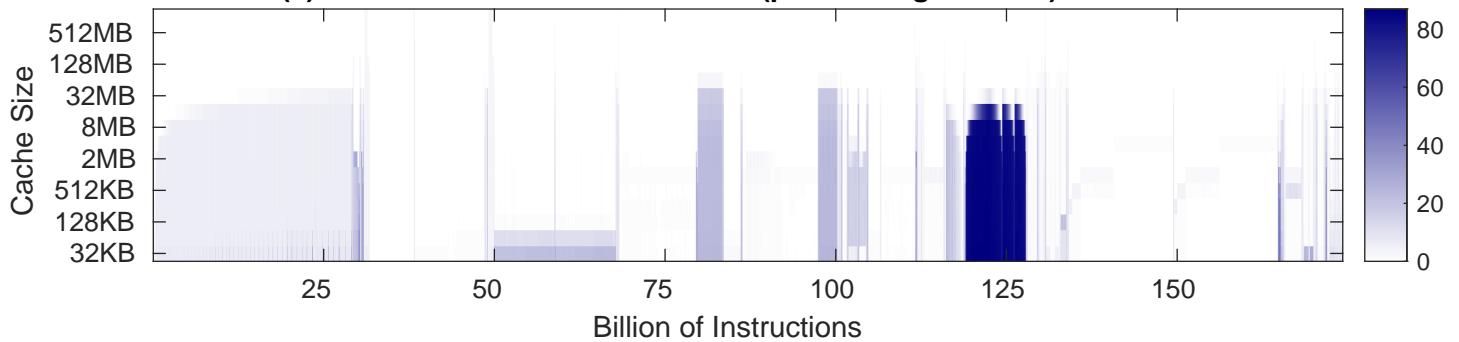
	0-1	1-3	3-10	10-20	20-inf
512MB	86.9	13.1	0	0	0
128MB	64.89	26.17	8.94	0	0
32MB	57.56	20.97	21.47	0	0
8MB	49.79	30.58	19.62	0	0
2MB	42.36	39.75	17.9	0	0
512KB	7.75	21.95	24.87	45.43	0
128KB	8.01	12.9	27.01	23.61	28.46
32KB	7.55	11.97	25.67	16.6	38.21
512MB	5.53	16.15	28.32	16.54	33.45
128MB	3.06	6.85	36.8	25.1	28.19
32MB	4.16	8.46	15.54	43.71	28.13
8MB	4.21	5.56	17.24	41.31	31.67
2MB	4.12	4.91	17.47	42.05	31.45
512KB	4.33	4.76	20.92	36.39	33.6
128KB	3.55	4.42	21.44	40.36	30.23
32KB	2.64	2.72	13.24	53.78	27.62

(g) Execution without Prefetching

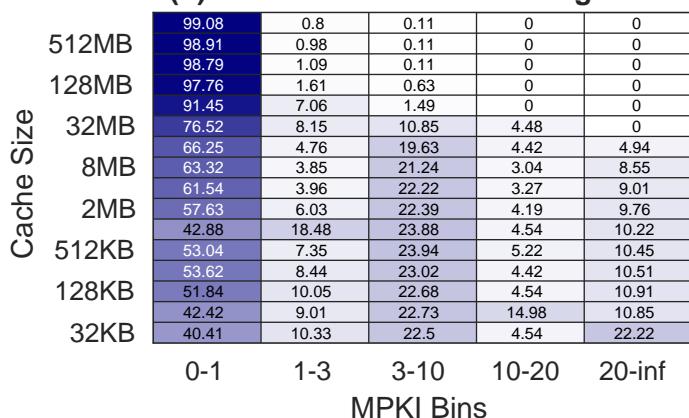
	0-1	1-3	3-10	10-20	20-inf
512MB	38.35	14.31	4.08	7.98	35.28
128MB	33.51	15.48	14.29	10.44	26.28
32MB	21.52	21.07	10.99	17.95	28.47
8MB	16.18	21.16	15.64	23.45	23.57
2MB	9.22	18.94	14.78	7.62	49.43
512KB	6.27	6.83	28.48	11.14	47.28
128KB	5.32	5.83	23.24	13.96	51.66
32KB	5.09	7.16	22.69	11.61	53.45
512MB	3.84	7	22.9	20.09	46.17
128MB	1.66	2.51	17.92	23.74	54.17
32MB	0.47	1.14	6.54	10.48	81.36
8MB	0.19	0.58	3.58	5.69	89.95
2MB	0.18	0.43	3.25	6.1	90.04
512KB	0.15	0.48	3.39	5.73	90.25
128KB	0.03	0.35	4.17	7.5	87.95
32KB	0	0.24	2.75	9.39	87.61

Memory Behavior Analysis: SPEC 2006 - gcc i.p. 7 - 174B instructions

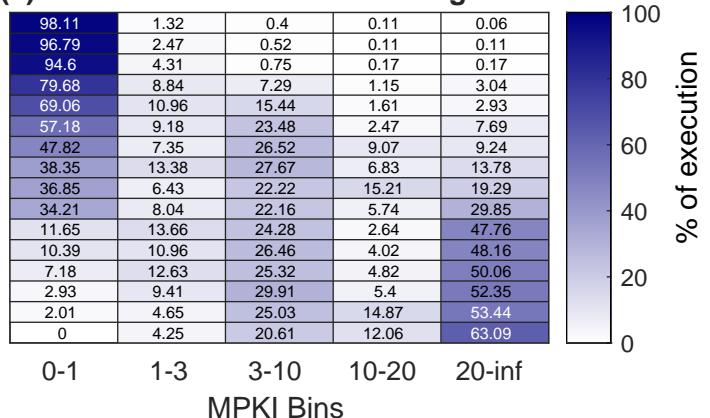
(a) MPKI over time and cache size (prefetching enabled)



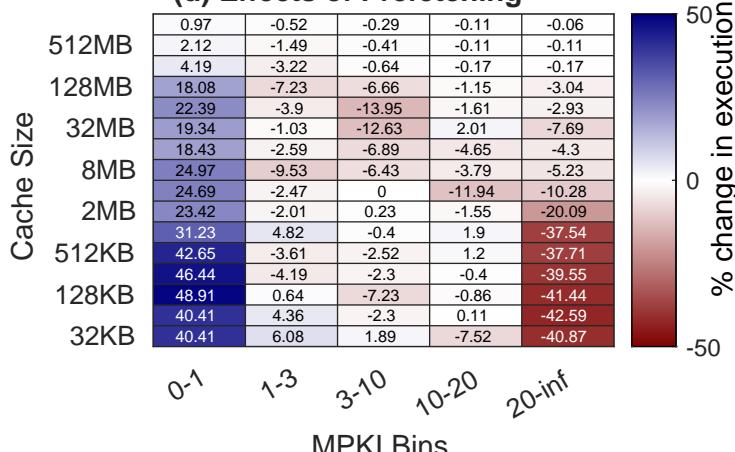
(b) Execution with Prefetching



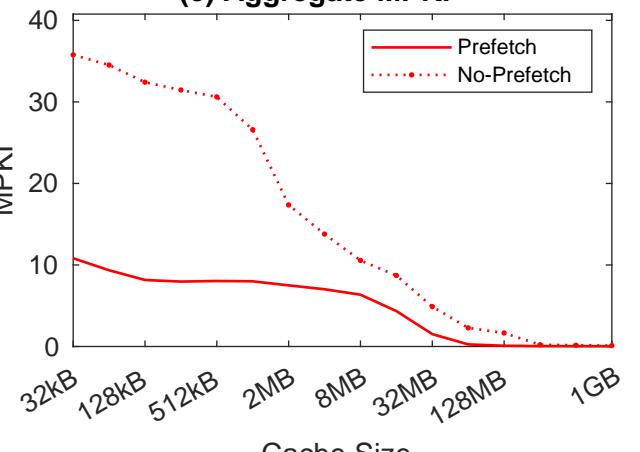
(c) Execution without Prefetching



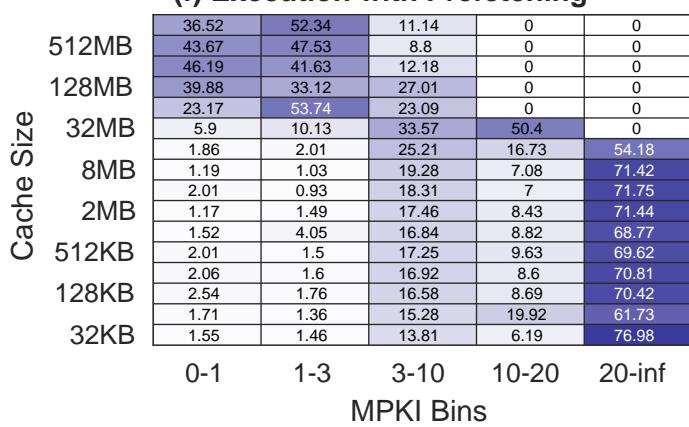
(d) Effects of Prefetching



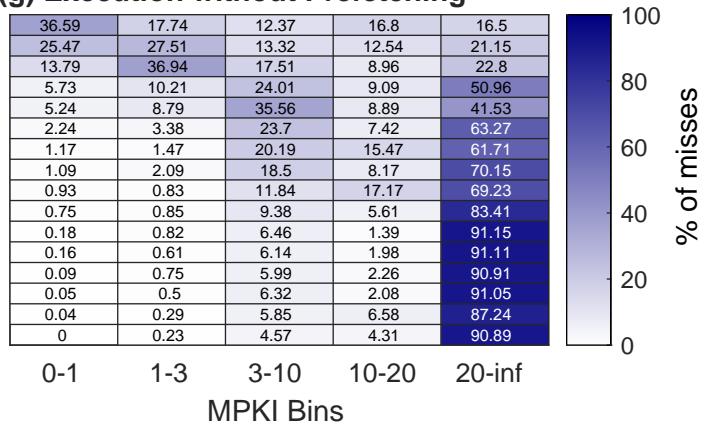
(e) Aggregate MPKI



(f) Execution with Prefetching

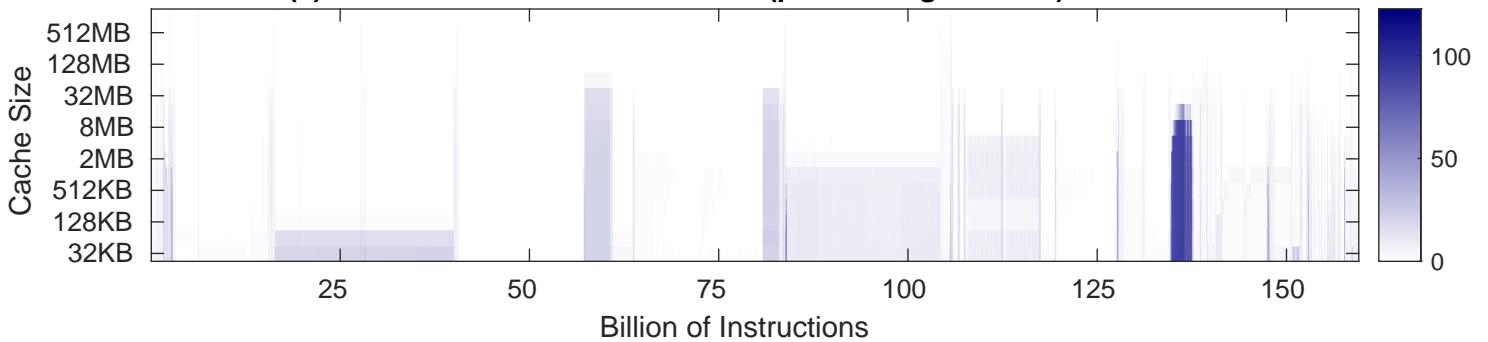


(g) Execution without Prefetching



Memory Behavior Analysis: SPEC 2006 - gcc i.p. 8 - 159B instructions

(a) MPKI over time and cache size (prefetching enabled)



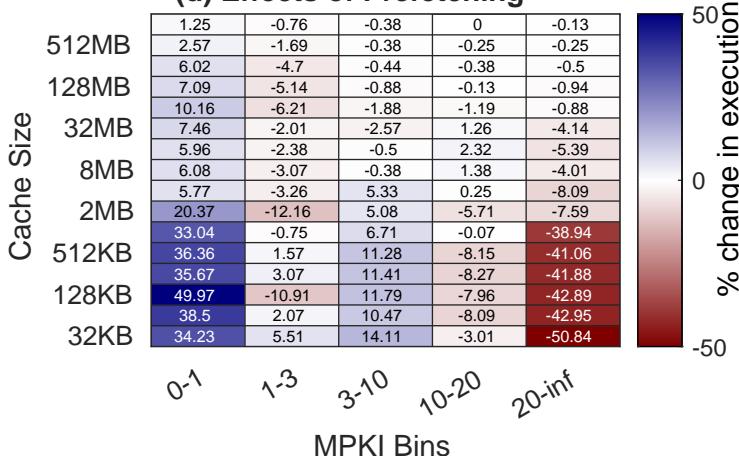
(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	99.87	0.06	0.06	0	0
	99.56	0.38	0.06	0	0
	99.06	0.69	0.19	0.06	0
	98.5	1.13	0.31	0.06	0
	94.17	3.51	2.26	0.06	0
32MB	86.39	5.83	4.14	3.64	0
	84.14	4.08	5.96	5.02	0.82
	82.95	3.7	6.33	4.45	2.57
	76.18	3.89	12.1	3.13	4.7
8MB	62.82	16.3	12.6	2.88	5.39
	56.68	5.58	28.78	3.32	5.64
	59.56	5.27	25.45	3.7	6.02
2MB	58.43	6.02	25.64	3.89	6.02
	56.99	7.4	25.52	3.95	6.14
	41.13	8.15	25.2	19.25	6.27
512KB	35.67	11.03	26.46	12.73	14.11
128KB					
32KB					

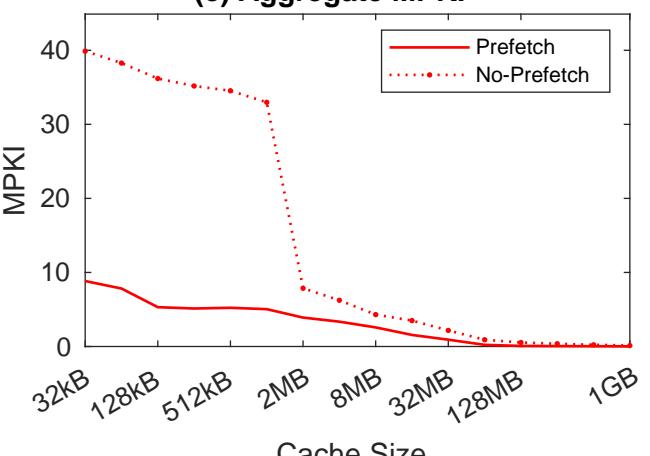
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
98.62	0.82	0.44	0	0.13	
96.99	2.07	0.44	0.25	0.25	
93.04	5.39	0.63	0.44	0.5	
91.41	6.27	1.19	0.19	0.94	
84.01	9.72	4.14	1.25	0.88	
78.93	7.84	6.71	2.38	4.14	
78.18	6.46	6.46	2.7	6.21	
76.87	6.77	6.71	3.07	6.58	
70.41	7.15	6.77	2.88	12.79	
42.45	28.46	7.52	8.59	12.98	
23.64	6.33	22.07	3.39	44.58	
23.2	3.7	14.17	11.85	47.08	
22.76	2.95	14.23	12.16	47.9	
7.02	18.31	13.73	11.91	49.03	
2.63	6.08	14.73	27.34	49.22	
1.44	5.52	12.35	15.74	64.95	

(d) Effects of Prefetching



(e) Aggregate MPKI



(f) Execution with Prefetching

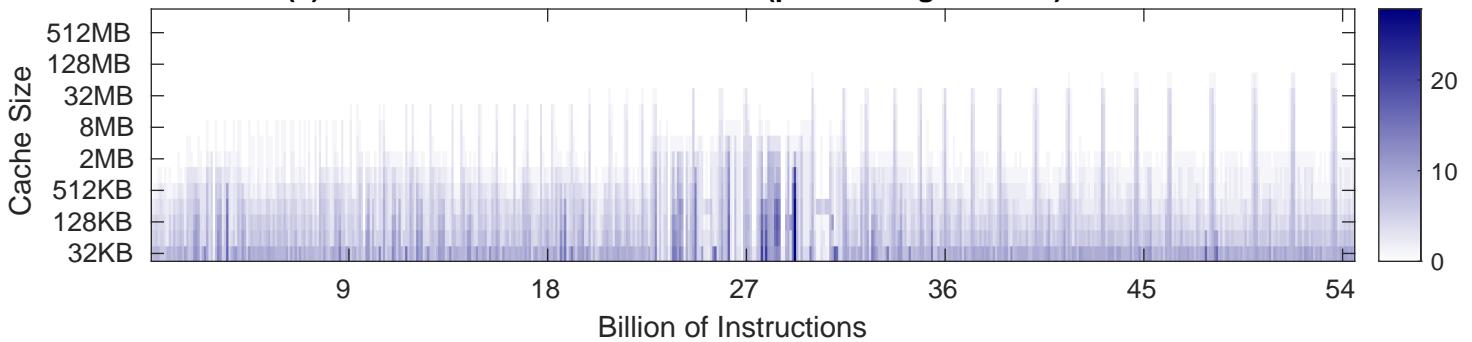
	0-1	1-3	3-10	10-20	20-inf
512MB	75.74	3.42	20.85	0	0
	71.06	17.83	11.11	0	0
	48.41	21.49	17.59	12.51	0
	49.29	22.79	18.8	9.11	0
	30.75	30.86	35.27	3.12	0
32MB	7.43	11.82	22.63	58.11	0
	5.25	4.97	20.49	49.84	19.45
	3.97	2.55	12.98	28.58	51.92
	3.15	2.1	21.65	12.89	60.2
8MB	3.3	8.02	20.96	9.82	57.91
	3.45	1.88	39.17	9.04	46.46
	3.8	1.67	37.66	9.32	47.55
2MB	3.71	1.91	34.82	10.1	49.46
	5.21	2.24	34.13	9.83	48.6
	2.41	1.64	25.38	36.53	34.04
512KB	1.91	2.16	23.44	24	48.48
128KB					
32KB					

(g) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
30.69	11.27	17.94	0	40.1	
21.13	13.39	11.75	17.36	36.37	
7.34	21.23	12.41	16.2	42.81	
10.42	17.82	11.42	6.56	53.78	
8.67	16.72	24.12	15.71	34.78	
3.77	6.22	17.72	17.59	54.7	
3.09	2.98	10.22	11.18	72.54	
3.22	2.94	8.69	10.7	74.45	
2.71	2.19	6.37	6.9	81.83	
1.81	7.02	5.75	17.63	67.79	
0.18	0.4	4.76	1.58	93.08	
0.18	0.19	2.75	4.08	92.81	
0.2	0.15	2.71	4.08	92.86	
0.09	1.09	2.62	3.9	92.31	
0.04	0.28	2.44	9.72	87.52	
0.03	0.3	2.12	4.63	92.92	

Memory Behavior Analysis: SPEC 2006 - gcc i.p. 9 - 54B instructions

(a) MPKI over time and cache size (prefetching enabled)



(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	97.98	2.02	0	0	0
8MB	91.93	4.22	3.85	0	0
2MB	87.71	7.52	4.77	0	0
512KB	84.77	9.36	5.87	0	0
128KB	74.68	14.86	10.46	0	0
32KB	65.14	19.63	15.05	0.18	0
	31.01	45.69	22.75	0.37	0.18
	8.44	48.81	41.47	1.1	0.18
	1.83	31.74	64.04	2.2	0.18
	1.83	11.38	82.75	3.85	0.18
	1.47	5.14	87.34	5.87	0.18
	0	3.67	77.25	18.53	0.55

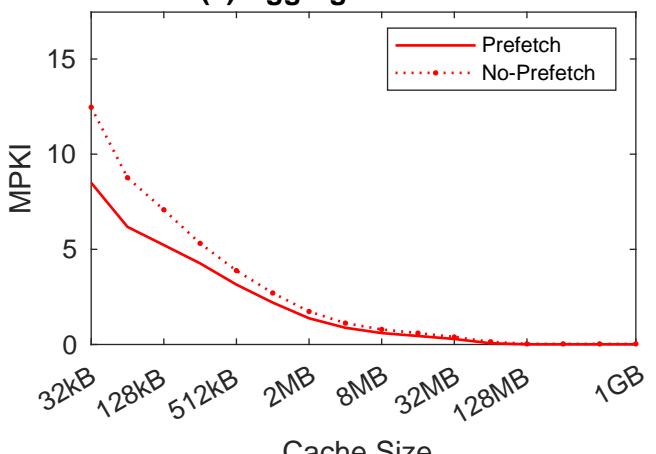
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	99.82	0.18	0	0	0
128MB	99.82	0.18	0	0	0
32MB	99.82	0.18	0	0	0
8MB	96.51	3.12	0.37	0	0
2MB	90.46	5.32	4.22	0	0
512KB	86.06	7.34	6.61	0	0
128KB	80.55	11.38	8.07	0	0
32KB	70.28	17.06	12.48	0.18	0
	55.6	26.61	17.06	0.73	0
	18.53	48.81	31.19	1.28	0.18
	4.22	41.83	51.19	2.2	0.55
	1.47	17.25	76.51	3.67	1.1
	1.47	3.67	82.2	8.99	3.67
	1.1	2.2	77.25	14.13	5.32
	0	1.47	36.15	52.66	9.72

(d) Effects of Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	0.18	-0.18	0	0	0
128MB	0.18	-0.18	0	0	0
32MB	0.18	-0.18	0	0	0
8MB	1.47	-1.1	-0.37	0	0
2MB	1.47	-1.1	-0.37	0	0
512KB	1.65	0.18	-1.84	0	0
128KB	4.22	-2.02	-2.2	0	0
32KB	9.54	-6.98	-2.01	-0.55	0
	12.48	-3.12	-8.44	-0.91	0
	4.4	-2.2	-2.02	-0.18	0
	4.22	6.98	-9.72	-1.1	-0.37
	0.36	14.49	-12.47	-1.47	-0.92
	0.36	7.71	0.55	-5.14	-3.49
	0.37	2.94	10.09	-8.26	-5.14
	0	2.2	41.1	-34.13	-9.17

(e) Aggregate MPKI



(f) Execution with Prefetching

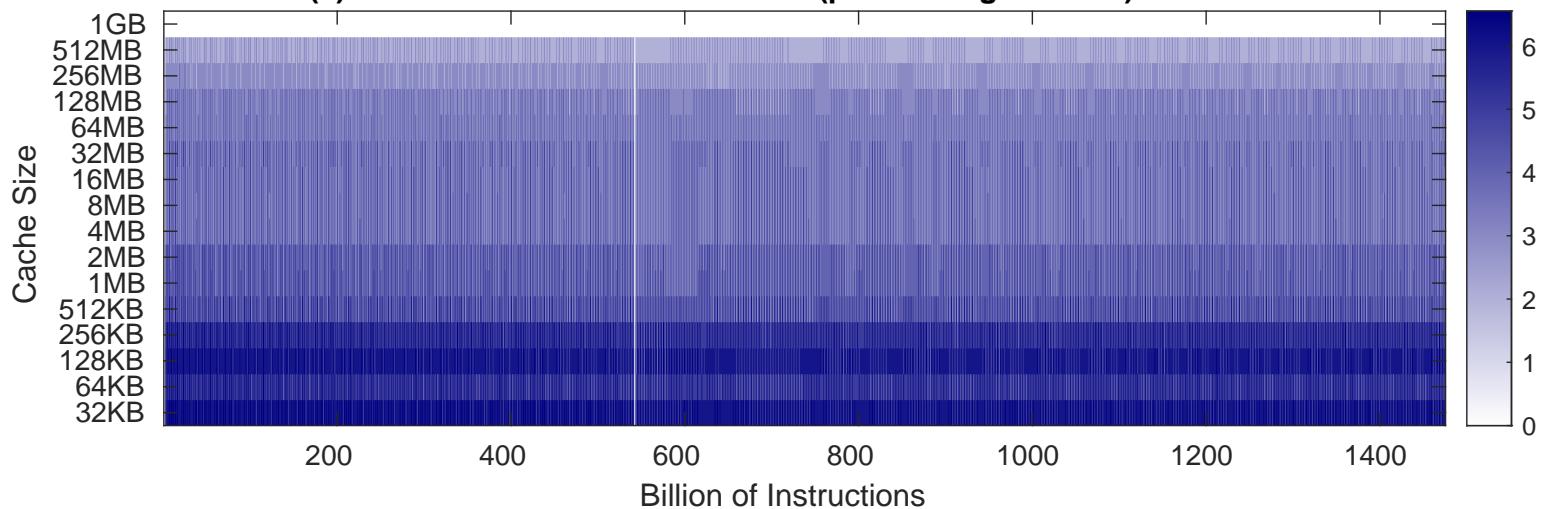
	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	51.78	48.22	0	0	0
8MB	22.56	27.58	49.86	0	0
2MB	20.78	34.72	44.49	0	0
512KB	26.26	31.29	42.45	0	0
128KB	20.38	28.67	50.95	0	0
32KB	21.81	24.12	52.72	1.35	0
	8.5	37.74	50.21	1.86	1.68
	1.61	29.71	63.14	4.12	1.42
	0.16	17.19	74.74	6.75	1.15
	0.16	5.06	84.2	9.62	0.97
	0.16	1.86	85.06	12.1	0.83
	0	0.89	71.56	26.04	1.52

(g) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	92.51	7.49	0	0	0
128MB	92.51	7.49	0	0	0
32MB	92.72	7.28	0	0	0
8MB	50.95	41.15	7.91	0	0
2MB	31.15	26.37	42.47	0	0
512KB	29.47	24.07	46.45	0	0
128KB	28.52	26.07	45.4	0	0
32KB	21.56	26.34	50.4	1.69	0
	18.91	26.51	49.79	4.79	0
	4.44	32.53	55.98	5.62	1.42
	0.48	22.11	66.49	7.4	3.52
	0.08	8	77.14	8.93	5.85
	0.07	1.3	67.43	16.95	14.25
	0.07	0.59	59.52	21.59	18.23
	0	0.25	24.43	53.53	21.79

Memory Behavior Analysis: SPEC 2006 - gemsfDTD - 1475B instructions

(a) MPKI over time and cache size (prefetching enabled)



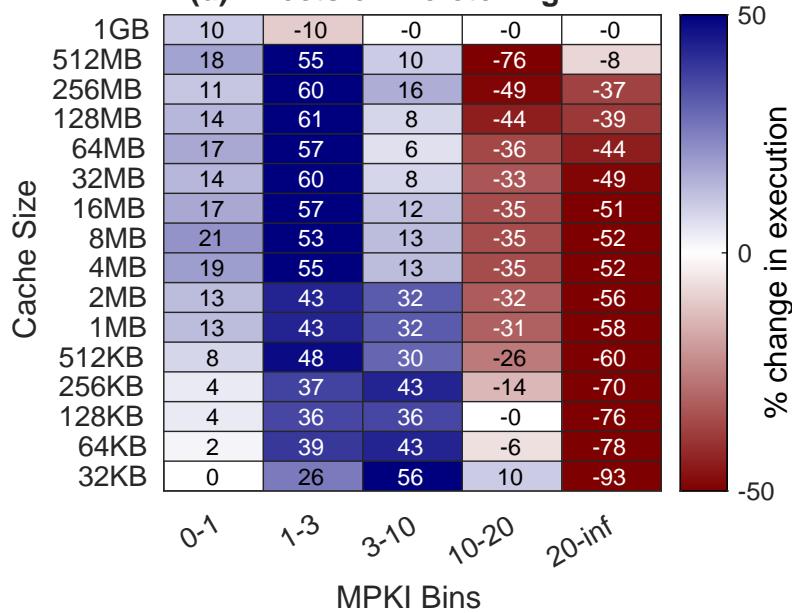
(b) Execution with Prefetching

1GB	100	0	0	0	0
512MB	18	55	26	0	0
256MB	11	60	29	0	0
128MB	15	61	21	4	0
64MB	17	58	17	8	0
32MB	14	60	16	10	0
16MB	17	57	16	10	0
8MB	21	53	16	10	0
4MB	19	55	16	10	0
2MB	13	43	33	11	0
1MB	13	43	33	11	0
512KB	8	48	30	14	0
256KB	5	37	43	16	0
128KB	4	36	36	23	0
64KB	2	39	43	16	0
32KB	0	26	56	17	0

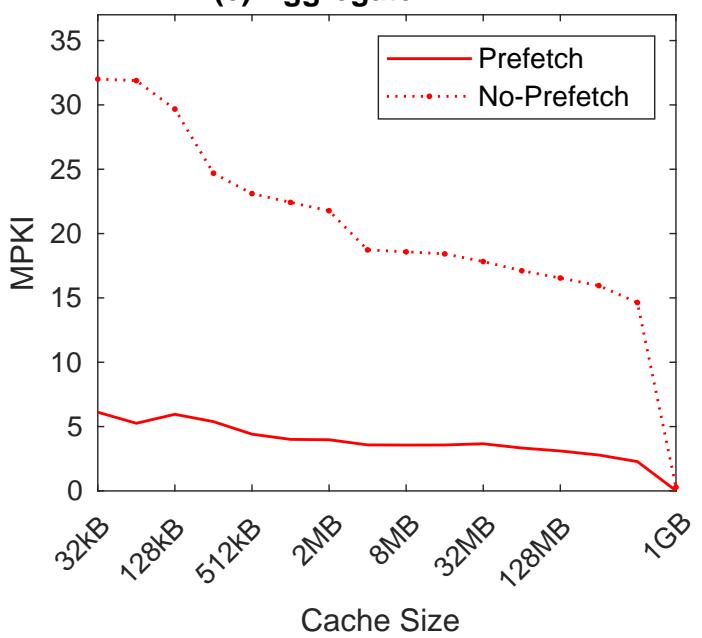
(c) Execution without Prefetching

90	10	0	0	0
0	0	16	76	8
0	0	13	49	37
0	0	13	48	39
0	0	11	44	44
0	0	8	43	49
0	0	4	45	51
0	0	3	45	52
0	0	3	45	52
0	0	1	42	56
0	0	1	41	58
0	0	0	39	60
0	0	0	30	70
0	0	0	24	76
0	0	0	22	78
0	0	0	7	93

(d) Effects of Prefetching

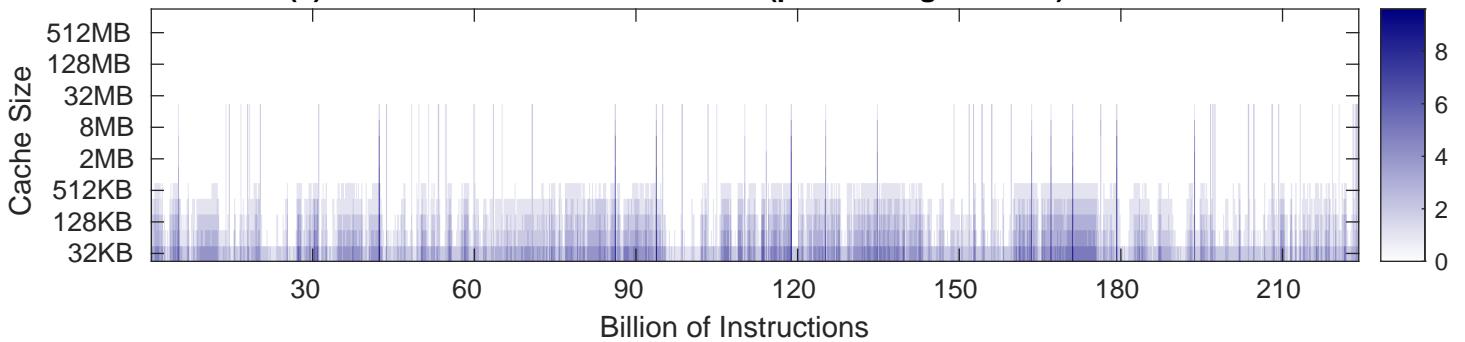


(e) Aggregate MPKI



Memory Behavior Analysis: SPEC 2006 - gobmk i.p. 1 - 224B instructions

(a) MPKI over time and cache size (prefetching enabled)



(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	100	0	0	0	0
2MB	100	0	0	0	0
512KB	95.18	4.77	0.04	0	0
128KB	94.38	5	0.62	0	0
32KB	94.2	4.91	0.89	0	0
	94.24	4.77	0.98	0	0
	94.24	4.69	1.07	0	0
	94.07	4.86	1.07	0	0
	52.61	46.14	1.25	0	0
	37.71	55.96	6.34	0	0
	27.67	49.75	22.58	0	0
	0.45	44.53	54.98	0.04	0

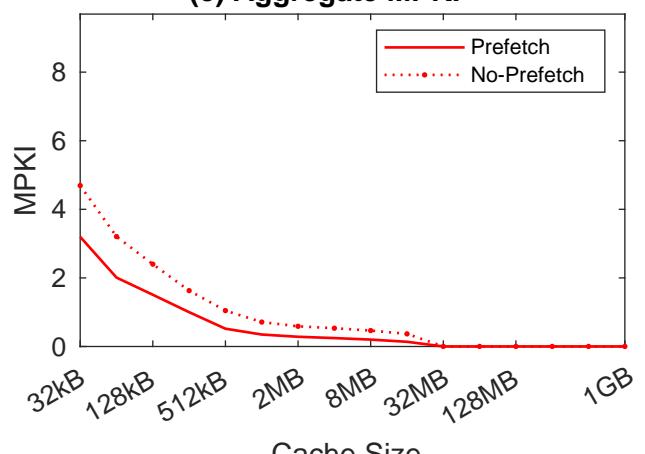
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
99.96	0	0.04	0	0	0
99.96	0	0.04	0	0	0
99.96	0	0.04	0	0	0
99.96	0	0.04	0	0	0
99.96	0	0.04	0	0	0
99.96	0	0.04	0	0	0
94.33	1.65	3.97	0.04	0	0
94.07	0.89	5	0.04	0	0
93.93	0.8	5.22	0.04	0	0
93.84	0.8	5.31	0.04	0	0
93.53	1.03	5.4	0.04	0	0
66.44	28.02	5.49	0.04	0	0
41.54	50.42	7.99	0.04	0	0
30.21	35.12	33.82	0.85	0	0
22.94	24.19	51.54	1.34	0	0
0.04	29.85	67.16	2.95	0	0

(d) Effects of Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	0.04	0	-0.04	0	0
128MB	0.04	0	-0.04	0	0
32MB	0.04	0	-0.04	0	0
8MB	0.04	0	-0.04	0	0
2MB	0.85	3.12	-3.93	-0.04	0
512KB	0.31	4.11	-4.38	-0.04	0
128KB	0.27	4.11	-4.33	-0.04	0
32KB	0.4	3.97	-4.33	-0.04	0
	0.71	3.66	-4.33	-0.04	0
	27.63	23.16	-4.42	-0.04	0
	11.07	-4.28	-6.74	-0.04	0
	7.5	20.84	-27.48	-0.85	0
	4.73	25.56	-28.96	-1.34	0
	0.41	14.68	-12.18	-2.91	0

(e) Aggregate MPKI



(f) Execution with Prefetching

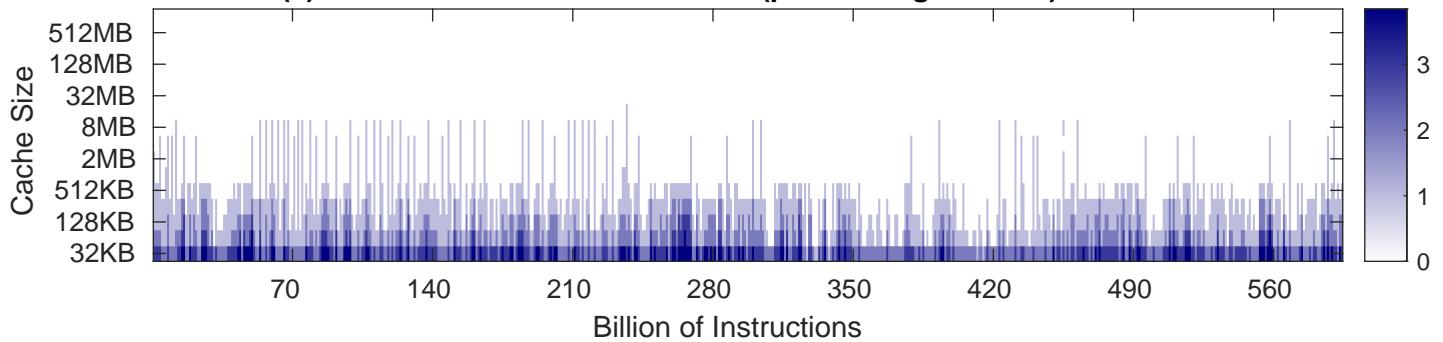
	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	37.17	61.69	1.13	0	0
2MB	41.42	46.72	11.86	0	0
512KB	47.62	35.38	17	0	0
128KB	52.55	29.29	18.16	0	0
32KB	59.87	23.31	16.81	0	0
	71.44	16.54	12.02	0	0
	20.74	71.82	7.44	0	0
	9.01	74.67	16.33	0	0
	7.03	51.74	41.22	0	0
	0.13	28.11	71.62	0.15	0

(g) Execution without Prefetching

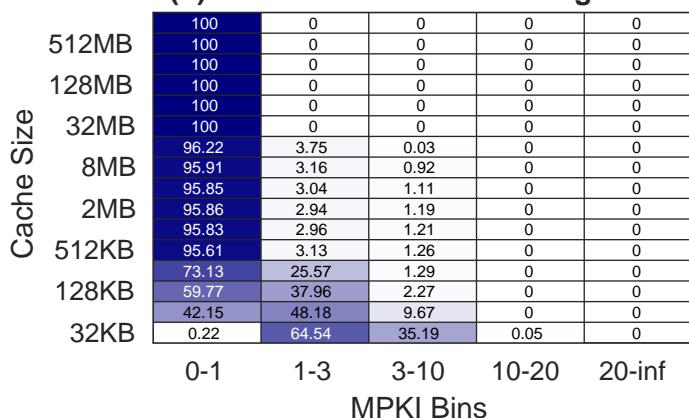
	0-1	1-3	3-10	10-20	20-inf
11.12	0	88.88	0	0	0
11.14	0	88.86	0	0	0
11.12	0	88.88	0	0	0
11.12	0	88.88	0	0	0
12.44	0	87.56	0	0	0
24.09	9.43	64.66	1.82	0	0
28.72	3.93	65.9	1.44	0	0
31.92	3.05	63.77	1.26	0	0
35.85	2.69	60.31	1.14	0	0
45.29	2.52	51.25	0.94	0	0
30.37	33.06	35.93	0.64	0	0
10.01	60.55	29.03	0.41	0	0
4.25	30.69	61.17	3.89	0	0
3.65	14.74	76.99	4.62	0	0
0.01	14.74	78.15	7.1	0	0

Memory Behavior Analysis: SPEC 2006 - gobmk i.p. 2 - 594B instructions

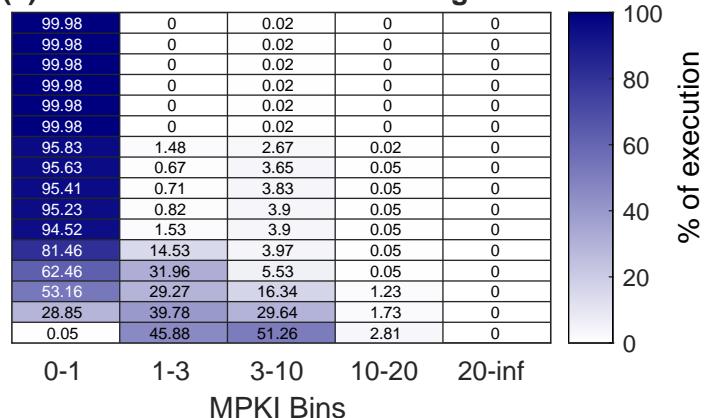
(a) MPKI over time and cache size (prefetching enabled)



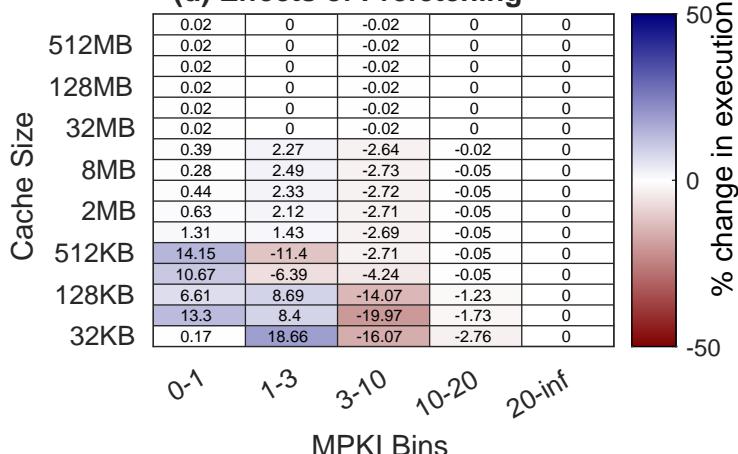
(b) Execution with Prefetching



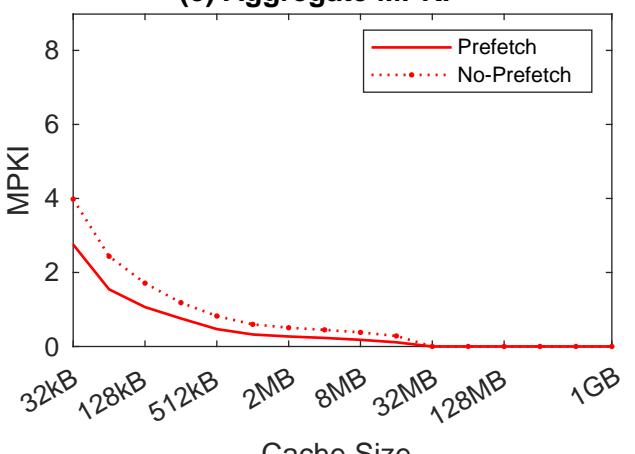
(c) Execution without Prefetching



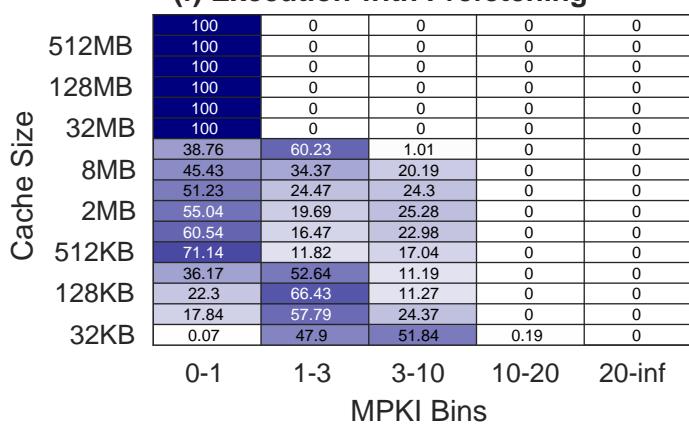
(d) Effects of Prefetching



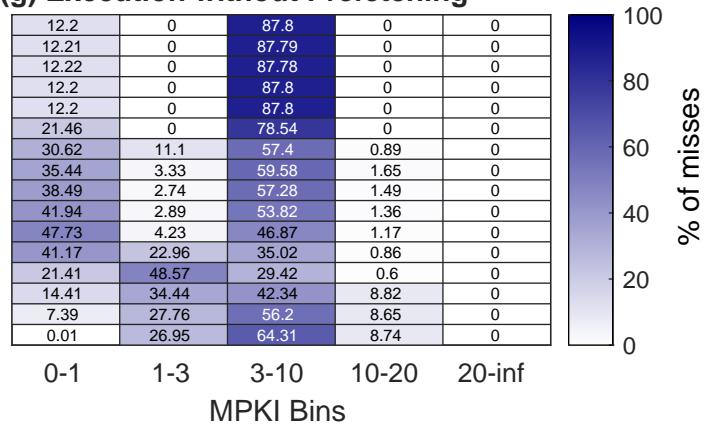
(e) Aggregate MPKI



(f) Execution with Prefetching

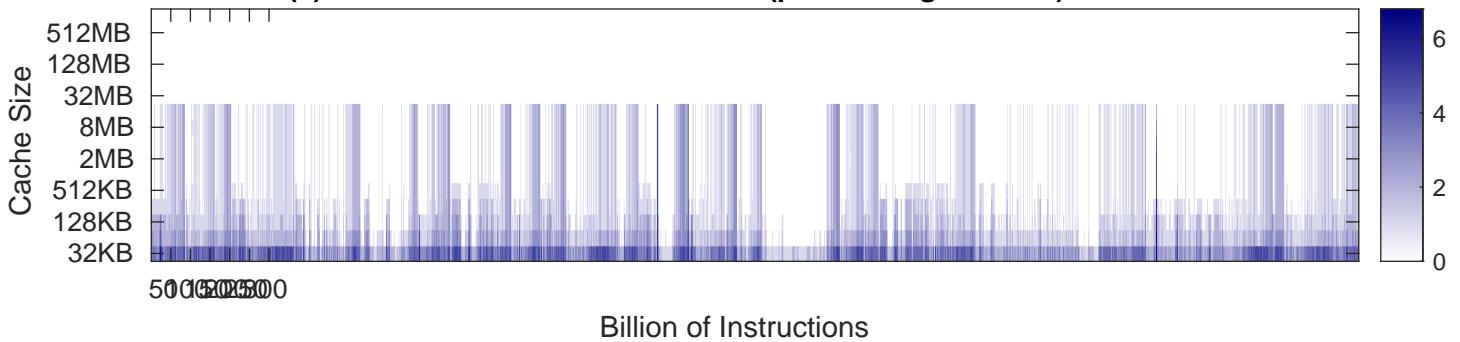


(g) Execution without Prefetching



Memory Behavior Analysis: SPEC 2006 - gobmk i.p. 3 - 307B instructions

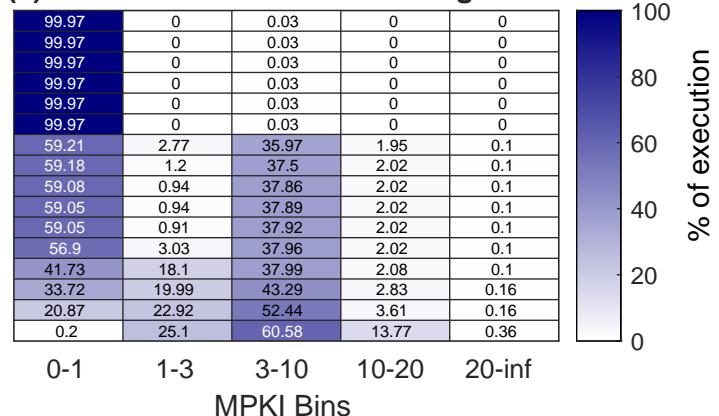
(a) MPKI over time and cache size (prefetching enabled)



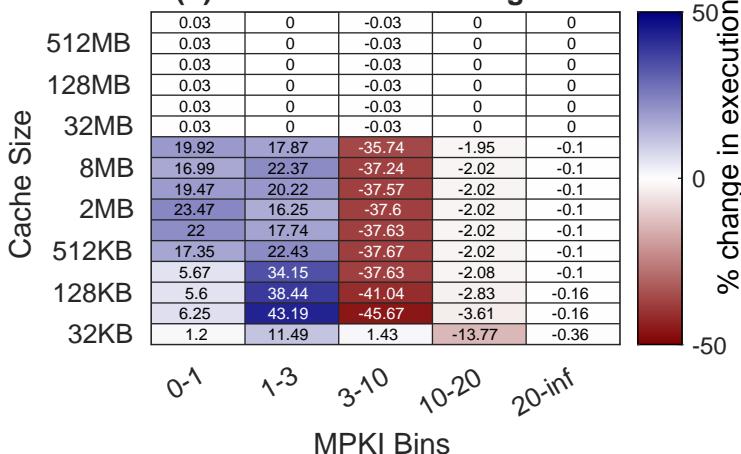
(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	79.13	20.64	0.23	0	0
2MB	76.17	23.57	0.26	0	0
512KB	78.55	21.16	0.29	0	0
128KB	82.52	17.19	0.29	0	0
32KB	81.05	18.65	0.29	0	0
	74.25	25.46	0.29	0	0
	47.4	52.25	0.36	0	0
	39.32	58.43	2.25	0	0
	27.12	66.11	6.77	0	0
	1.4	36.59	62.01	0	0

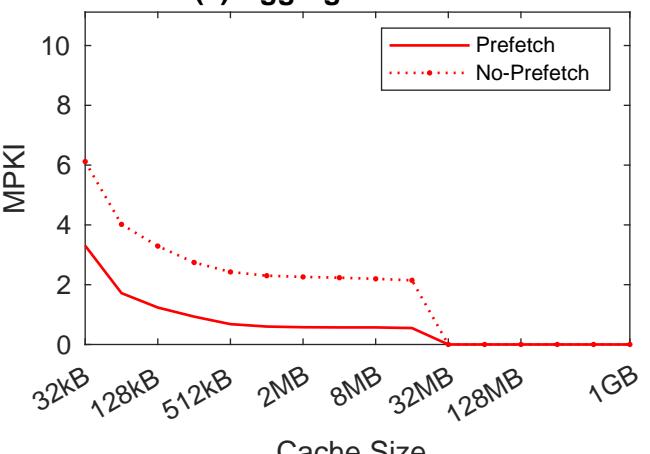
(c) Execution without Prefetching



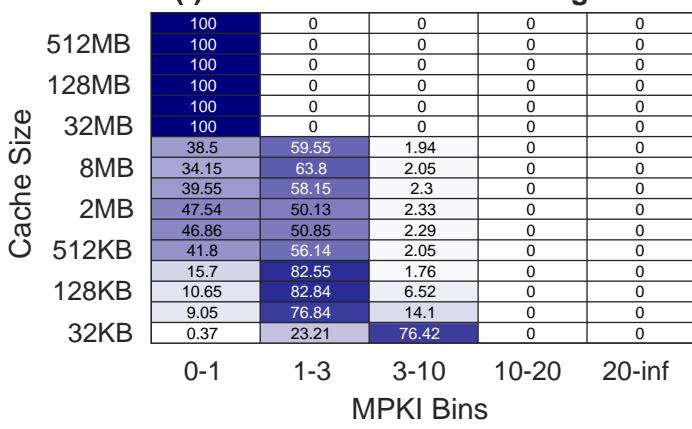
(d) Effects of Prefetching



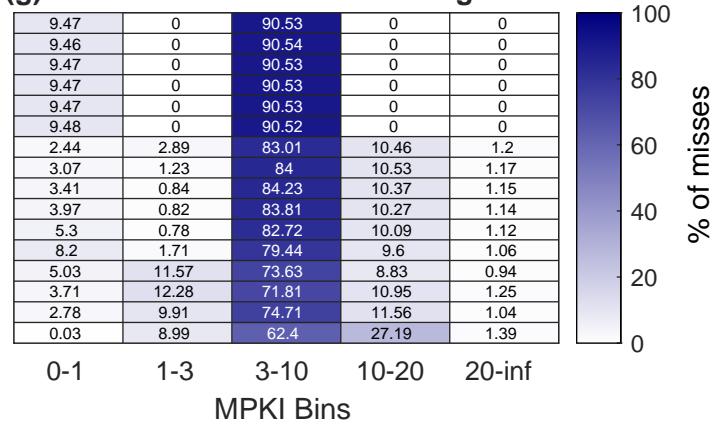
(e) Aggregate MPKI



(f) Execution with Prefetching

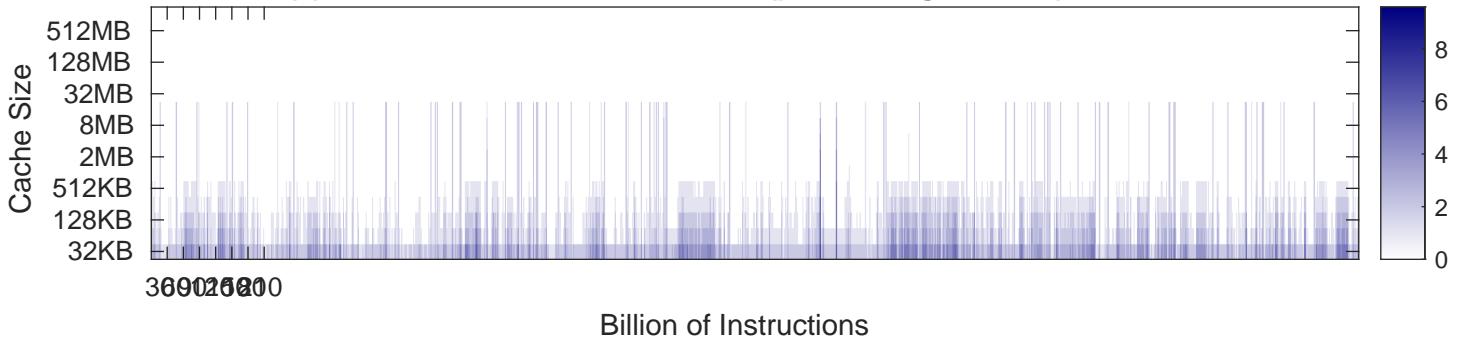


(g) Execution without Prefetching



Memory Behavior Analysis: SPEC 2006 - gobmk i.p. 4 - 224B instructions

(a) MPKI over time and cache size (prefetching enabled)



(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	92.73	7.23	0.04	0	0
2MB	91.97	7.63	0.4	0	0
512KB	92.01	7.5	0.49	0	0
128KB	92.1	7.41	0.49	0	0
32KB	92.01	7.45	0.54	0	0
	91.88	7.59	0.54	0	0
	67.11	32.31	0.58	0	0
	52.34	45.29	2.37	0	0
	38.87	48.59	12.54	0	0
	0.4	58.86	40.7	0.04	0

MPKI Bins

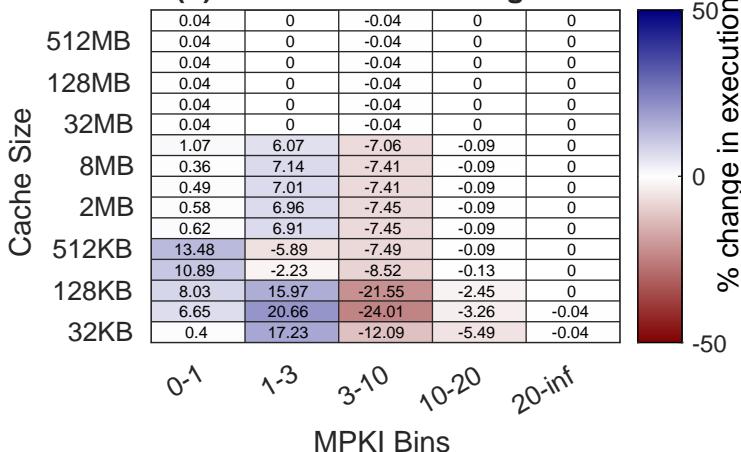
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	99.96	0	0.04	0	0
128MB	99.96	0	0.04	0	0
32MB	99.96	0	0.04	0	0
8MB	99.96	0	0.04	0	0
2MB	99.96	0	0.04	0	0
512KB	91.66	1.16	7.1	0.09	0
128KB	91.61	0.49	7.81	0.09	0
32KB	91.52	0.49	7.9	0.09	0
	91.52	0.45	7.94	0.09	0
	91.39	0.54	7.99	0.09	0
	78.4	13.48	8.03	0.09	0
	56.22	34.54	9.1	0.13	0
	44.31	29.32	23.92	2.45	0
	32.22	27.93	36.55	3.26	0.04
	0	41.63	52.79	5.53	0.04

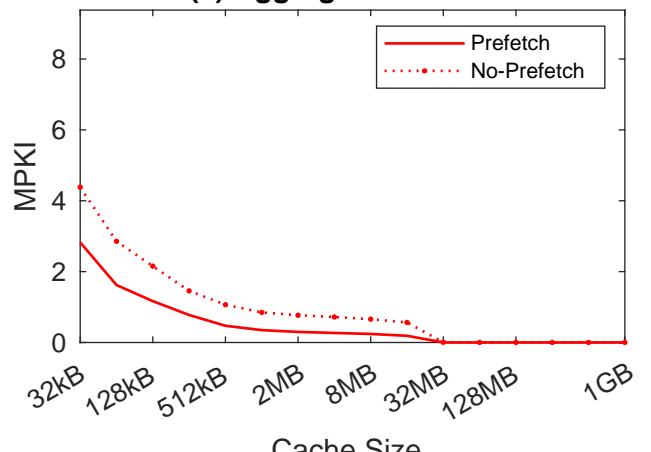
MPKI Bins

% of execution

(d) Effects of Prefetching



(e) Aggregate MPKI



(f) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	29.93	69.25	0.82	0	0
2MB	34.13	59.56	6.32	0	0
512KB	41.86	49.81	8.33	0	0
128KB	47.61	43.65	8.74	0	0
32KB	54.13	37.43	8.44	0	0
	64.87	28.55	6.57	0	0
	31.56	64.06	4.38	0	0
	16.17	75.69	8.14	0	0
	13.2	59.28	27.53	0	0
	0.13	42.51	57.2	0.16	0

MPKI Bins

(g) Execution without Prefetching

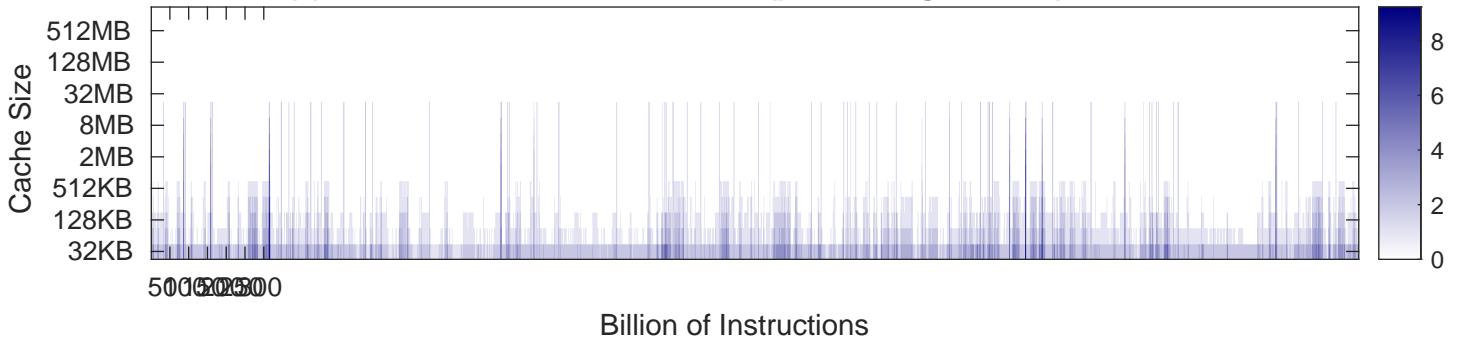
	0-1	1-3	3-10	10-20	20-inf
512MB	10.75	0	89.25	0	0
128MB	10.74	0	89.26	0	0
32MB	10.81	0	89.19	0	0
8MB	10.8	0	89.2	0	0
2MB	71.26	0	28.74	0	0
512KB	16.01	4.61	77.4	1.98	0
128KB	20.01	1.61	76.62	1.76	0
32KB	22.7	1.36	74.3	1.63	0
	26.02	1.15	71.29	1.54	0
	32.13	1.1	65.37	1.39	0
	30.97	15.26	52.66	1.11	0
	14.4	42.77	41.69	1.14	0
	7.7	27.53	51.99	12.77	0
	6.35	17.85	62.52	12.95	0.33
	0	22.16	62.64	14.96	0.23

MPKI Bins

% of misses

Memory Behavior Analysis: SPEC 2006 - gobmk i.p. 5 - 321B instructions

(a) MPKI over time and cache size (prefetching enabled)



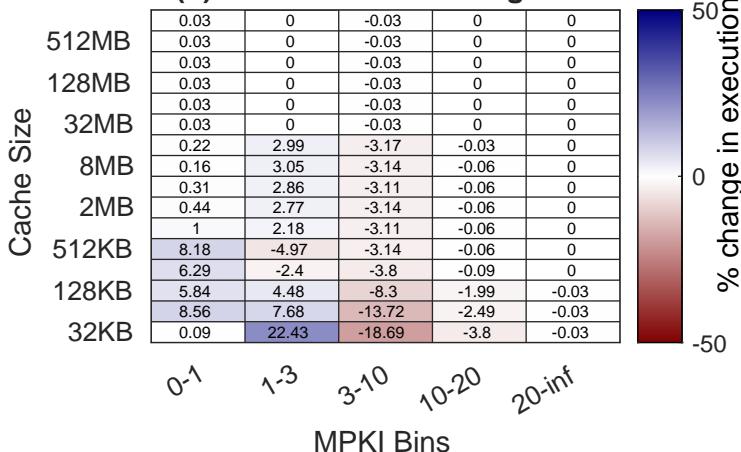
(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	96.36	3.61	0.03	0	0
2MB	96.24	3.27	0.5	0	0
512KB	96.24	3.2	0.56	0	0
128KB	96.27	3.17	0.56	0	0
32KB	96.27	3.14	0.59	0	0
	96.08	3.33	0.59	0	0
	82.43	16.98	0.59	0	0
	71.91	26.81	1.28	0	0
	50.64	43.36	6	0	0
	0.12	72.88	26.97	0.03	0

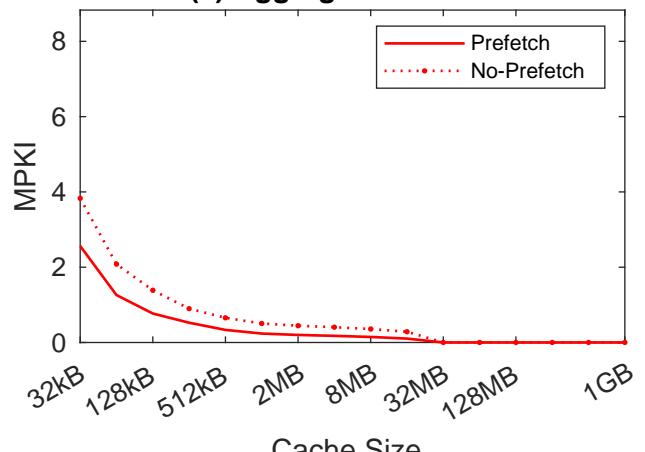
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
99.97	0	0.03	0	0	0
99.97	0	0.03	0	0	0
99.97	0	0.03	0	0	0
99.97	0	0.03	0	0	0
99.97	0	0.03	0	0	0
99.97	0	0.03	0	0	0
96.14	0.62	3.2	0.03	0	0
96.08	0.22	3.64	0.06	0	0
95.93	0.34	3.67	0.06	0	0
95.83	0.4	3.7	0.06	0	0
95.27	0.96	3.7	0.06	0	0
87.9	8.3	3.73	0.06	0	0
76.14	19.38	4.39	0.09	0	0
66.07	22.33	9.58	1.99	0.03	0
42.08	35.68	19.72	2.49	0.03	0
0.03	50.45	45.66	3.83	0.03	0

(d) Effects of Prefetching



(e) Aggregate MPKI



(f) Execution with Prefetching

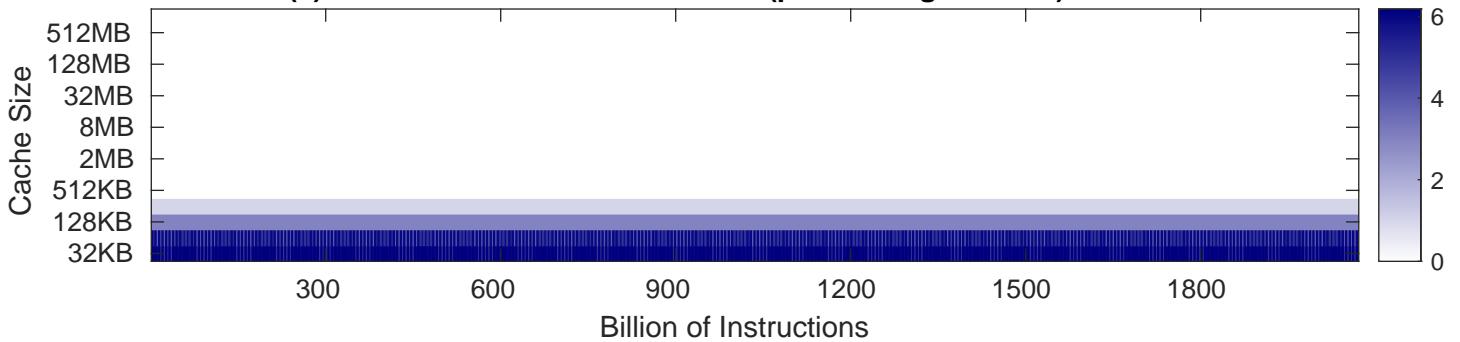
	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	34.44	64.5	1.06	0	0
2MB	42.75	44.49	12.75	0	0
512KB	50.09	34.28	15.64	0	0
128KB	54.76	29.23	16.01	0	0
32KB	60.61	24.38	15.01	0	0
	70.61	18.22	11.17	0	0
	41.69	50.94	7.37	0	0
	27.65	64.3	8.05	0	0
	22.41	59.73	17.85	0	0
	0.04	58.3	41.53	0.12	0

(g) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
10.31	0	89.69	0	0	0
10.32	0	89.68	0	0	0
10.33	0	89.67	0	0	0
10.31	0	89.69	0	0	0
10.31	0	89.69	0	0	0
23.8	4.71	69.85	1.64	0	0
29.14	1.1	67.5	2.26	0	0
32.16	1.32	64.5	2.02	0	0
35.87	1.38	60.9	1.85	0	0
41.31	2.48	54.57	1.63	0	0
39.33	16.54	42.87	1.26	0	0
26.14	38.27	34.25	1.34	0	0
16.45	32.16	33.19	17.75	0.45	0
11.19	29.19	44.59	14.72	0.3	0
0.01	31.4	55.61	12.81	0.17	0

Memory Behavior Analysis: SPEC 2006 - gromacs - 2071B instructions

(a) MPKI over time and cache size (prefetching enabled)



(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	100	0	0	0	0
2MB	100	0	0	0	0
512KB	100	0	0	0	0
128KB	71.41	28.59	0	0	0
32KB	0.02	49.23	50.75	0	0
	0.02	0	98.37	1.61	0
	0.02	0	72.01	27.97	0

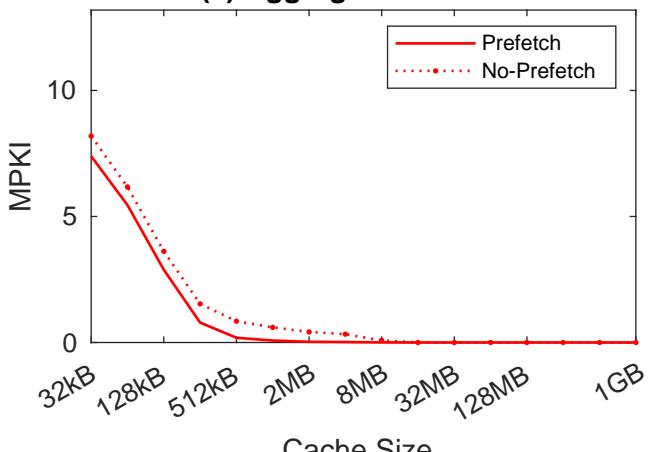
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
100	0	0	0	0	0
100	0	0	0	0	0
100	0	0	0	0	0
100	0	0	0	0	0
100	0	0	0	0	0
100	0	0	0	0	0
100	0	0	0	0	0
99.93	0.07	0	0	0	0
95.47	4.53	0	0	0	0
68.4	31.55	0.05	0	0	0
65.34	34.6	0.03	0.03	0	0
28.37	71.03	0.56	0.04	0	0
0.01	0.68	99.27	0.04	0	0
0.01	0	90.11	9.87	0	0
0.01	0	71.05	28.92	0.01	0

(d) Effects of Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	0	0	0	0	0
128MB	0	0	0	0	0
32MB	0	0	0	0	0
8MB	0	0	0	0	0
2MB	0.07	-0.07	0	0	0
512KB	4.53	-4.53	0	0	0
128KB	31.6	-31.55	-0.05	0	0
32KB	34.66	-34.6	-0.03	-0.03	0
	43.04	-42.44	-0.56	-0.04	0
	0.01	48.55	-48.52	-0.04	0
	0.01	0	8.26	-8.26	0
	0.01	0	0.96	-0.95	-0.01

(e) Aggregate MPKI



(f) Execution with Prefetching

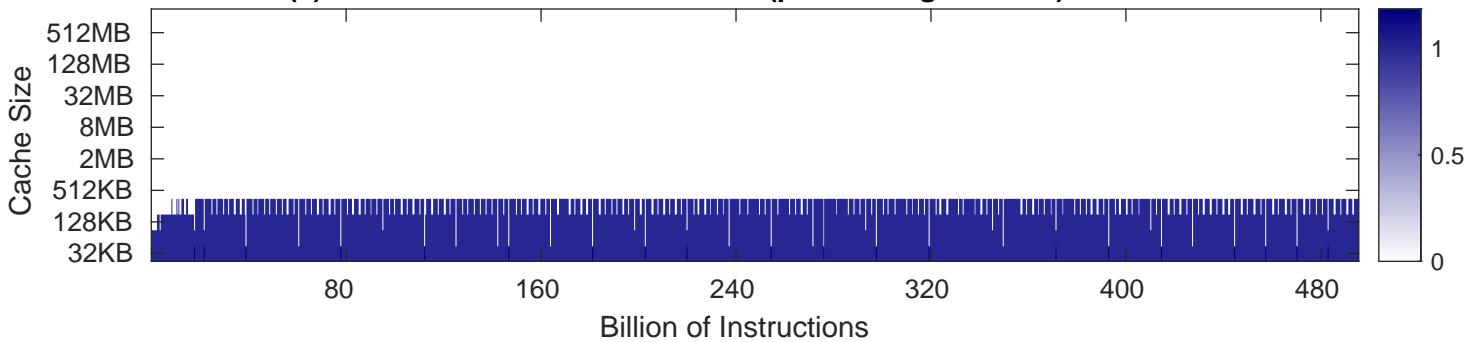
	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	100	0	0	0	0
2MB	100	0	0	0	0
512KB	100	0	0	0	0
128KB	56.14	43.86	0	0	0
32KB	0	41.09	58.91	0	0
	0	0	97.03	2.97	0
	0	0	47.97	52.03	0

(g) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
100	0	0	0	0	0
100	0	0	0	0	0
100	0	0	0	0	0
100	0	0	0	0	0
100	0	0	0	0	0
100	0	0	0	0	0
99.67	0.33	0	0	0	0
87.61	12.39	0	0	0	0
25.7	73.8	0.5	0	0	0
24.13	75.27	0.22	0.37	0	0
13.42	85.03	1.14	0.34	0.07	0
	0	0.55	99.26	0.16	0.03
	0	0	83.68	16.3	0.02
	0	0	49.87	50.1	0.03

Memory Behavior Analysis: SPEC 2006 - h264 i.p. 1 - 495B instructions

(a) MPKI over time and cache size (prefetching enabled)



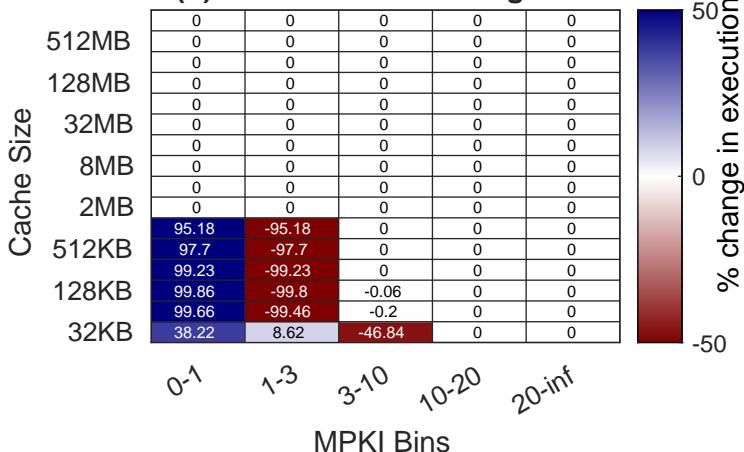
(b) Execution with Prefetching

Cache Size	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	100	0	0	0	0
2MB	100	0	0	0	0
512KB	100	0	0	0	0
128KB	100	0	0	0	0
32KB	99.72	0.28	0	0	0
	38.26	61.74	0	0	0

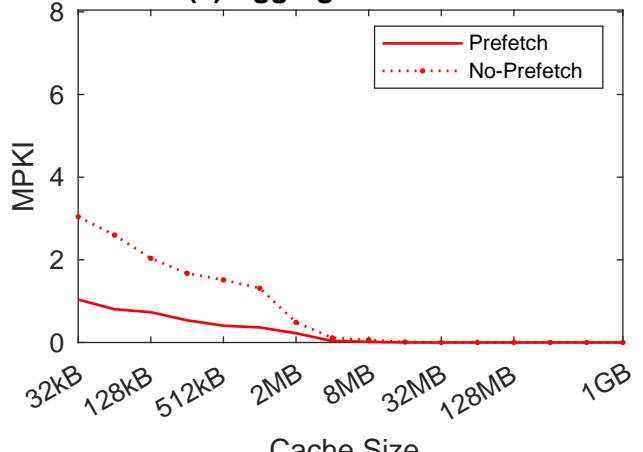
(c) Execution without Prefetching

Cache Size	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	100	0	0	0	0
2MB	100	0	0	0	0
512KB	100	0	0	0	0
128KB	100	0	0	0	0
32KB	4.82	95.18	0	0	0
	2.3	97.7	0	0	0
	0.77	99.23	0	0	0
	0.14	99.8	0.06	0	0
	0.06	99.74	0.2	0	0
	0.04	53.12	46.84	0	0

(d) Effects of Prefetching



(e) Aggregate MPKI



(f) Execution with Prefetching

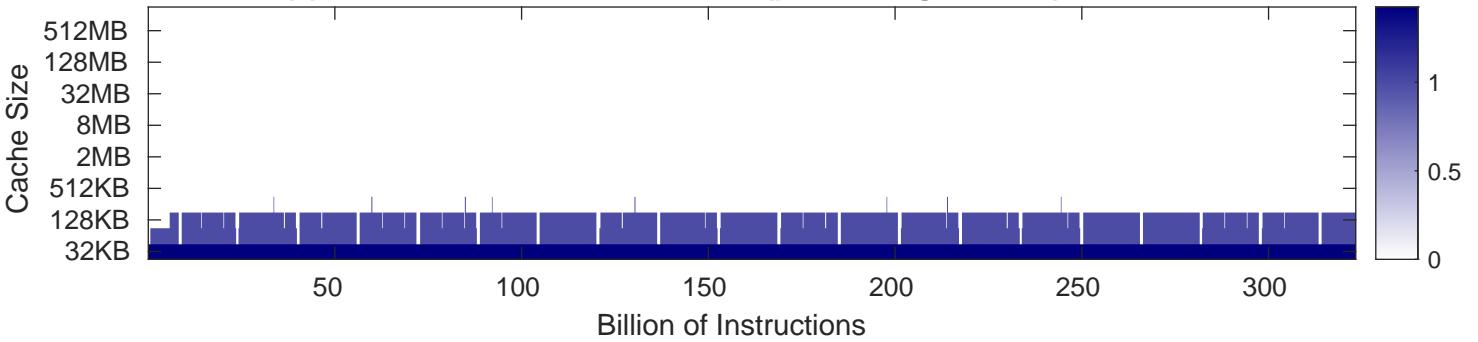
Cache Size	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	100	0	0	0	0
2MB	100	0	0	0	0
512KB	100	0	0	0	0
128KB	100	0	0	0	0
32KB	99.64	0.36	0	0	0
	33.91	66.09	0	0	0

(g) Execution without Prefetching

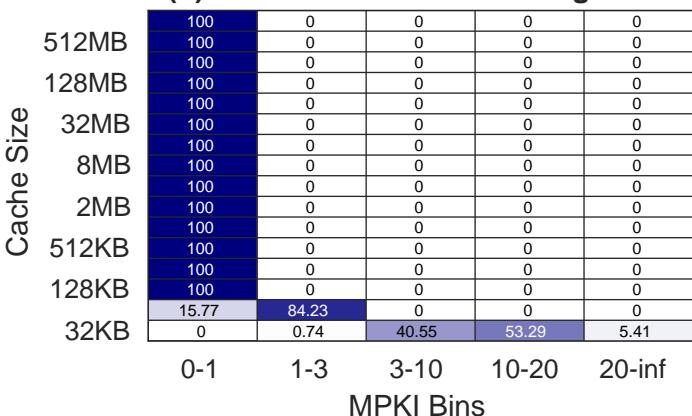
Cache Size	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	100	0	0	0	0
2MB	100	0	0	0	0
512KB	100	0	0	0	0
128KB	100	0	0	0	0
32KB	2.26	97.74	0	0	0
	1.13	98.87	0	0	0
	0.35	99.65	0	0	0
	0.04	99.87	0.09	0	0
	0.01	99.75	0.24	0	0
	0.01	48.71	51.28	0	0

Memory Behavior Analysis: SPEC 2006 - h264 i.p. 2 - 323B instructions

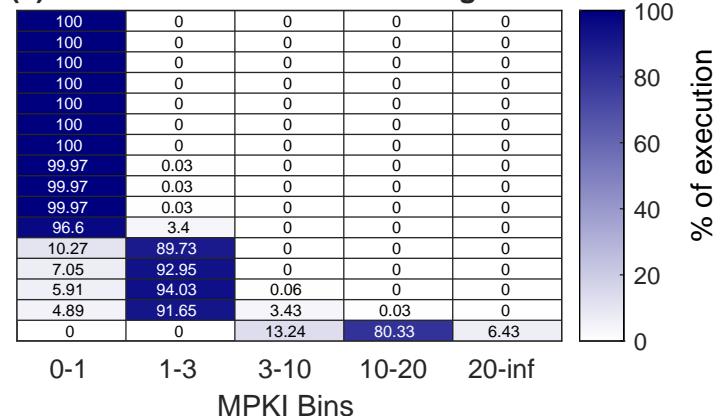
(a) MPKI over time and cache size (prefetching enabled)



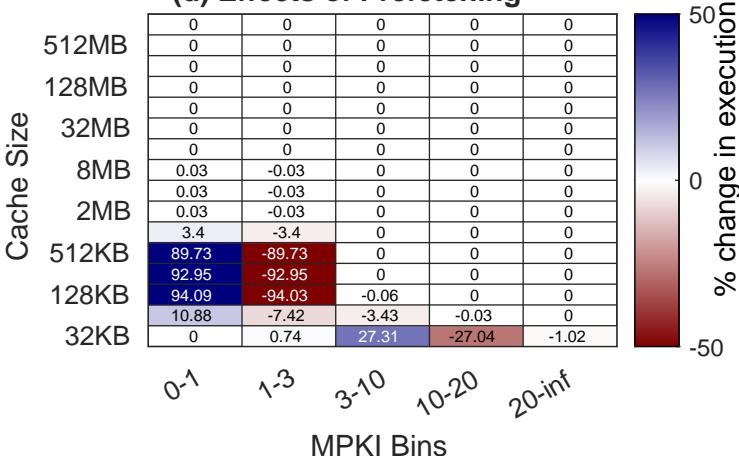
(b) Execution with Prefetching



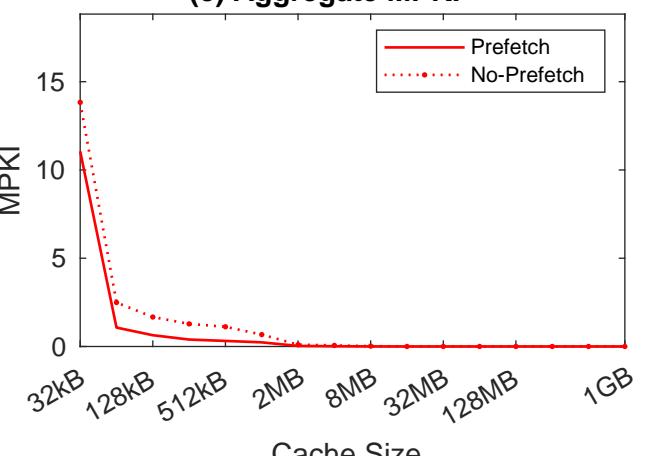
(c) Execution without Prefetching



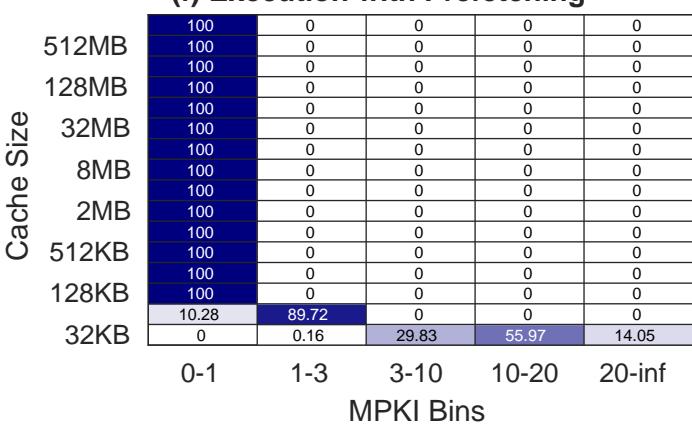
(d) Effects of Prefetching



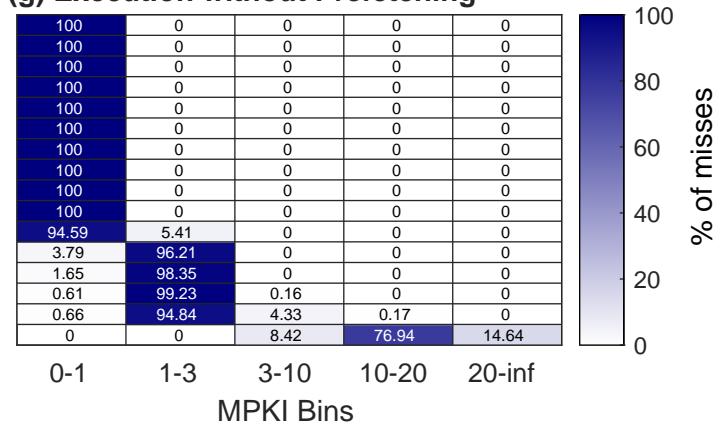
(e) Aggregate MPKI



(f) Execution with Prefetching

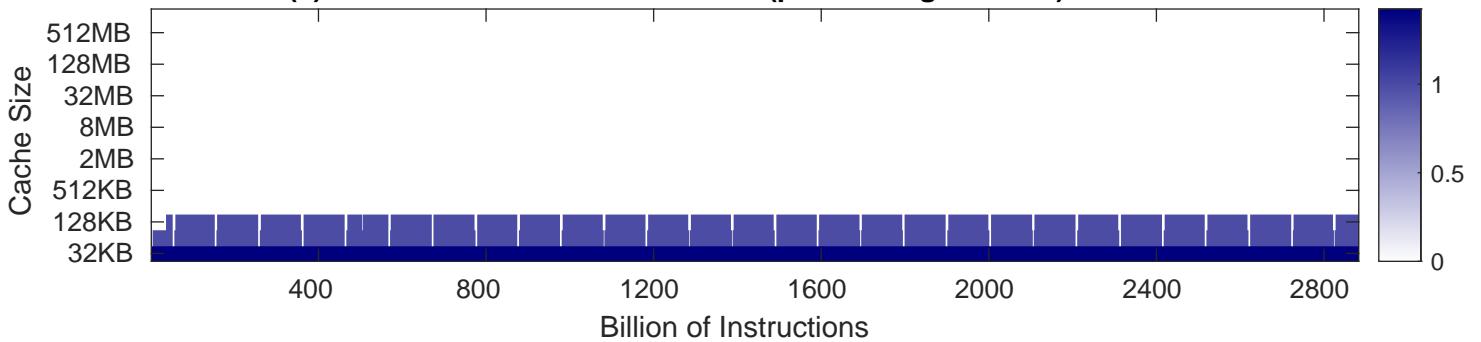


(g) Execution without Prefetching



Memory Behavior Analysis: SPEC 2006 - h264 i.p. 3 - 2882B instructions

(a) MPKI over time and cache size (prefetching enabled)



(b) Execution with Prefetching

Cache Size	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
	100	0	0	0	0
	100	0	0	0	0
128MB	100	0	0	0	0
	100	0	0	0	0
	100	0	0	0	0
32MB	100	0	0	0	0
	100	0	0	0	0
8MB	100	0	0	0	0
	100	0	0	0	0
2MB	100	0	0	0	0
	100	0	0	0	0
512KB	100	0	0	0	0
	100	0	0	0	0
128KB	100	0	0	0	0
	99.66	0.34	0	0	0
32KB	9.95	89.56	0.48	0	0
	0.43	0.19	38.65	55.94	4.78

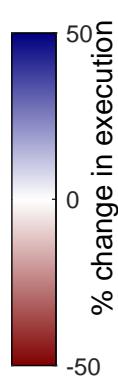
(c) Execution without Prefetching

MPKI Bins	0-1	1-3	3-10	10-20	20-inf
99.99	0.01	0	0	0	
99.99	0.01	0	0	0	
99.99	0.01	0	0	0	
99.99	0.01	0	0	0	
99.99	0.01	0	0	0	
99.99	0.01	0	0	0	
99.97	0.03	0	0	0	
99.74	0.26	0	0	0	
99.52	0.48	0	0	0	
99.47	0.53	0	0	0	
99.17	0.83	0	0	0	
8.25	91.71	0.04	0	0	
6.29	93.11	0.6	0	0	
5.77	93.36	0.52	0.35	0	
4.78	91.81	2.19	1.04	0.17	
0.04	0.09	6.11	87.98	5.78	

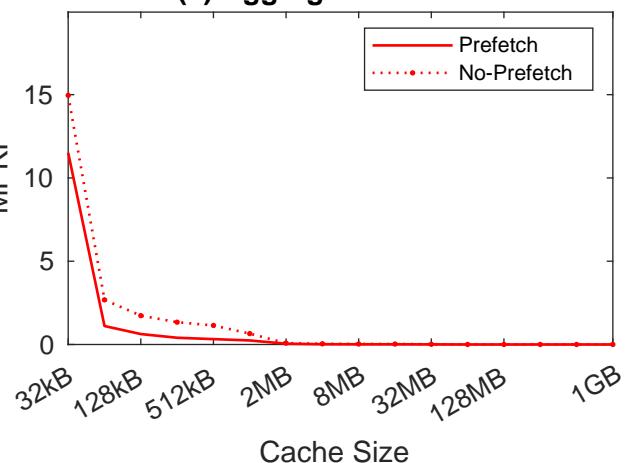


(d) Effects of Prefetching

Cache Size	0-1	1-3	3-10	10-20	20-inf
512MB	0.01	-0.01	0	0	0
	0.01	-0.01	0	0	0
	0.01	-0.01	0	0	0
	0.01	-0.01	0	0	0
128MB	0.01	-0.01	0	0	0
	0.01	-0.01	0	0	0
	0.01	-0.01	0	0	0
32MB	0.01	-0.01	0	0	0
	0.03	-0.03	0	0	0
8MB	0.26	-0.26	0	0	0
	0.48	-0.48	0	0	0
2MB	0.53	-0.53	0	0	0
	0.83	-0.83	0	0	0
512KB	91.75	-91.71	-0.04	0	0
	93.71	-93.11	-0.6	0	0
128KB	93.89	-93.02	-0.52	-0.35	0
	5.17	-2.25	-1.71	-1.04	-0.17
32KB	0.39	0.1	32.54	-32.04	-1



(e) Aggregate MPKI

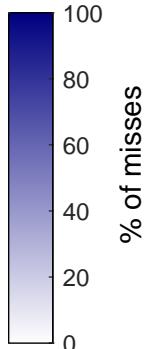


(f) Execution with Prefetching

Cache Size	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
	100	0	0	0	0
	100	0	0	0	0
128MB	100	0	0	0	0
	100	0	0	0	0
	100	0	0	0	0
32MB	100	0	0	0	0
	100	0	0	0	0
	100	0	0	0	0
8MB	100	0	0	0	0
	100	0	0	0	0
	100	0	0	0	0
2MB	100	0	0	0	0
	100	0	0	0	0
	100	0	0	0	0
512KB	100	0	0	0	0
	100	0	0	0	0
	100	0	0	0	0
128KB	99.32	0.68	0	0	0
	5.51	93.07	1.42	0	0
32KB	0.02	0.03	28.96	56.67	14.32

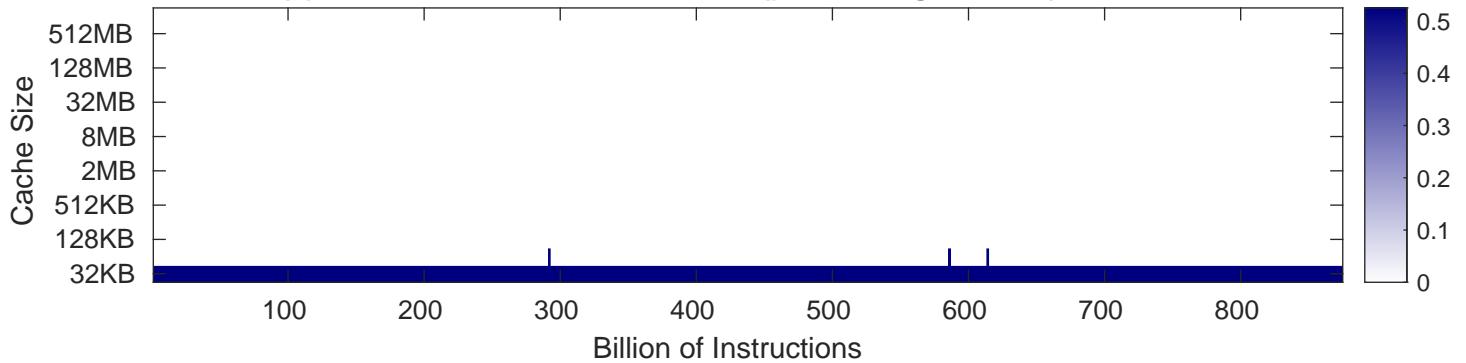
(g) Execution without Prefetching

MPKI Bins	0-1	1-3	3-10	10-20	20-inf
95.86	4.14	0	0	0	
95.86	4.14	0	0	0	
95.86	4.14	0	0	0	
95.86	4.14	0	0	0	
96.19	3.81	0	0	0	
99.45	0.55	0	0	0	
98.93	1.07	0	0	0	
89.2	10.8	0	0	0	
82.53	17.47	0	0	0	
89.8	10.2	0	0	0	
97.92	2.08	0	0	0	
2.12	97.69	0.18	0	0	
0.73	95.57	3.69	0	0	
0.41	95.28	1.89	2.42	0	
0.57	89.72	3.04	5.28	1.39	
0	0.01	3.57	82.41	14.01	

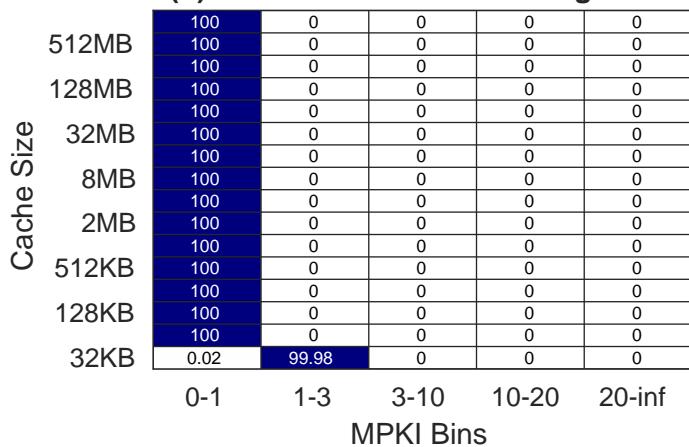


Memory Behavior Analysis: SPEC 2006 - hmmer i.p. 1 - 875B instructions

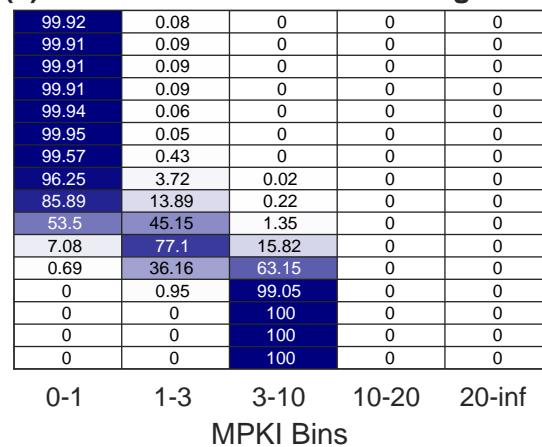
(a) MPKI over time and cache size (prefetching enabled)



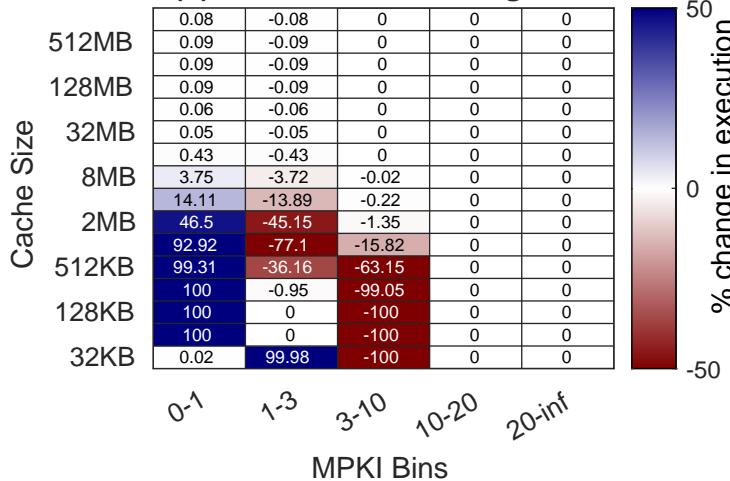
(b) Execution with Prefetching



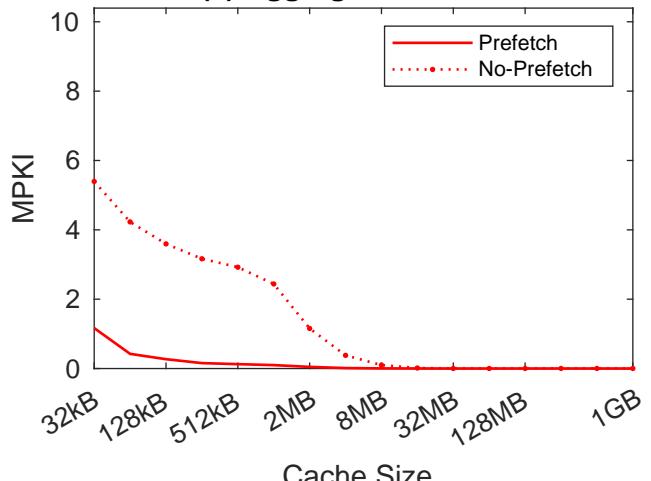
(c) Execution without Prefetching



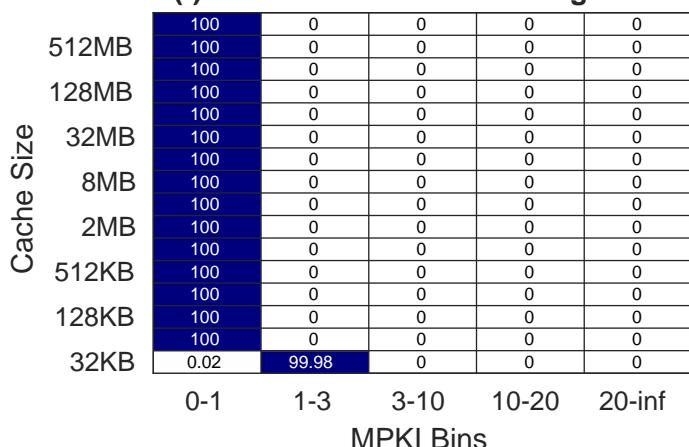
(d) Effects of Prefetching



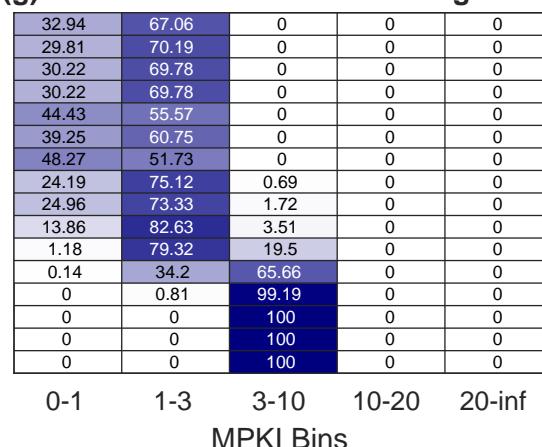
(e) Aggregate MPKI



(f) Execution with Prefetching

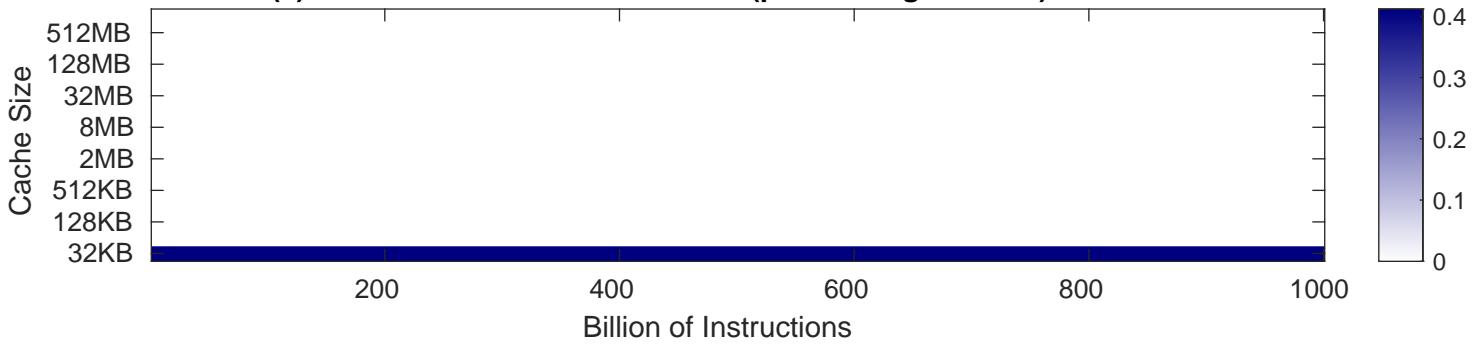


(g) Execution without Prefetching

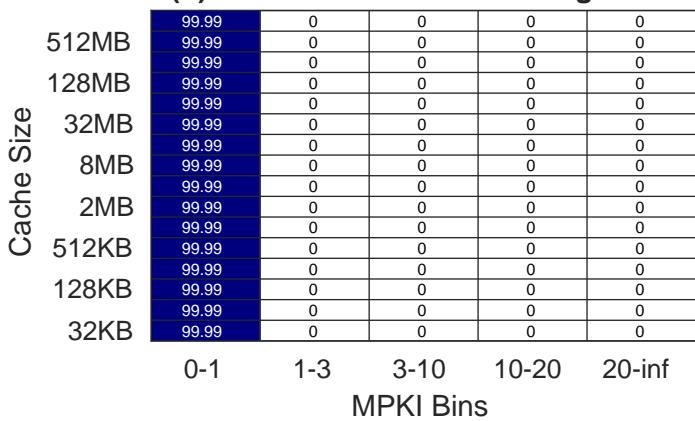


Memory Behavior Analysis: SPEC 2006 - hmmer i.p. 2 - 1000B instructions

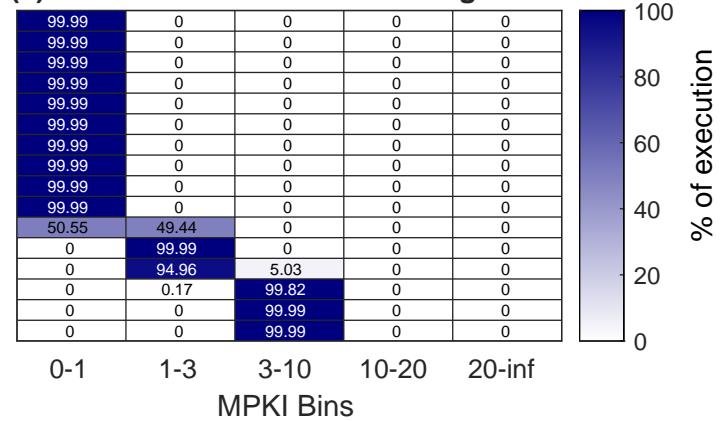
(a) MPKI over time and cache size (prefetching enabled)



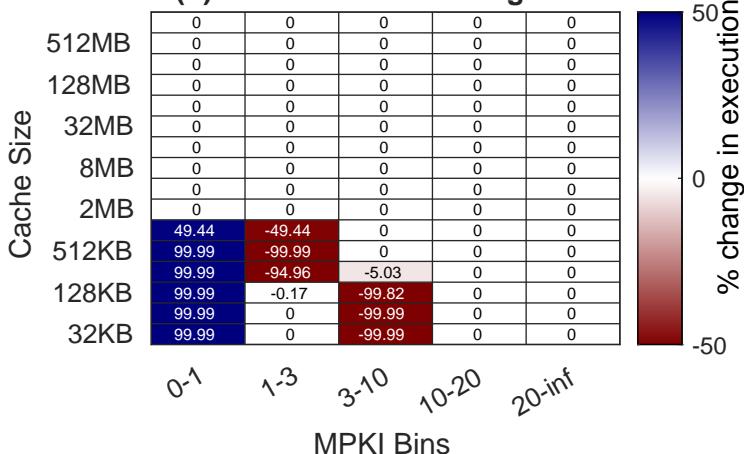
(b) Execution with Prefetching



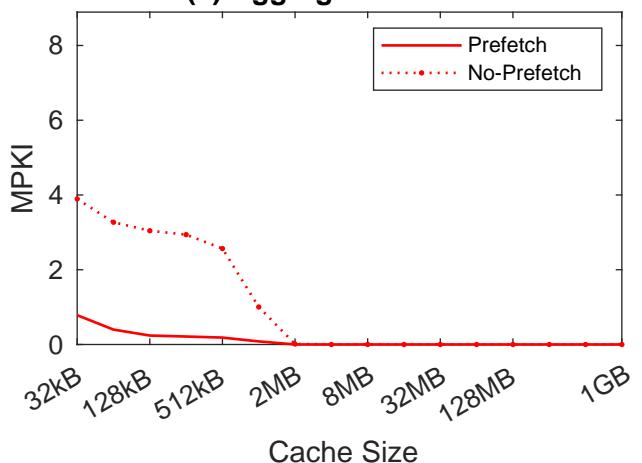
(c) Execution without Prefetching



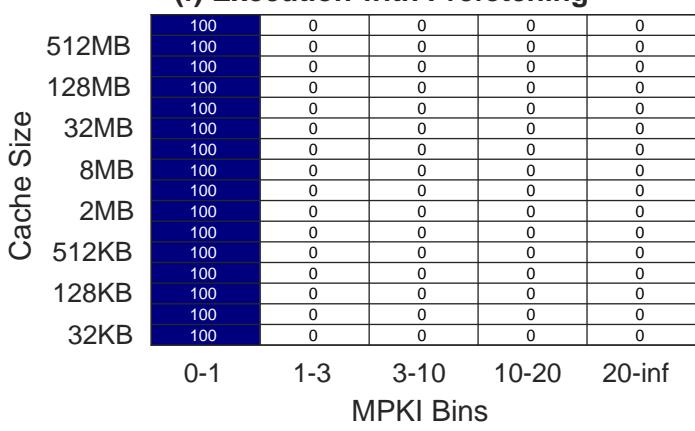
(d) Effects of Prefetching



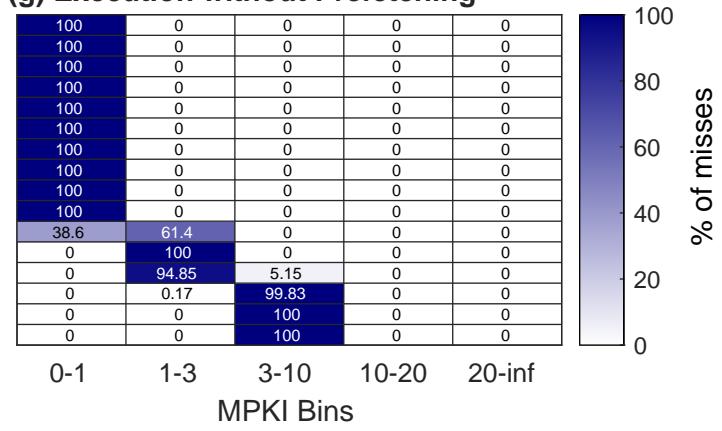
(e) Aggregate MPKI



(f) Execution with Prefetching

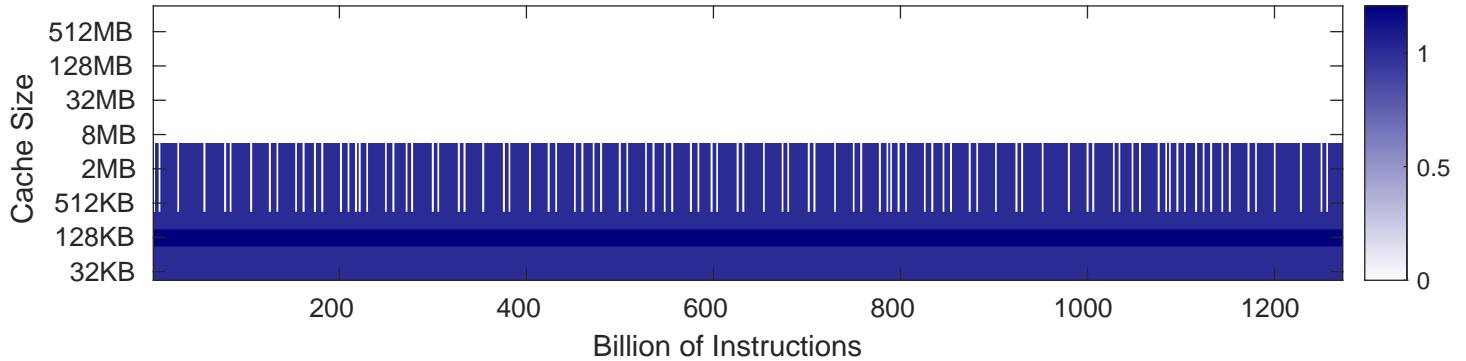


(g) Execution without Prefetching



Memory Behavior Analysis: SPEC 2006 - lmb - 1273B instructions

(a) MPKI over time and cache size (prefetching enabled)



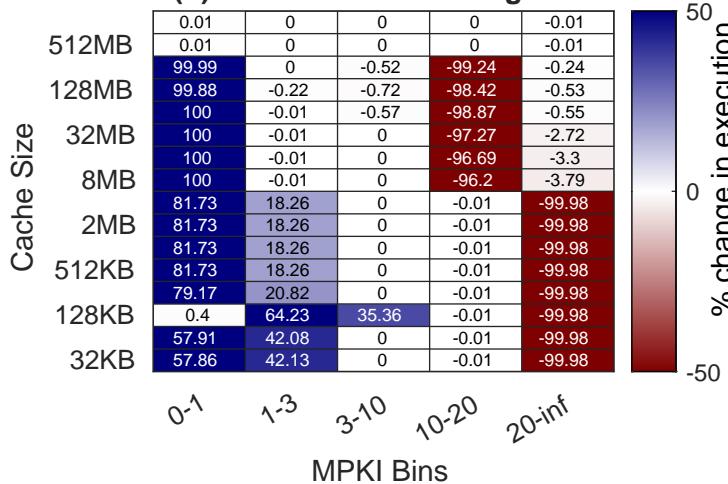
(b) Execution with Prefetching

Cache Size	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
	100	0	0	0	0
	100	0	0	0	0
128MB	100	0	0	0	0
	100	0	0	0	0
	100	0	0	0	0
32MB	100	0	0	0	0
	100	0	0	0	0
	100	0	0	0	0
8MB	100	0	0	0	0
	81.73	18.27	0	0	0
	81.73	18.27	0	0	0
	81.73	18.27	0	0	0
2MB	81.73	18.27	0	0	0
	79.17	20.83	0	0	0
	0.4	64.24	35.36	0	0
	57.91	42.09	0	0	0
512KB	57.86	42.14	0	0	0
	57.86	42.14	0	0	0
128KB					
32KB					

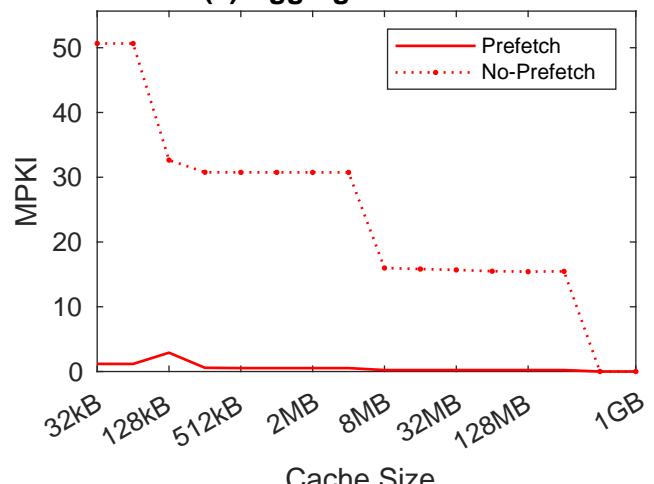
(c) Execution without Prefetching

Cache Size	0-1	1-3	3-10	10-20	20-inf
512MB	99.99	0	0	0	0.01
	99.99	0	0	0	0.01
	0.01	0	0.52	99.24	0.24
128MB	0.12	0.22	0.72	98.42	0.53
	0	0.01	0.57	98.87	0.55
	0	0.01	0	97.27	2.72
32MB	0	0.01	0	96.69	3.3
	0	0.01	0	96.2	3.79
8MB	0	0.01	0	0.01	99.98
	0	0.01	0	0.01	99.98
2MB	0	0.01	0	0.01	99.98
	0	0.01	0	0.01	99.98
512KB	0	0.01	0	0.01	99.98
	0	0.01	0	0.01	99.98
128KB	0	0.01	0	0.01	99.98
	0	0.01	0	0.01	99.98
32KB	0	0.01	0	0.01	99.98

(d) Effects of Prefetching



(e) Aggregate MPKI



(f) Execution with Prefetching

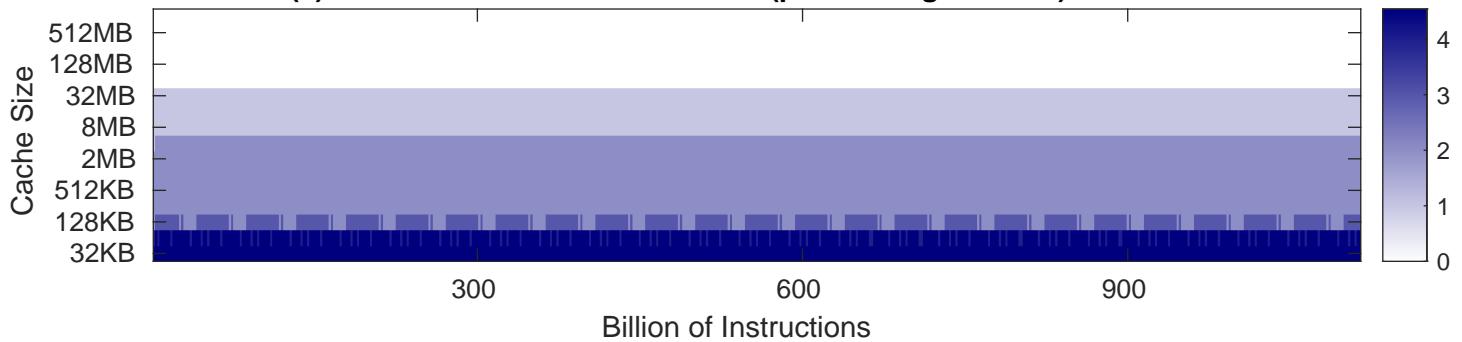
Cache Size	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
	100	0	0	0	0
	100	0	0	0	0
128MB	100	0	0	0	0
	100	0	0	0	0
	100	0	0	0	0
32MB	100	0	0	0	0
	100	0	0	0	0
	100	0	0	0	0
8MB	100	0	0	0	0
	58.75	41.25	0	0	0
2MB	58.75	41.25	0	0	0
	58.75	41.25	0	0	0
512KB	58.75	41.25	0	0	0
	55.33	44.67	0	0	0
128KB	0.05	57.39	42.56	0	0
	35.84	64.16	0	0	0
32KB	35.56	64.44	0	0	0

(g) Execution without Prefetching

Cache Size	0-1	1-3	3-10	10-20	20-inf
512MB	0.47	0	0	0	99.53
	0.47	0	0	0	99.53
	0	0	0.26	99.38	0.36
128MB	0	0.03	0.3	98.84	0.83
	0	0	0.26	98.88	0.86
	0	0	0	96.15	3.85
32MB	0	0	0	94.82	5.18
	0	0	0	93.33	6.67
8MB	0	0	0	0	100
	0	0	0	0	100
2MB	0	0	0	0	100
	0	0	0	0	100
512KB	0	0	0	0	100
	0	0	0	0	100
1MB	0	0	0	0	100
	0	0	0	0	100
2MB	0	0	0	0	100
	0	0	0	0	100
4MB	0	0	0	0	100
	0	0	0	0	100
8MB	0	0	0	0	100
	0	0	0	0	100
16MB	0	0	0	0	100
	0	0	0	0	100
32MB	0	0	0	0	100
	0	0	0	0	100
64MB	0	0	0	0	100
	0	0	0	0	100
128MB	0	0	0	0	100
	0	0	0	0	100
256MB	0	0	0	0	100
	0	0	0	0	100
512MB	0	0	0	0	100
	0	0	0	0	100
1GB	0	0	0	0	100

Memory Behavior Analysis: SPEC 2006 - leslie3d - 1115B instructions

(a) MPKI over time and cache size (prefetching enabled)



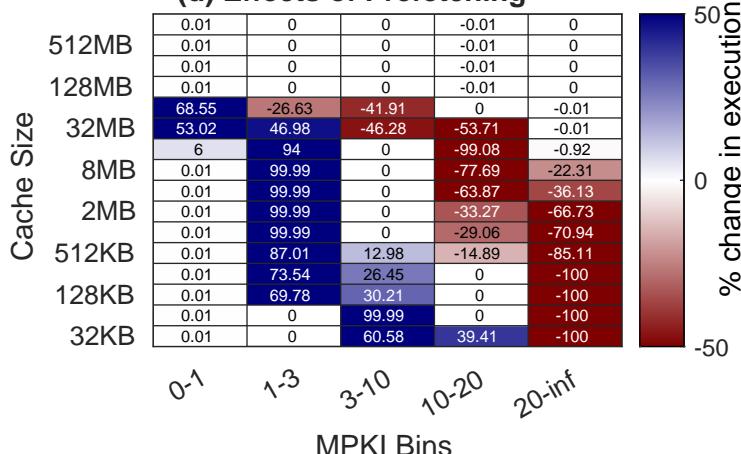
(b) Execution with Prefetching

Cache Size	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	53.02	46.98	0	0	0
2MB	6	94	0	0	0
512KB	0.01	99.99	0	0	0
128KB	0.01	99.99	0	0	0
32KB	0.01	99.99	0	0	0
	0.01	87.01	12.98	0	0
	0.01	73.54	26.45	0	0
	0.01	69.78	30.21	0	0
	0.01	0	99.99	0	0
	0.01	0	60.58	39.41	0

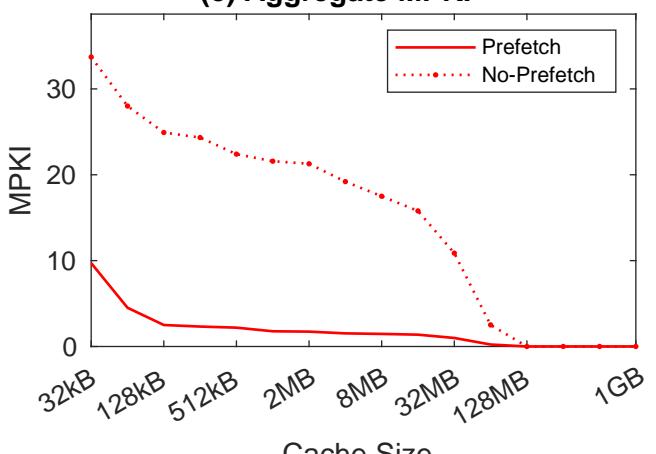
(c) Execution without Prefetching

Cache Size	0-1	1-3	3-10	10-20	20-inf
512MB	99.99	0	0	0.01	0
128MB	99.99	0	0	0.01	0
32MB	99.99	0	0	0.01	0
8MB	31.45	26.63	41.91	0	0.01
2MB	0	0	46.28	53.71	0.01
512KB	0	0	0	99.08	0.92
128KB	0	0	0	77.69	22.31
32KB	0	0	0	63.87	36.13
	0	0	0	33.27	66.73
	0	0	0	29.06	70.94
	0	0	0	14.89	85.11
	0	0	0	0	100
	0	0	0	0	100
	0	0	0	0	100

(d) Effects of Prefetching



(e) Aggregate MPKI



(f) Execution with Prefetching

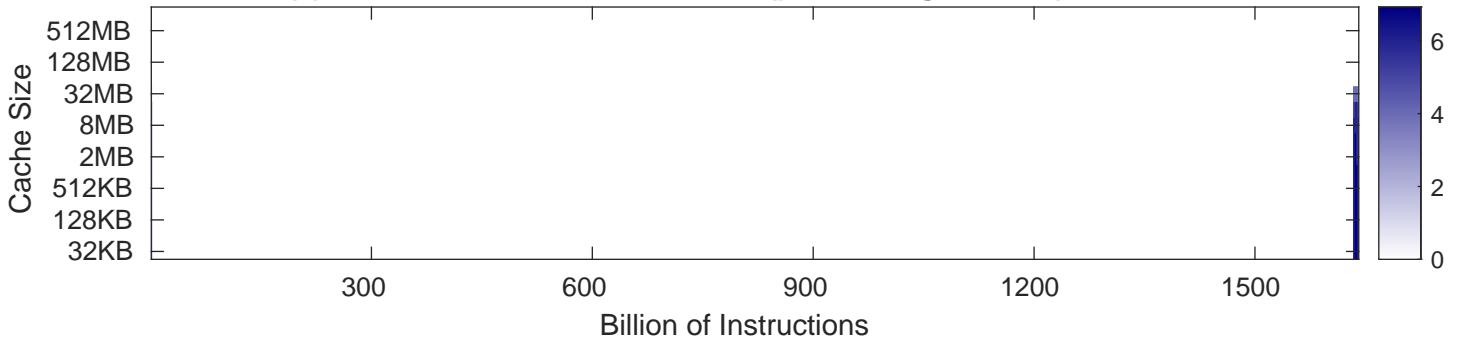
Cache Size	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	37.04	62.96	0	0	0
2MB	4.32	95.68	0	0	0
512KB	0	100	0	0	0
128KB	0	100	0	0	0
32KB	0	100	0	0	0
	0	80.55	19.45	0	0
	0	62.04	37.96	0	0
	0	58.43	41.57	0	0
	0	0	100	0	0
	0	0	56.3	43.7	0

(g) Execution without Prefetching

Cache Size	0-1	1-3	3-10	10-20	20-inf
512MB	1.44	0	0	98.56	0
128MB	1.44	0	0	98.56	0
32MB	1.44	0	0	98.56	0
8MB	7.72	17.07	75.09	0	0.12
2MB	0	0	38.44	61.53	0.03
512KB	0	0	0	98.81	1.19
128KB	0	0	0	73.01	26.99
32KB	0	0	0	58.45	41.55
	0	0	0	28.21	71.79
	0	0	0	24.33	75.67
	0	0	0	12.85	87.15
	0	0	0	0	100
	0	0	0	0	100
	0	0	0	0	100

Memory Behavior Analysis: SPEC 2006 - libquantum - 1640B instructions

(a) MPKI over time and cache size (prefetching enabled)



(b) Execution with Prefetching

Cache Size	MPKI Bins				
	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
512MB	100	0	0	0	0
512MB	100	0	0	0	0
512MB	100	0	0	0	0
512MB	99.99	0.01	0	0	0
32MB	99.7	0.09	0.12	0.09	0
32MB	99.67	0.07	0.15	0.09	0.02
8MB	99.67	0.05	0.16	0.06	0.06
2MB	99.66	0.05	0.16	0.06	0.06
512KB	99.66	0.05	0.15	0.07	0.06
512KB	99.66	0.05	0.15	0.07	0.06
128KB	99.66	0.05	0.15	0.07	0.06
32KB	99.66	0.05	0.15	0.07	0.06

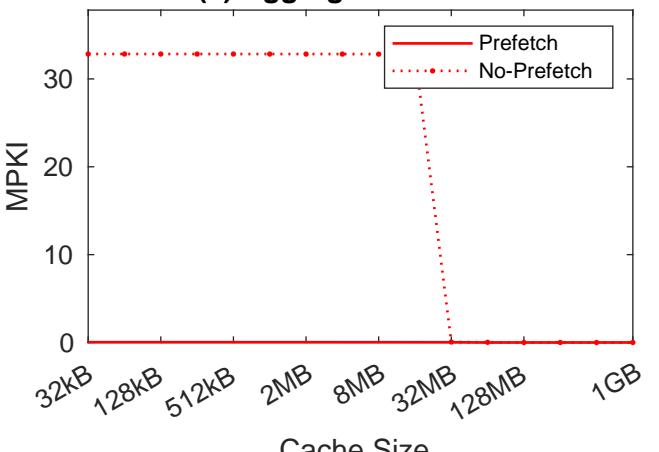
(c) Execution without Prefetching

Cache Size	MPKI Bins				
	0-1	1-3	3-10	10-20	20-inf
512MB	99.96	0.03	0.01	0	0
512MB	99.96	0.04	0.01	0	0
512MB	99.96	0.04	0.01	0	0
512MB	99.95	0.04	0.02	0	0
512MB	98.76	1.07	0.17	0	0
512MB	98.3	1.23	0.34	0.13	0
512MB	0.13	5.64	1.3	1.77	91.15
512MB	0.01	5.6	1.2	2.02	91.17
512MB	0.01	5.61	1.18	2.02	91.18
512MB	0	5.6	1.18	2.03	91.18
512MB	0	5.6	1.18	2.03	91.18
512MB	0	5.6	1.18	2.03	91.18
512MB	0	5.59	1.19	2.04	91.18

(d) Effects of Prefetching

Cache Size	MPKI Bins				
	0-1	1-3	3-10	10-20	20-inf
512MB	0.04	-0.03	-0.01	0	0
512MB	0.04	-0.04	-0.01	0	0
512MB	0.04	-0.04	-0.01	0	0
128MB	0.05	-0.04	-0.02	0	0
32MB	1.23	-1.06	-0.17	0	0
32MB	1.4	-1.14	-0.22	-0.04	0
8MB	99.54	-5.57	-1.15	-1.68	-91.13
8MB	99.66	-5.55	-1.04	-1.96	-91.11
8MB	99.65	-5.56	-1.02	-1.96	-91.12
2MB	99.66	-5.56	-1.02	-1.96	-91.12
512KB	99.66	-5.55	-1.03	-1.96	-91.12
512KB	99.66	-5.55	-1.03	-1.96	-91.12
128KB	99.66	-5.55	-1.03	-1.96	-91.12
32KB	99.66	-5.54	-1.04	-1.97	-91.12

(e) Aggregate MPKI



(f) Execution with Prefetching

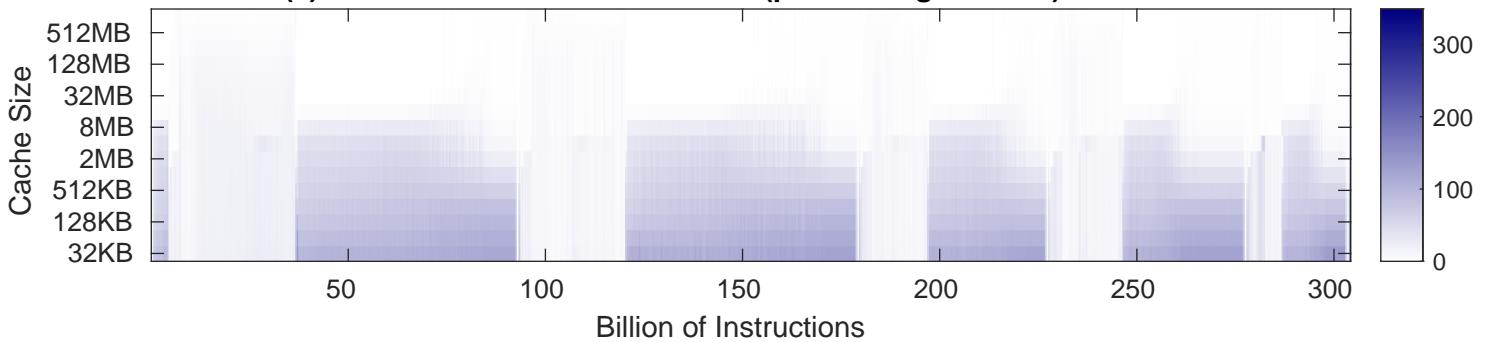
Cache Size	MPKI Bins				
	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
512MB	100	0	0	0	0
512MB	100	0	0	0	0
512MB	41.57	58.43	0	0	0
32MB	19.83	6.79	26.26	47.12	0
32MB	3.24	4.82	26.64	52.37	12.93
8MB	2.64	2.69	25.22	28.49	40.97
2MB	2.56	2.93	24.76	28.37	41.39
512KB	2.42	2.91	22.77	30.27	41.64
512KB	2.41	2.89	22.79	30.24	41.67
128KB	2.37	2.89	22.8	30.25	41.69
32KB	2.36	2.9	22.84	30.23	41.67
32KB	2.4	2.91	22.82	30.21	41.66
32KB	2.55	2.9	22.82	30.17	41.56

(g) Execution without Prefetching

Cache Size	MPKI Bins				
	0-1	1-3	3-10	10-20	20-inf
512MB	48.86	34.14	17	0	0
512MB	46.27	37.07	16.67	0	0
512MB	46.27	37.07	16.67	0	0
512MB	54.5	21.03	24.47	0	0
512MB	7.53	57.27	35.19	0	0
512MB	10.2	27.54	29.88	32.38	0
512MB	0	0.31	0.27	0.82	98.59
512MB	0	0.31	0.26	0.93	98.5
512MB	0	0.31	0.26	0.93	98.5
512MB	0	0.31	0.25	0.93	98.5
512MB	0	0.31	0.25	0.93	98.5
512MB	0	0.31	0.25	0.93	98.5
512MB	0	0.31	0.25	0.94	98.5
512MB	0	0.31	0.25	0.94	98.5

Memory Behavior Analysis: SPEC 2006 - mcf - 304B instructions

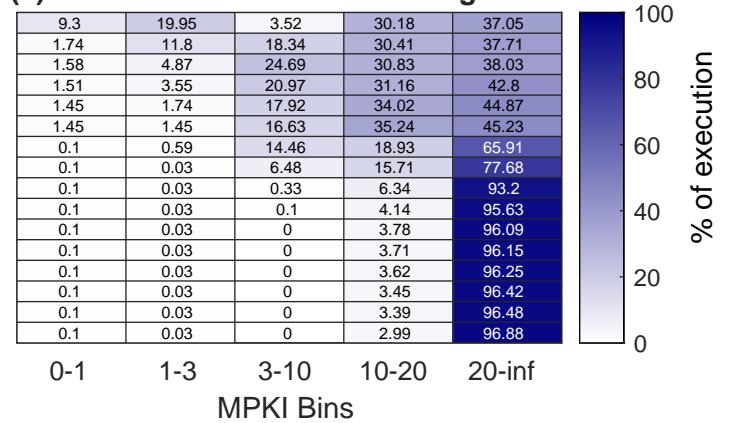
(a) MPKI over time and cache size (prefetching enabled)



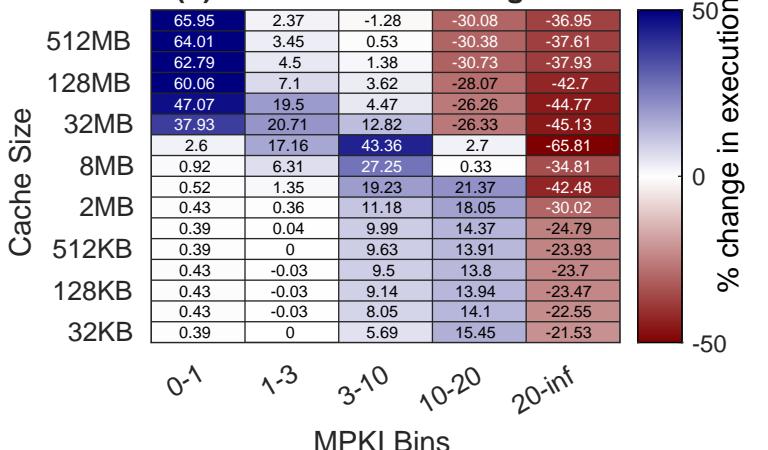
(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	75.25	22.32	2.24	0.1	0.1
128MB	65.75	15.25	18.87	0.03	0.1
32MB	64.37	9.37	26.07	0.1	0.1
8MB	61.57	10.65	24.59	3.09	0.1
2MB	48.52	21.24	22.39	7.76	0.1
512KB	39.38	22.16	29.45	8.91	0.1
128KB	2.7	17.75	57.82	21.63	0.1
32KB	1.02	6.34	33.73	16.04	42.87
	0.62	1.38	19.56	27.71	50.72
512MB	0.53	0.39	11.28	22.19	65.61
128MB	0.49	0.07	9.99	18.15	71.3
32MB	0.49	0.03	9.63	17.62	72.22
8MB	0.53	0	9.5	17.42	72.55
2MB	0.53	0	9.14	17.39	72.95
512KB	0.53	0	8.05	17.49	73.93
128KB	0.49	0.03	5.69	18.44	75.35
32KB	0.49	0.03	5.69	18.44	75.35

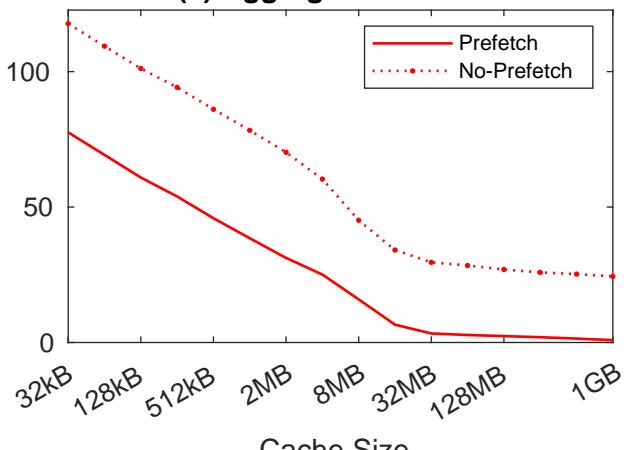
(c) Execution without Prefetching



(d) Effects of Prefetching



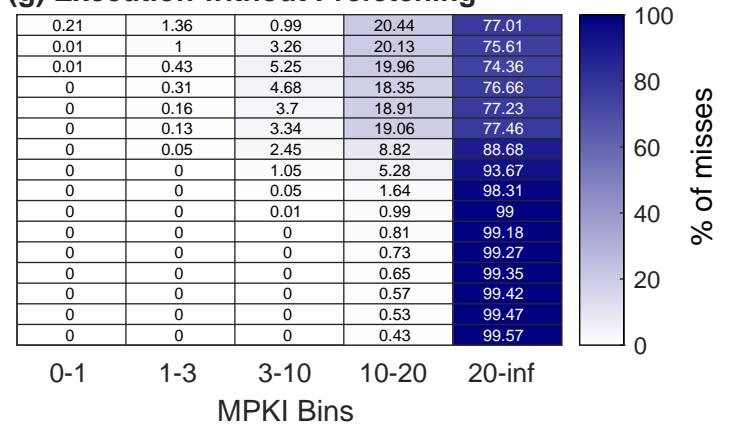
(e) Aggregate MPKI



(f) Execution with Prefetching

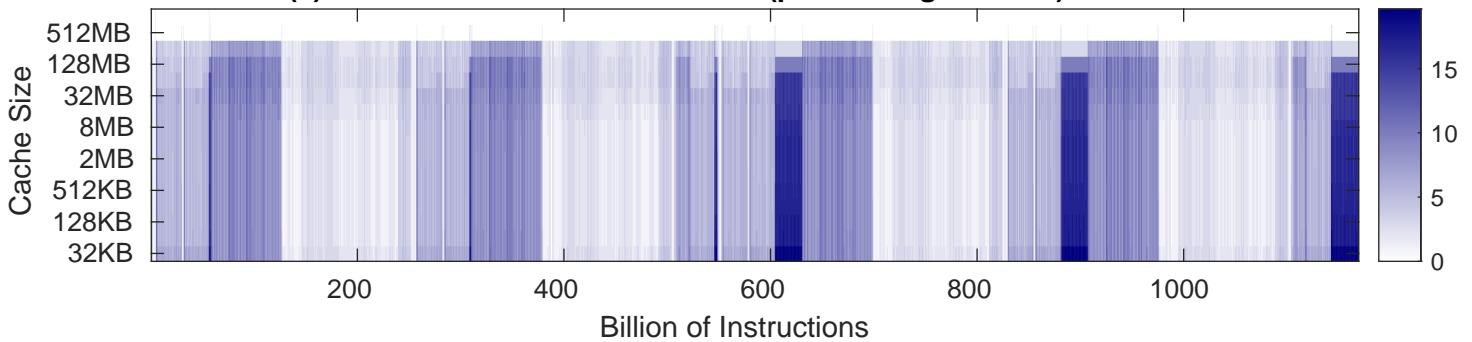
	0-1	1-3	3-10	10-20	20-inf
512MB	35.95	42.8	10.32	1.37	9.56
128MB	17.03	21.13	53.04	0.26	8.53
32MB	12.67	9.67	69.96	0.57	7.13
8MB	10.29	9.02	60.38	14.12	6.18
2MB	5.18	12.85	41.8	34.8	5.37
512KB	3.23	11.28	44.57	36.41	4.52
128KB	0.25	5.52	47.93	44	2.3
32KB	0.03	0.87	11.48	15.49	72.13
	0.01	0.12	6.02	15.57	78.28
512MB	0.01	0.02	2.89	11.15	85.93
128MB	0	0	2.12	7.15	90.72
32MB	0	0	1.74	5.82	92.44
8MB	0	0	1.46	4.89	93.64
2MB	0	0	1.25	4.3	94.44
512KB	0	0	0.98	3.75	95.27
128KB	0	0	0.63	3.47	95.9
32KB	0	0	0.63	3.47	95.9

(g) Execution without Prefetching



Memory Behavior Analysis: SPEC 2006 - milc - 1169B instructions

(a) MPKI over time and cache size (prefetching enabled)



(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	99.9	0.04	0.06	0	0
128MB	99.03	0.51	0.45	0	0
32MB	19.17	21.62	52.72	6.41	0.09
8MB	10.22	20.71	55.01	13.45	0.61
2MB	8.49	21.46	53.02	14.72	2.31
512KB	20.14	10.76	50.89	15.7	2.5
128KB	22.23	10.85	49.71	14.94	2.27
32KB	22.93	11.01	48.74	14.94	2.38
512MB	23.06	11.16	48.31	14.93	2.54
128MB	23.06	11.26	48.21	14.93	2.55
32MB	23.06	11.24	48.22	14.93	2.56
8MB	23.06	11.24	48.03	15.04	2.63
2MB	23.06	11.22	47.97	15.07	2.68
512KB	23.06	11.22	47.88	15.06	2.77
128KB	23.04	11.01	47.91	15.11	2.93
32KB	20.95	8.64	51.59	14.87	3.96

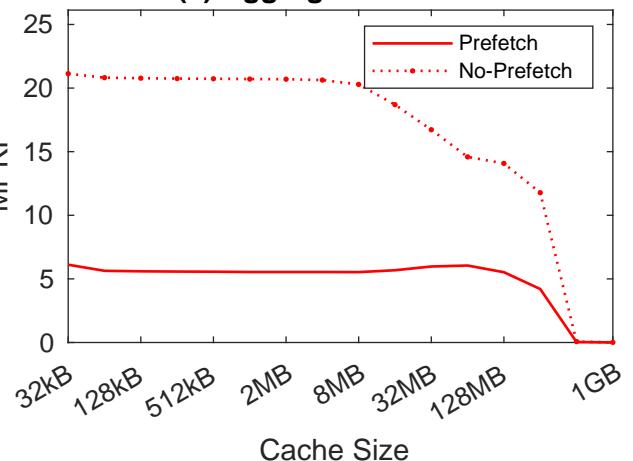
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	99.77	0.08	0.14	0.02	0
128MB	98.17	1.03	0.69	0.1	0
32MB	2.27	0.33	24.52	69.75	3.13
8MB	2.28	0.18	3.46	85.83	8.26
2MB	2.27	0.19	3	81.38	13.16
512KB	2.27	0.19	0.49	76.23	20.83
128KB	2.26	0.2	0.2	66.63	30.72
32KB	2.27	0.19	0.16	53.02	44.37
512MB	2.27	0.19	0.16	51.17	46.22
128MB	2.27	0.19	0.16	50.92	46.46
32MB	2.26	0.2	0.16	50.89	46.5
8MB	1.64	0.81	0.16	50.65	46.74
2MB	1.64	0.8	0.16	50.53	46.85
512KB	1.64	0.8	0.17	50.26	47.12
128KB	1.64	0.8	0.17	49.85	47.53
32KB	1.63	0.19	0.15	48.91	49.13

(d) Effects of Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	0.13	-0.04	-0.08	-0.02	0
128MB	0.86	-0.52	-0.24	-0.1	0
32MB	16.9	21.29	28.2	-63.34	-3.04
8MB	7.94	20.53	51.55	-72.38	-7.65
2MB	6.22	21.27	50.02	-66.66	-10.85
512KB	17.87	10.57	50.4	-60.53	-18.33
128KB	19.97	10.65	49.51	-51.69	-28.45
32KB	20.66	10.82	48.58	-38.08	-41.99
512MB	20.79	10.97	48.15	-36.24	-43.68
128MB	20.79	11.07	48.05	-35.99	-43.91
32MB	20.8	11.04	48.06	-35.96	-43.94
8MB	21.42	10.43	47.87	-35.61	-44.11
2MB	20.79	11.03	47.81	-35.46	-44.17
512KB	21.42	10.42	47.71	-35.2	-44.35
128KB	21.4	10.21	47.74	-34.74	-44.6
32KB	19.32	8.45	51.44	-34.04	-45.17

(e) Aggregate MPKI



(f) Execution with Prefetching

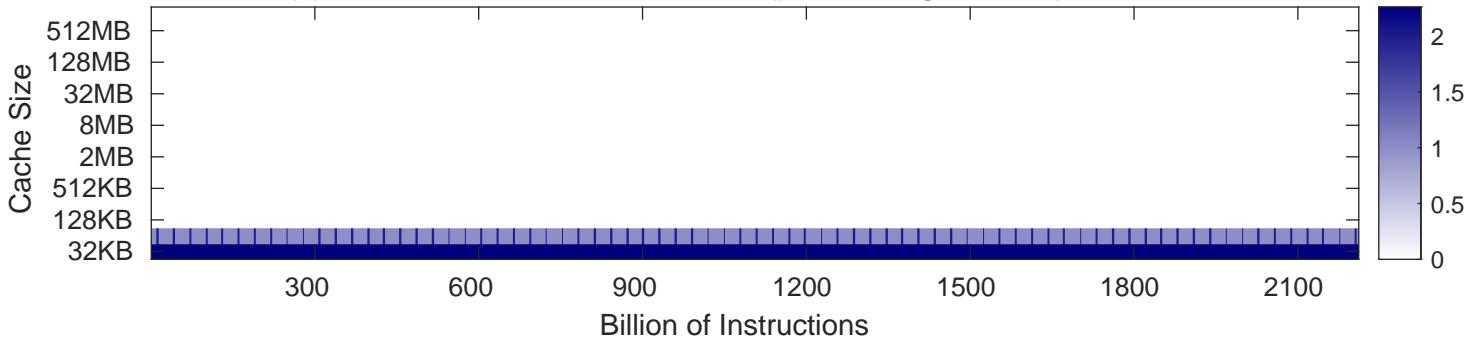
	0-1	1-3	3-10	10-20	20-inf
512MB	12.22	19.49	68.3	0	0
128MB	18.73	23.98	57.29	0	0
32MB	3.25	10.78	65.21	20.35	0.41
8MB	1.35	6.31	57.25	32.65	2.44
2MB	1.03	6	49.86	34.74	8.38
512KB	2.39	3.9	47.69	36.85	9.17
128KB	1.72	4.36	48.1	37.02	8.79
32KB	0.89	4.46	47.02	38.12	9.51
512MB	0.75	4.52	46.39	38.12	10.22
128MB	0.74	4.56	46.28	38.16	10.26
32MB	0.74	4.55	46.28	38.14	10.29
8MB	0.73	4.52	45.7	38.35	10.56
2MB	0.73	4.51	45.44	38.28	11.04
512KB	0.75	4.4	45.13	38.17	11.55
128KB	1.38	2.94	45.92	34.83	14.93

(g) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	10.08	13.4	56.48	20.04	0
128MB	10.09	24	47.47	18.44	0
32MB	0.19	0.06	16.34	77.25	6.17
8MB	0.15	0.02	2.22	83.81	13.8
2MB	0.15	0.02	1.87	77.01	20.95
512KB	0.13	0.02	0.25	70.38	29.23
128KB	0.12	0.02	0.07	59.55	40.25
32KB	0.11	0.01	0.05	45.26	54.56
512MB	0.11	0.01	0.05	43.21	56.62
128MB	0.11	0.01	0.05	42.94	56.9
32MB	0.11	0.01	0.05	42.9	56.93
8MB	0.08	0.05	0.05	42.67	57.15
2MB	0.11	0.01	0.05	42.56	57.27
512KB	0.08	0.06	0.05	42.28	57.53
128KB	0.08	0.05	0.06	41.85	57.97
32KB	0.07	0.01	0.05	40.24	59.62

Memory Behavior Analysis: SPEC 2006 - namd - 2211B instructions

(a) MPKI over time and cache size (prefetching enabled)



(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	100	0	0	0	0
2MB	99.06	0.94	0	0	0
512KB	99.05	0.95	0	0	0
128KB	99.34	0.66	0	0	0
32KB	99.43	0.57	0	0	0
	55.9	44.08	0.02	0	0
	0.06	0	99.94	0	0

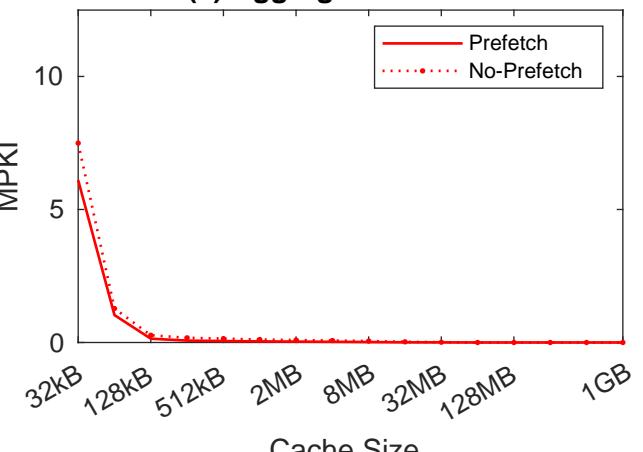
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	99.99	0	0.01	0	0
128MB	99.99	0	0.01	0	0
32MB	99.99	0	0.01	0	0
8MB	99.99	0	0.01	0	0
2MB	99.99	0	0.01	0	0
512KB	99.53	0.46	0.01	0	0
128KB	99.16	0.84	0.01	0	0
32KB	98.89	1.02	0.09	0	0
	98.87	0.26	0.87	0	0
	98.87	0.23	0.9	0	0
	98.85	0.24	0.91	0	0
	98.85	0.23	0.91	0	0
	98.87	0.2	0.93	0	0
	98.86	0.2	0.94	0	0
	40.44	57.94	1.63	0	0
	0.06	0	85.28	14.66	0

(d) Effects of Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	0.01	0	-0.01	0	0
128MB	0.01	0	-0.01	0	0
32MB	0.01	0	-0.01	0	0
8MB	0.47	-0.46	-0.01	0	0
2MB	0.84	-0.84	-0.01	0	0
512KB	1.11	-1.02	-0.09	0	0
128KB	1.13	-0.26	-0.87	0	0
32KB	0.19	0.71	-0.9	0	0
	0.2	0.71	-0.91	0	0
	0.47	0.72	-0.91	0	0
	0.57	0.37	-0.94	0	0
	15.46	-13.86	-1.61	0	0
	0	0	14.66	-14.66	0

(e) Aggregate MPKI



(f) Execution with Prefetching

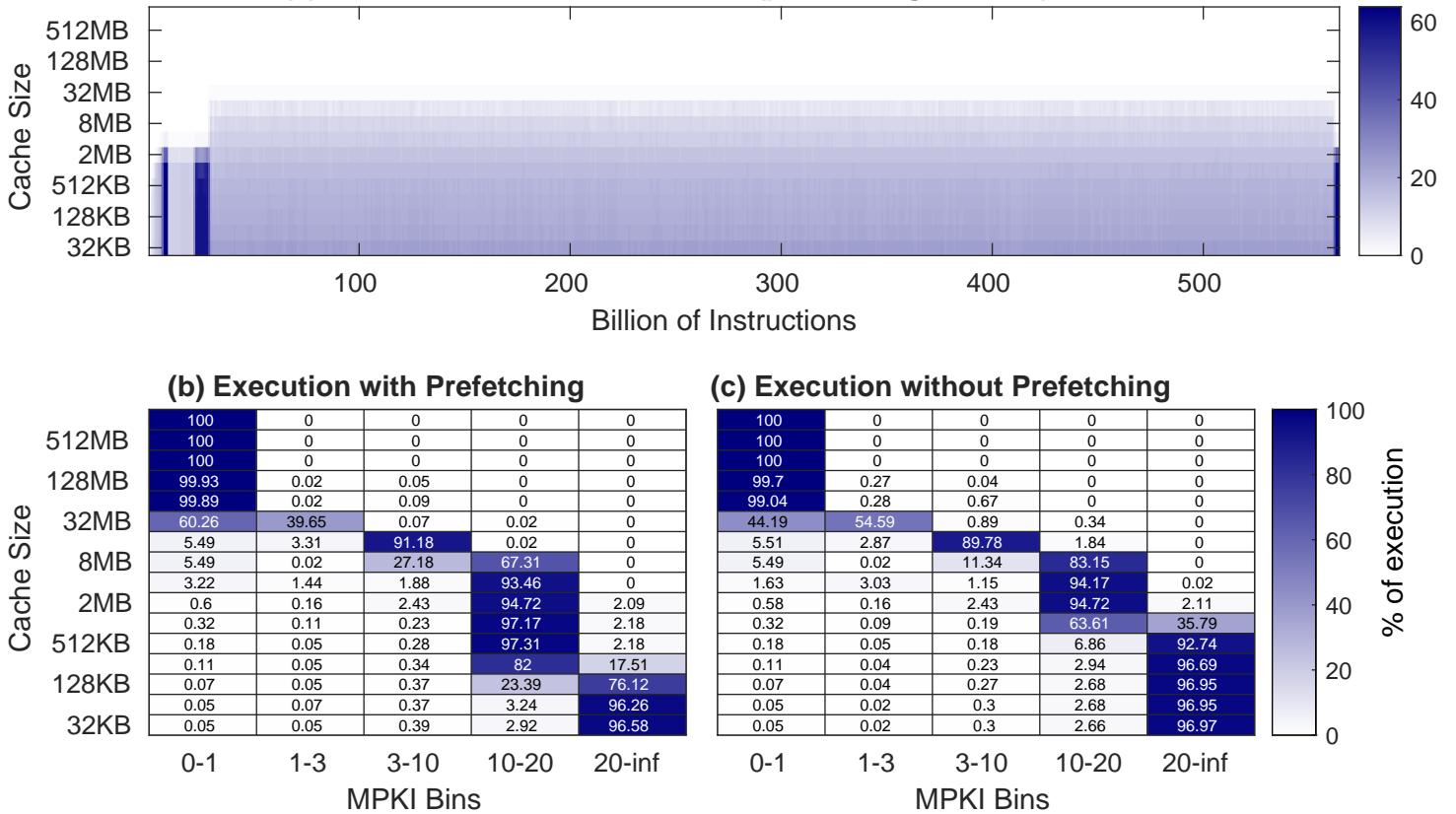
	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	100	0	0	0	0
2MB	70.29	29.71	0	0	0
512KB	75.43	24.57	0	0	0
128KB	80.13	19.87	0	0	0
32KB	89.27	10.73	0	0	0
	95.89	4.11	0	0	0
	39.55	60.39	0.07	0	0
	0	0	100	0	0

(g) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	39.36	0	60.64	0	0
128MB	39.36	0	60.64	0	0
32MB	40.5	56.91	2.59	0	0
8MB	44.78	54.12	1.1	0	0
2MB	49.52	44.79	5.69	0	0
	54.87	6.74	38.39	0	0
	60.88	4.78	34.35	0	0
	67.73	3.98	28.29	0	0
	74.8	3.02	22.18	0	0
	78.95	2.13	18.92	0	0
	86.22	1.33	12.44	0	0
	27.65	65.9	6.45	0	0
	0	0	78.94	21.06	0

Memory Behavior Analysis: SPEC 2006 - omnetpp - 564B instructions

(a) MPKI over time and cache size (prefetching enabled)



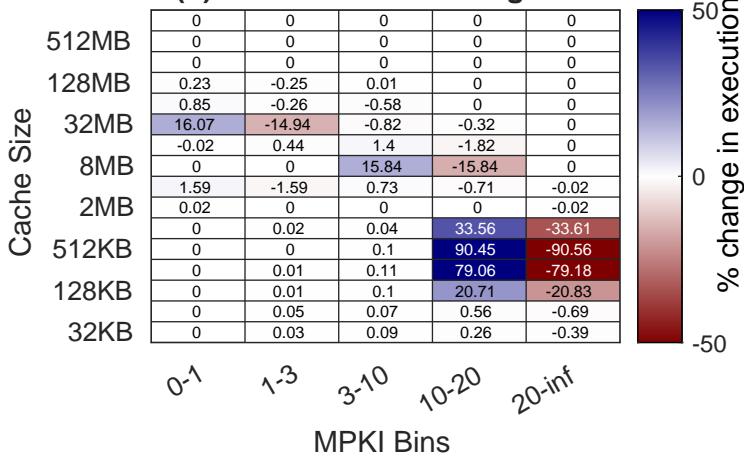
(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	99.93	0.02	0.05	0	0
2MB	99.89	0.02	0.09	0	0
512KB	60.26	39.65	0.07	0.02	0
128KB	5.49	3.31	91.18	0.02	0
32KB	5.49	0.02	27.18	67.31	0

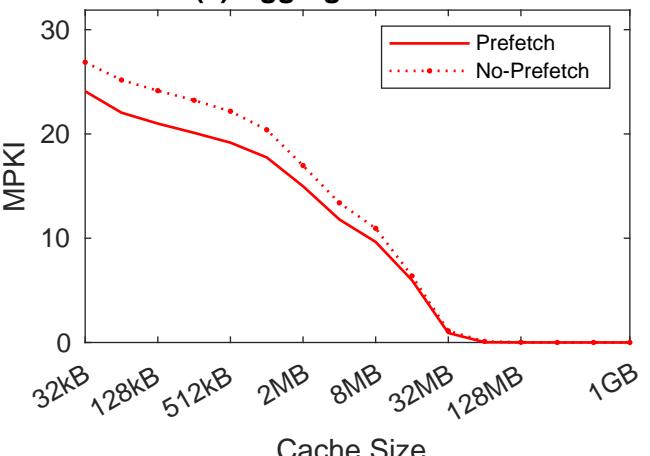
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	99.7	0.27	0.04	0	0
2MB	99.04	0.28	0.67	0	0
512KB	44.19	54.59	0.89	0.34	0
128KB	5.51	2.87	89.78	1.84	0
32KB	5.49	0.02	11.34	83.15	0

(d) Effects of Prefetching



(e) Aggregate MPKI



(f) Execution with Prefetching

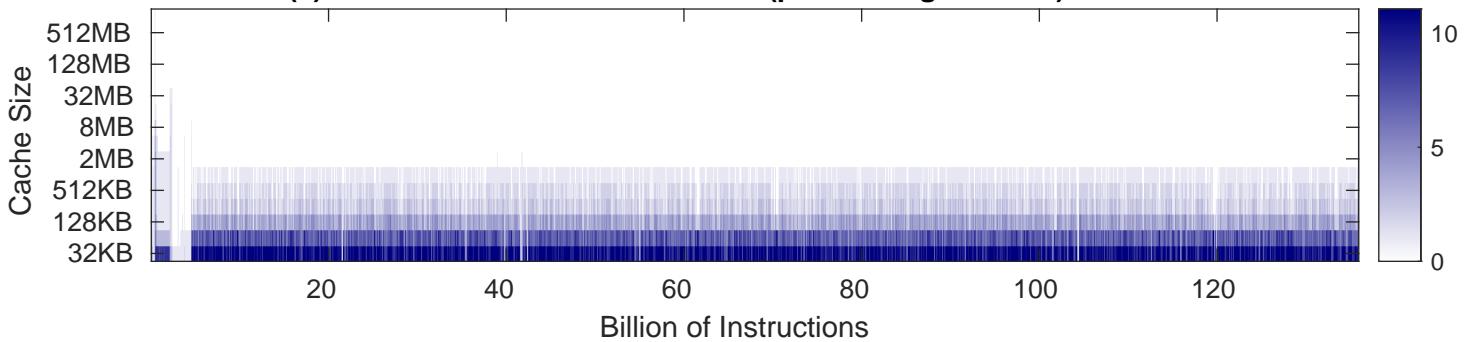
	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	62.26	7.15	30.59	0	0
8MB	83.03	1.39	15.59	0	0
2MB	45.33	54.09	0.38	0.2	0
512KB	0.06	1.29	98.61	0.04	0
128KB	0.05	0	25.27	74.68	0
32KB	0.17	0.26	1.05	98.52	0

(g) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	68.93	23.79	7.28	0	0
8MB	58.98	6.03	34.98	0	0
2MB	27.17	64.17	5.39	3.28	0
512KB	0.14	1.06	95.48	3.32	0
128KB	0.1	0	9.18	90.71	0
32KB	0.07	0.4	0.45	99.06	0.03

Memory Behavior Analysis: SPEC 2006 - perl i.p. 1 - 135B instructions

(a) MPKI over time and cache size (prefetching enabled)



(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	99.93	0.07	0	0	0
8MB	99.93	0.07	0	0	0
2MB	99.78	0.15	0.07	0	0
512KB	99.63	0.29	0.07	0	0
128KB	99.56	0.37	0.07	0	0
32KB	99.56	0.22	0.22	0	0
	81.9	17.88	0.22	0	0
	27.45	72.33	0.22	0	0
	15.6	79.84	4.56	0	0
	1.84	23.47	74.69	0	0
	1.69	2.5	94.92	0.88	0
	0.88	1.62	32.3	65.19	0
	0-1	1-3	3-10	10-20	20-inf
	MPKI Bins				

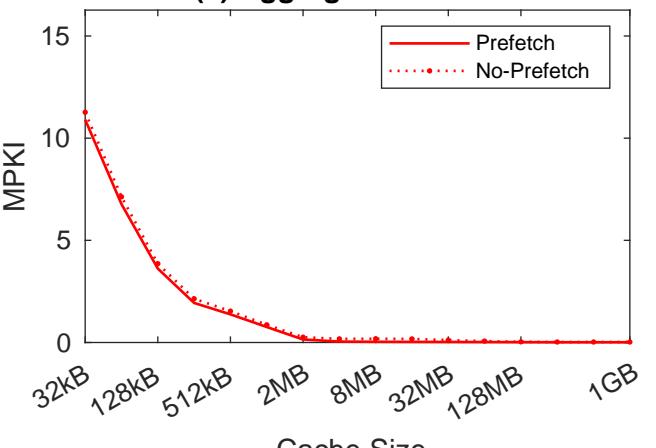
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	99.93	0.07	0	0	0
128MB	99.93	0.07	0	0	0
32MB	99.85	0.07	0.07	0	0
8MB	99.78	0.15	0	0.07	0
2MB	99.63	0.29	0	0	0.07
512KB	99.56	0.37	0	0	0.07
128KB	99.56	0.29	0.07	0	0.07
32KB	99.41	0.22	0.15	0	0.07
	63.65	36.13	0.15	0	0.07
	21.56	78.15	0.22	0	0.07
	10.96	75.64	13.32	0	0.07
	1.62	18.25	80.06	0	0.07
	1.03	2.65	94.19	2.06	0.07
	0	2.21	27.52	70.2	0.07
	0-1	1-3	3-10	10-20	20-inf
	MPKI Bins				

(d) Effects of Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	0.07	-0.07	0	0	0
128MB	0.07	-0.07	0	0	0
32MB	0.08	0	-0.07	0	0
8MB	0.15	-0.08	0	-0.07	0
2MB	0.07	-0.08	0.07	0	-0.07
512KB	0	0.08	0	0	-0.07
128KB	0.15	-0.15	0.07	0	-0.07
32KB	18.25	18.25	0.07	0	-0.07
	5.89	-5.82	0	0	-0.07
	4.64	4.2	-8.76	0	-0.07
	0.22	5.22	-5.37	0	-0.07
	0.66	-0.15	0.73	-1.18	-0.07
	0.88	-0.59	4.78	-5.01	-0.07
	0-1	1-3	3-10	10-20	20-inf
	MPKI Bins				

(e) Aggregate MPKI



(f) Execution with Prefetching

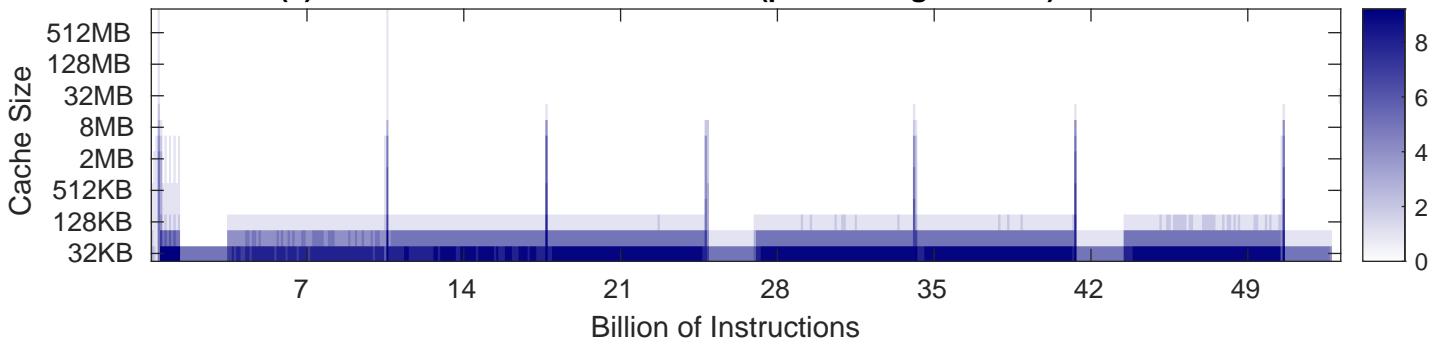
	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	92.01	7.99	0	0	0
2MB	86.08	13.92	0	0	0
512KB	80.23	19.77	0	0	0
128KB	81.59	7.13	11.28	0	0
32KB	93.75	2.2	4.04	0	0
	73.49	25.69	0.82	0	0
	12.09	87.45	0.46	0	0
	5.35	87.28	7.37	0	0
	0.23	15.41	84.36	0	0
	0.14	0.84	97.67	1.36	0
	0.07	0.26	25.56	74.11	0
	0-1	1-3	3-10	10-20	20-inf
	MPKI Bins				

(g) Execution without Prefetching

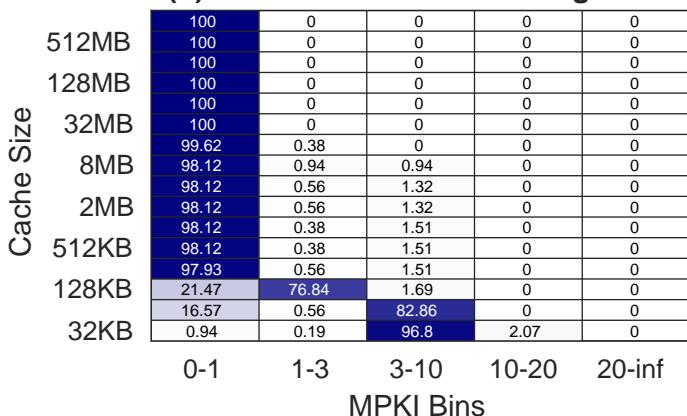
	0-1	1-3	3-10	10-20	20-inf
512MB	94.76	5.24	0	0	0
128MB	94.76	5.24	0	0	0
32MB	96.08	3.92	0	0	0
8MB	96.49	3.51	0	0	0
2MB	95.51	4.49	0	0	0
512KB	95.82	4.18	0	0	0
128KB	95.02	3.38	1.6	0	0
32KB	93.8	2.31	3.89	0	0
	94.76	2.17	3.07	0	0
	51.45	47.58	0.97	0	0
	9.19	90.03	0.77	0	0
	3.75	76.13	20.12	0	0
	0.31	11.45	88.25	0	0
	0.12	0.8	96.06	3.03	0
	0	0.34	21.15	78.5	0
	0-1	1-3	3-10	10-20	20-inf
	MPKI Bins				

Memory Behavior Analysis: SPEC 2006 - perl i.p. 2 - 53B instructions

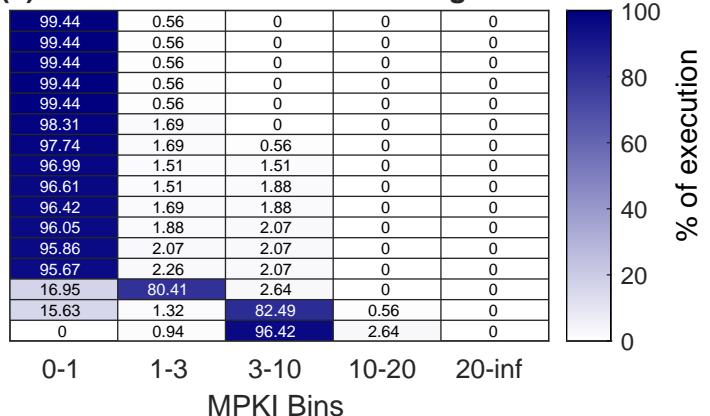
(a) MPKI over time and cache size (prefetching enabled)



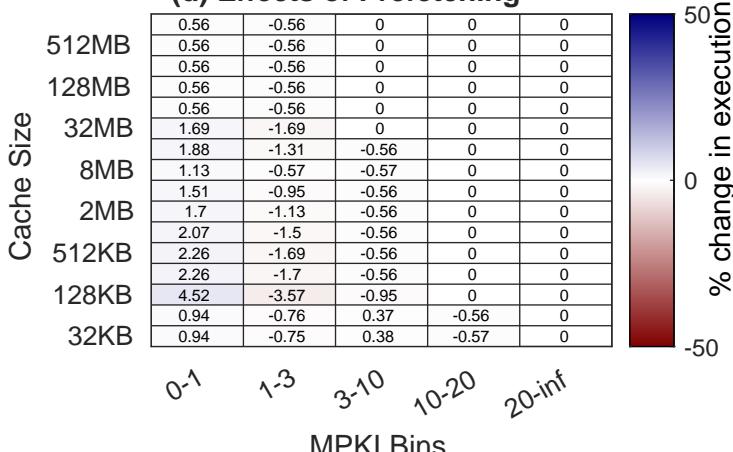
(b) Execution with Prefetching



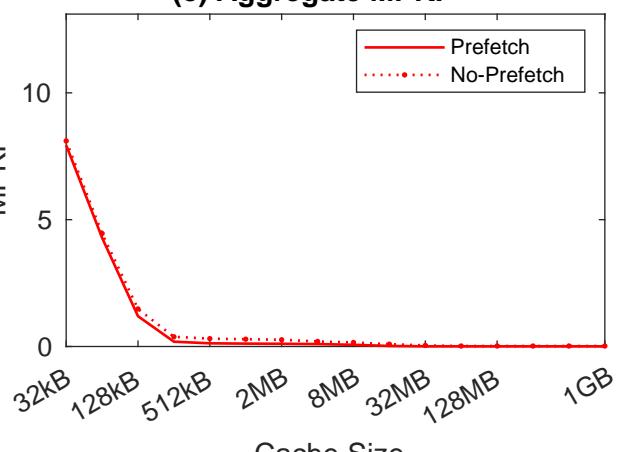
(c) Execution without Prefetching



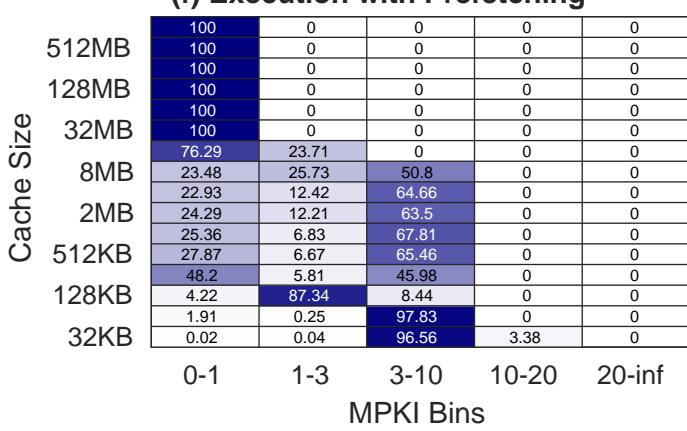
(d) Effects of Prefetching



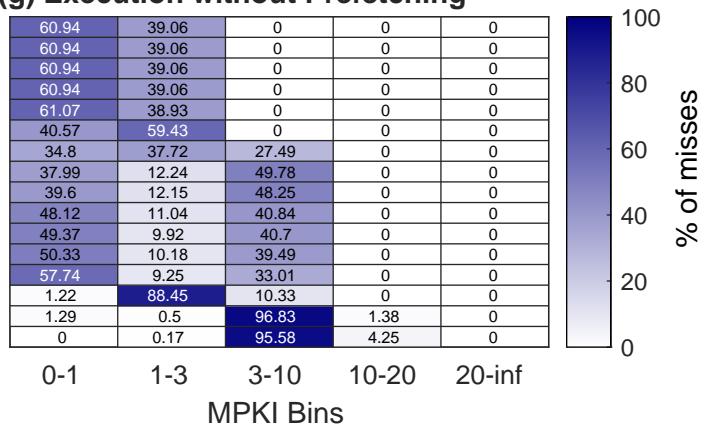
(e) Aggregate MPKI



(f) Execution with Prefetching

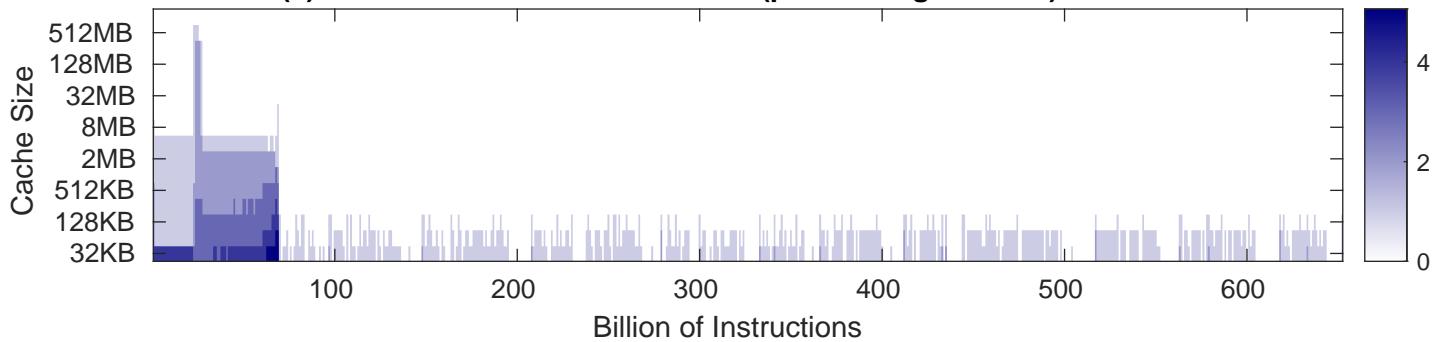


(g) Execution without Prefetching



Memory Behavior Analysis: SPEC 2006 - perl i.p. 3 - 652B instructions

(a) MPKI over time and cache size (prefetching enabled)



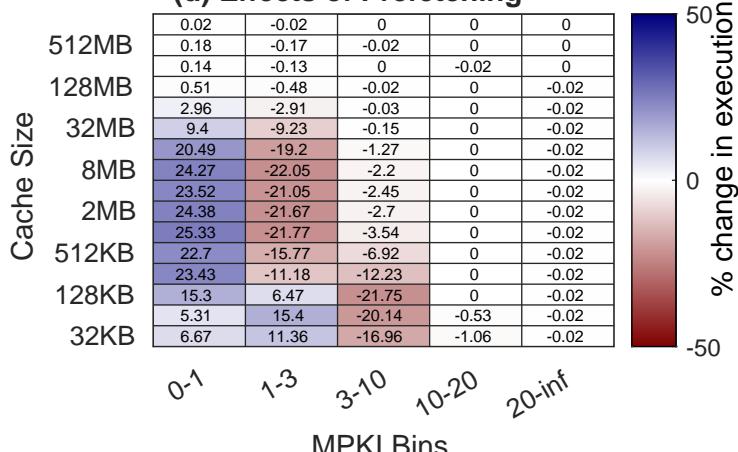
(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	99.86	0.14	0	0	0
32MB	99.36	0.64	0	0	0
8MB	99.36	0.64	0	0	0
2MB	99.34	0.66	0	0	0
512KB	99.34	0.66	0	0	0
128KB	99.33	0.67	0	0	0
32KB	99.31	0.67	0.02	0	0
	0-1	1-3	3-10	10-20	20-inf

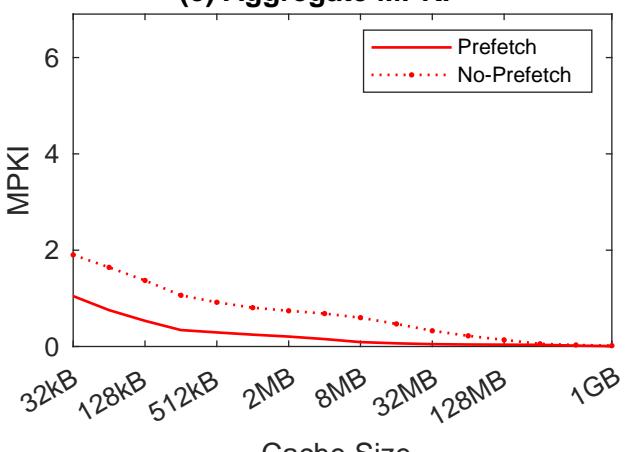
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	99.98	0.02	0	0	0
128MB	99.68	0.31	0.02	0	0
32MB	99.22	0.77	0	0.02	0
8MB	98.85	1.12	0.02	0	0.02
2MB	96.38	3.57	0.03	0	0.02
512KB	89.94	9.89	0.15	0	0.02
128KB	78.84	19.87	1.27	0	0.02
32KB	75.04	22.72	2.22	0	0.02
	0-1	1-3	3-10	10-20	20-inf

(d) Effects of Prefetching



(e) Aggregate MPKI



(f) Execution with Prefetching

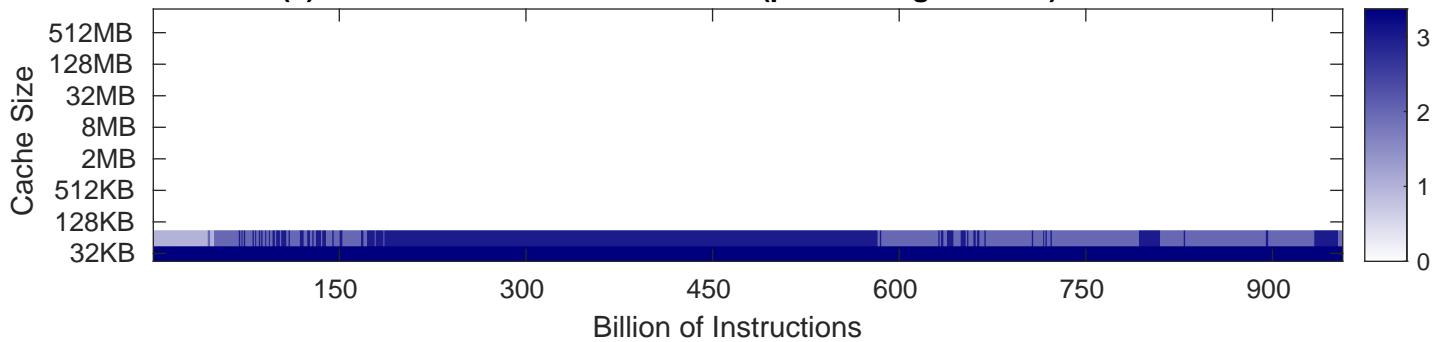
	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	90.27	9.73	0	0	0
32MB	71.4	28.6	0	0	0
8MB	73.88	26.12	0	0	0
2MB	76	24	0	0	0
512KB	79.59	20.41	0	0	0
128KB	84.56	15.44	0	0	0
32KB	88.28	11.2	0.52	0	0
	0-1	1-3	3-10	10-20	20-inf

(g) Execution without Prefetching

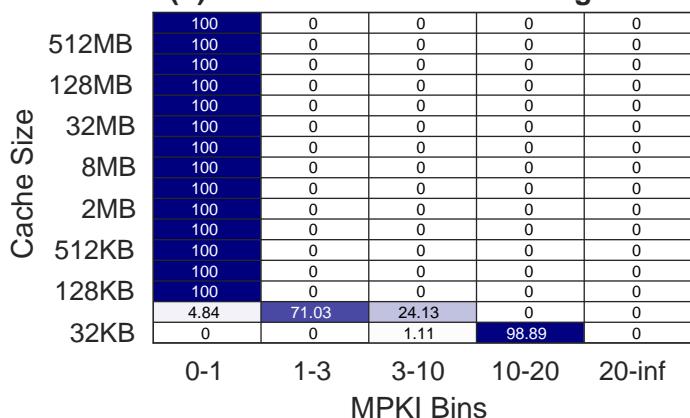
	0-1	1-3	3-10	10-20	20-inf
512MB	98.49	1.51	0	0	0
128MB	86.82	13.18	0	0	0
32MB	73.63	26.37	0	0	0
8MB	86.13	13.31	0.56	0	0
2MB	75.41	24	0.59	0	0
512KB	53.93	44.37	1.7	0	0
128KB	24.77	65.53	9.7	0	0
32KB	18.2	67.54	14.26	0	0
	0-1	1-3	3-10	10-20	20-inf

Memory Behavior Analysis: SPEC 2006 - porvay - 956B instructions

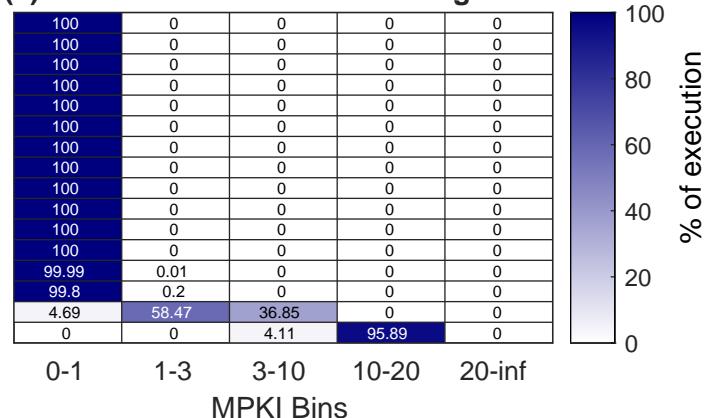
(a) MPKI over time and cache size (prefetching enabled)



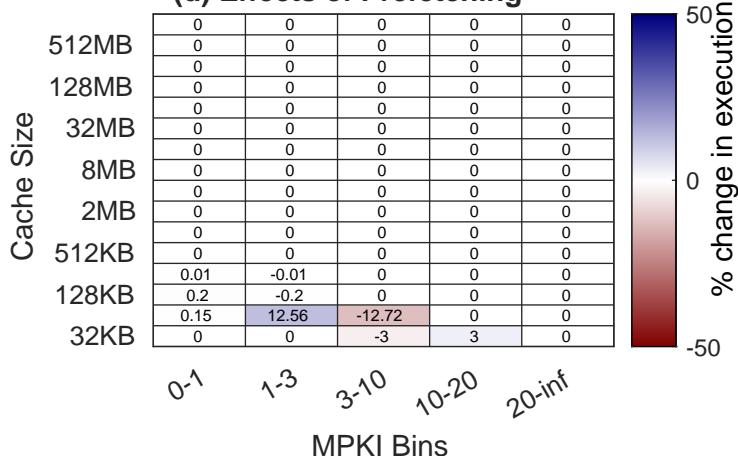
(b) Execution with Prefetching



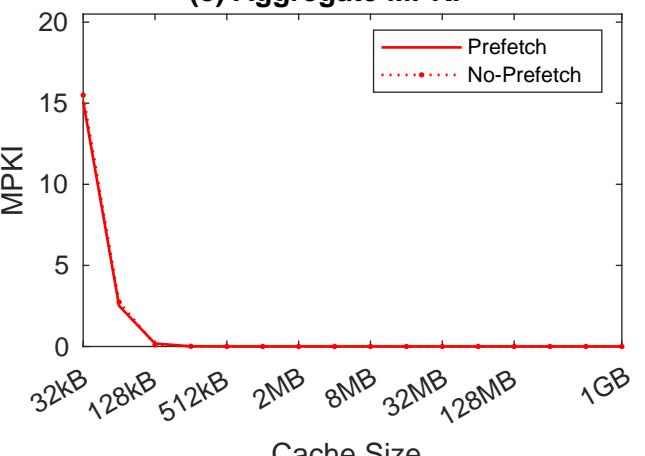
(c) Execution without Prefetching



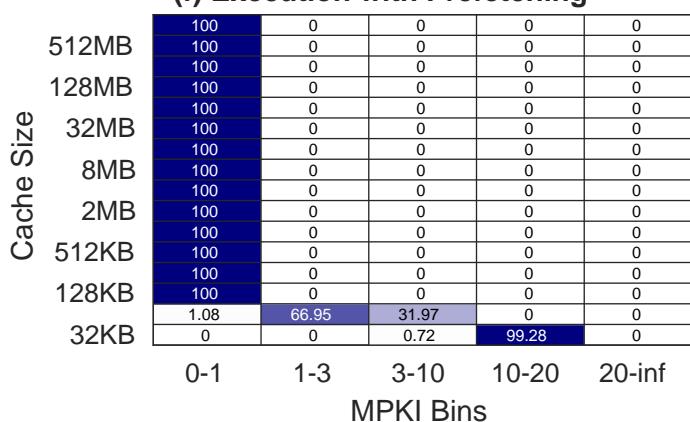
(d) Effects of Prefetching



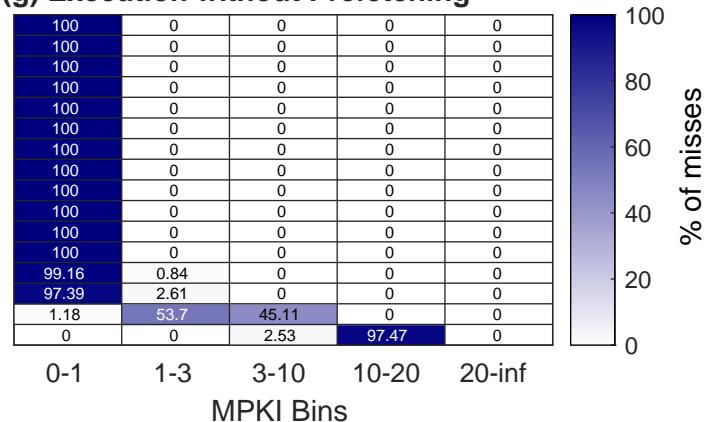
(e) Aggregate MPKI



(f) Execution with Prefetching

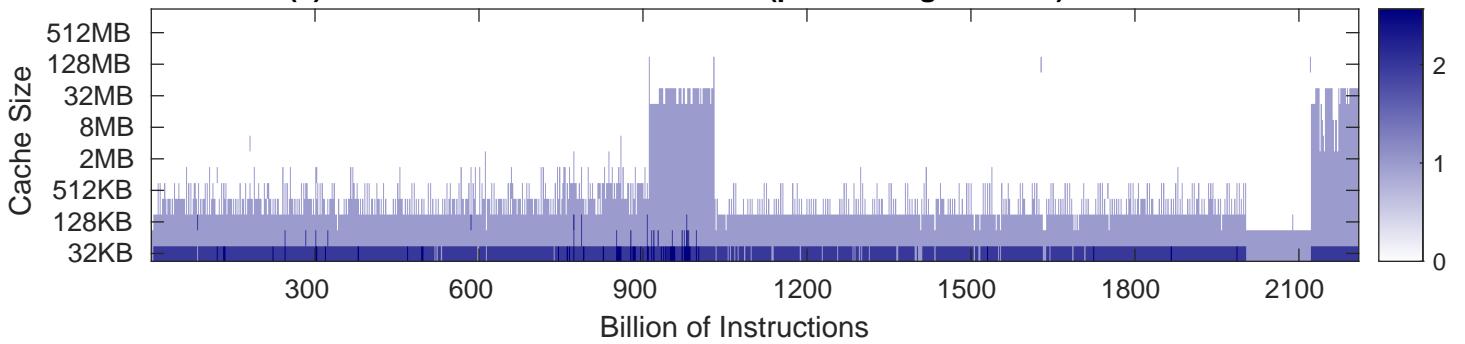


(g) Execution without Prefetching



Memory Behavior Analysis: SPEC 2006 - sjeng - 2209B instructions

(a) MPKI over time and cache size (prefetching enabled)



(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	99.96	0	0.04	0	0
8MB	99.96	0.02	0.02	0	0
2MB	99.97	0.03	0	0	0
512KB	99.98	0.02	0	0	0
128KB	100	0	0	0	0
32KB	100	0	0	0	0
	0-1	1-3	3-10	10-20	20-inf

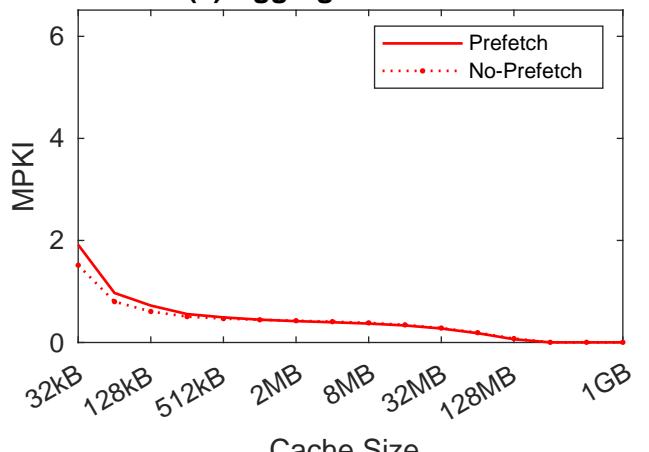
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	99.99	0	0	0	0
128MB	99.99	0	0	0	0
32MB	99.95	0	0	0	0.04
8MB	99.95	0	0	0	0.04
2MB	99.95	0	0	0	0.04
512KB	99.95	0	0	0	0.04
128KB	99.95	0	0	0	0.04
32KB	99.95	0.01	0	0	0.04
	0-1	1-3	3-10	10-20	20-inf

(d) Effects of Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	0.01	0	0	0	0
128MB	0.01	0	0	0	0
32MB	0.01	0	0.04	0	-0.04
8MB	0.02	0.02	0	-0.04	
2MB	0.03	0	0	-0.04	
512KB	0.05	0	0	-0.04	
128KB	-0.01	0	0	-0.04	
32KB	-0.05	0	0	-0.04	
	0-1	1-3	3-10	10-20	20-inf

(e) Aggregate MPKI



(f) Execution with Prefetching

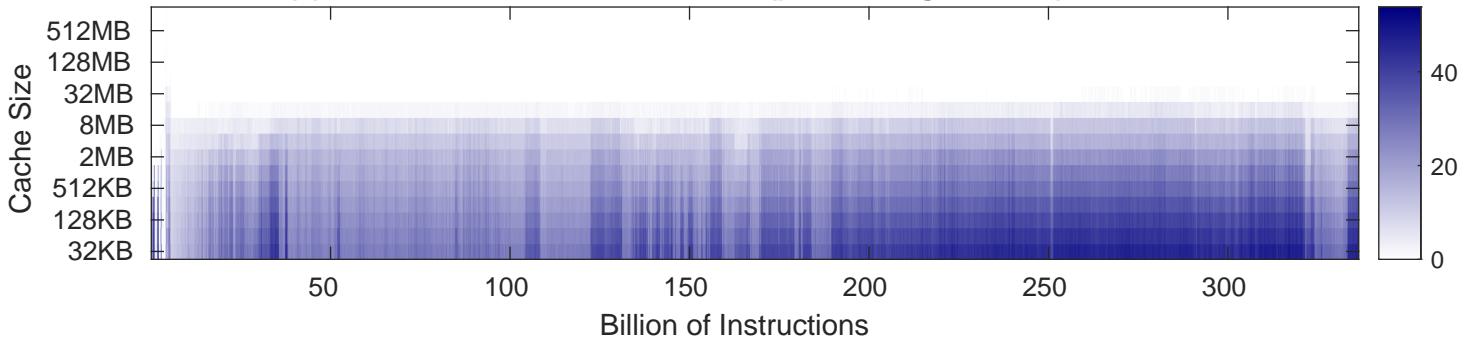
	0-1	1-3	3-10	10-20	20-inf
512MB	89	0	11	0	0
128MB	89	0	11	0	0
32MB	96.47	0.21	3.32	0	0
8MB	99.25	0.24	0.51	0	0
2MB	99.75	0.19	0.06	0	0
512KB	99.92	0.08	0	0	0
128KB	99.99	0.01	0	0	0
32KB	100	0	0	0	0
	0-1	1-3	3-10	10-20	20-inf

(g) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	57.31	0	9.86	0	32.83
128MB	57.31	0	9.86	0	32.83
32MB	75.65	0	0.24	0	24.11
8MB	88.71	0.05	0.2	0	11.04
2MB	91.93	0.04	0	0.16	7.87
512KB	93.26	0.04	0	0.14	6.56
128KB	93.89	0.03	0	0.13	5.95
32KB	94.21	0.04	0	0.12	5.62
	0-1	1-3	3-10	10-20	20-inf

Memory Behavior Analysis: SPEC 2006 - soplex i.p. 1 - 336B instructions

(a) MPKI over time and cache size (prefetching enabled)



(b) Execution with Prefetching

Cache Size	MPKI Bins				
	0-1	1-3	3-10	10-20	20-inf
512MB	99.97	0.03	0	0	0
512MB	99.97	0.03	0	0	0
512MB	99.97	0.03	0	0	0
512MB	99.97	0.03	0	0	0
512MB	99.97	0.03	0	0	0
32MB	98.99	0.83	0.18	0	0
32MB	7.28	61.53	31.18	0	0
8MB	1.19	0.8	61.33	36.68	0
8MB	1.19	0	10.4	88.29	0.12
2MB	1.07	0.06	3.15	60.55	35.17
512KB	0.59	0.21	1.84	44.8	52.56
512KB	0.45	0.24	1.07	31.24	67
512KB	0.36	0.27	0.83	8.2	90.34
128KB	0.33	0.3	0.45	3.18	95.75
128KB	0.24	0.3	0.36	2.97	96.14
32KB	0.18	0.36	0.15	2.73	96.58

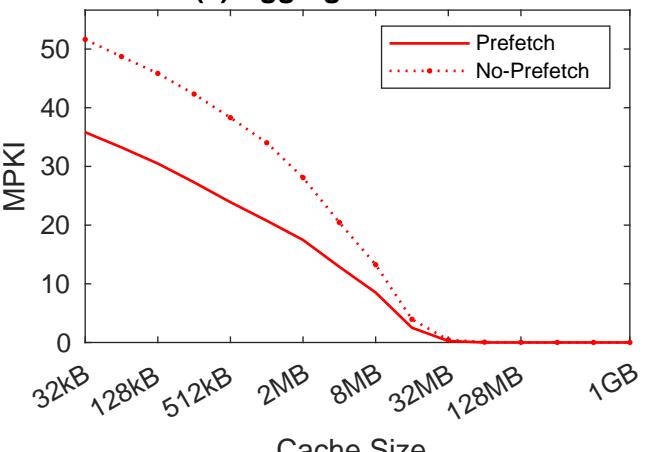
(c) Execution without Prefetching

Cache Size	MPKI Bins				
	0-1	1-3	3-10	10-20	20-inf
512MB	99.64	0.36	0	0	0
512MB	99.61	0.39	0	0	0
512MB	99.61	0.39	0	0	0
512MB	99.67	0.33	0	0	0
512MB	99.67	0.33	0	0	0
512KB	92.84	6.9	0.21	0.06	0
512KB	4.31	35.2	59.78	0.65	0.06
512KB	0.77	0.39	25.68	70.42	2.73
512KB	0.54	0.59	0.27	44.86	53.75
512KB	0.42	0.54	0.24	2.94	95.87
512KB	0.12	0.33	0.56	0.33	98.66
512KB	0.06	0.24	0.51	0.39	98.81
512KB	0.06	0.18	0.48	0.21	99.08
512KB	0.06	0.21	0.51	0.09	99.14
512KB	0.06	0.15	0.45	0.15	99.2
512KB	0.06	0.06	0.45	0.21	99.23

(d) Effects of Prefetching

Cache Size	MPKI Bins				
	0-1	1-3	3-10	10-20	20-inf
512MB	0.33	-0.33	0	0	0
512MB	0.36	-0.36	0	0	0
512MB	0.36	-0.36	0	0	0
128MB	0.3	-0.3	0	0	0
128MB	0.3	-0.3	0	0	0
32MB	6.15	-6.07	-0.03	-0.06	0
32MB	2.97	26.33	-28.6	-0.65	-0.06
8MB	0.42	0.41	35.65	-33.74	-2.73
8MB	0.65	-0.59	10.13	43.43	-53.63
2MB	0.65	-0.48	2.91	57.61	-60.7
512KB	0.47	-0.12	1.28	44.47	-46.1
512KB	0.39	0	0.56	30.85	-31.81
512KB	0.3	0.09	0.35	7.99	-8.74
512KB	0.27	0.09	-0.06	3.09	-3.39
512KB	0.18	0.15	-0.09	2.82	-3.06
512KB	0.12	0.3	-0.3	2.52	-2.65

(e) Aggregate MPKI



(f) Execution with Prefetching

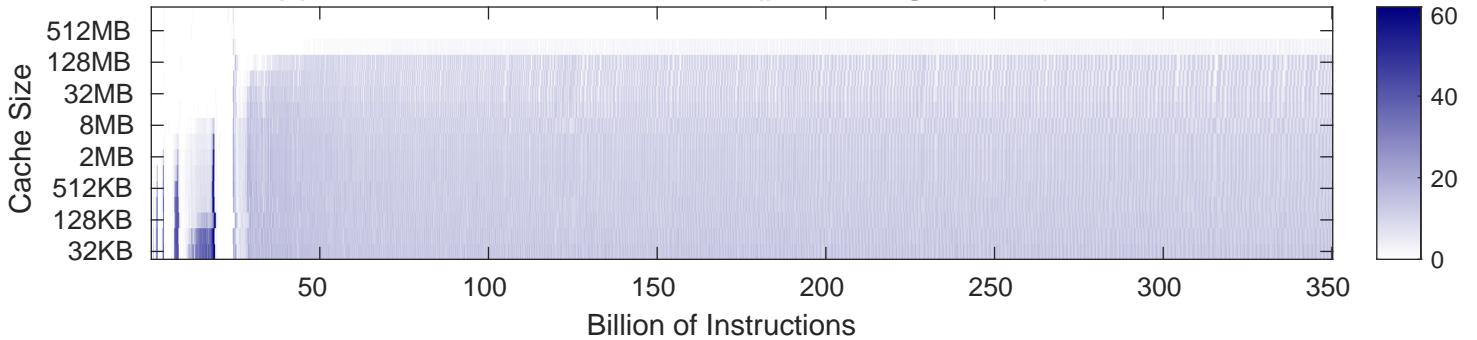
Cache Size	MPKI Bins				
	0-1	1-3	3-10	10-20	20-inf
512MB	76.72	23.28	0	0	0
512MB	75.96	24.04	0	0	0
512MB	76.01	23.99	0	0	0
128MB	76.11	23.89	0	0	0
128MB	93.13	6.87	0	0	0
32MB	92.79	4.43	2.78	0	0
32MB	1.31	45.56	53.13	0	0
8MB	0.03	0.26	49.36	50.35	0
8MB	0.03	0	5.42	94.36	0.19
2MB	0.02	0	1.44	53.79	44.73
512KB	0.01	0.01	0.37	23.45	76.16
512KB	0.01	0.02	0.26	5.3	94.42
512KB	0.01	0.02	0.12	1.57	98.28
512KB	0.01	0.01	0.08	1.37	98.53
512KB	0	0.02	0.02	1.17	98.78

(g) Execution without Prefetching

Cache Size	MPKI Bins				
	0-1	1-3	3-10	10-20	20-inf
512MB	50.21	49.79	0	0	0
512MB	47.55	52.45	0	0	0
512MB	46.16	53.84	0	0	0
512MB	81.47	18.53	0	0	0
512MB	92.3	7.7	0	0	0
512MB	75.76	18.81	3.61	1.82	0
512KB	0.56	20.36	76.67	2.1	0.31
512KB	0.02	0.05	16	79.66	4.27
512KB	0.01	0.06	0.11	36.7	63.12
512KB	0	0.04	0.04	1.95	97.96
512KB	0	0.02	0.08	0.15	99.75
512KB	0	0.01	0.06	0.14	99.78
512KB	0	0.01	0.05	0.07	99.87
512KB	0	0.01	0.06	0.03	99.9
512KB	0	0.01	0.05	0.05	99.89
512KB	0	0	0.04	0.06	99.9

Memory Behavior Analysis: SPEC 2006 - soplex i.p. 2 - 350B instructions

(a) MPKI over time and cache size (prefetching enabled)



(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	99.74	0.17	0.03	0.06	0
128MB	99.77	0.14	0.09	0	0
32MB	22.76	65.73	11.48	0.03	0
8MB	9.62	4.48	58.05	27.81	0.03
2MB	8.31	3.94	55.57	32.15	0.03
512KB	7.45	2.54	55.03	34.92	0.06
128KB	6.94	0.51	51.26	41.23	0.06
32KB	5.11	0.8	47.03	47	0.06
	3.91	0.91	41.35	53.63	0.2
512MB	3.63	0.83	34.38	60.91	0.26
128MB	3.31	0.91	28.38	66.99	0.4
32MB	3.28	0.66	23.79	71.56	0.71
8MB	3.17	0.77	19.87	75.36	0.83
2MB	3.31	0.63	14.62	80.24	1.2
512KB	2.97	0.71	8.99	85.01	2.31
128KB	2.94	0.57	4.05	89.66	2.77
32KB					

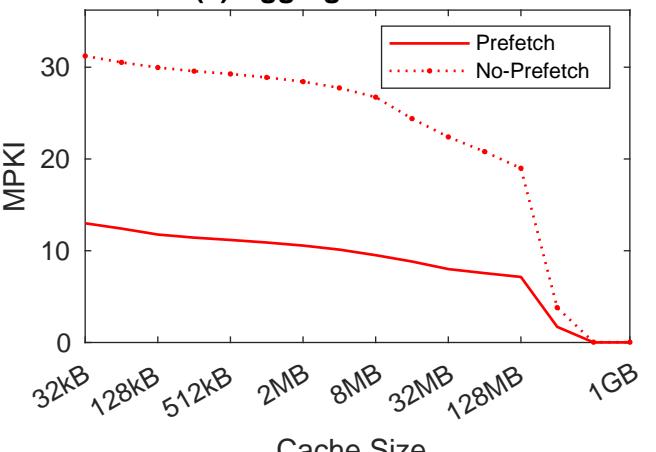
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	99.34	0.4	0.2	0.06	0
128MB	99.34	0.4	0.2	0.06	0
32MB	12.48	15.05	72.39	0.09	0
8MB	7.2	1.06	3.26	38.52	49.97
2MB	6.62	1.03	2.37	25.56	64.42
512KB	6.48	0.8	1.71	12.51	78.5
128KB	5.77	0.86	1	3.11	89.26
32KB	4.08	1.68	1	1.23	92
	2.91	1.43	2.31	1.17	92.18
512MB	2.66	1.2	2.6	1.26	92.29
128MB	2.48	1.14	2.63	1.37	92.38
32MB	2.26	1.11	2.6	1.2	92.83
8MB	2.37	0.97	2.6	1.14	92.92
2MB	2.11	1.14	1.48	2.14	93.12
512KB	2.23	1.06	1.17	1.11	94.43
128KB	2.03	0.91	1.09	1.09	94.89
32KB					

(d) Effects of Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	0.4	-0.23	-0.17	0	0
128MB	0.43	-0.26	-0.11	-0.06	0
32MB	10.28	50.68	-60.91	-0.06	0
8MB	2.42	3.42	54.79	-10.71	-49.94
2MB	1.69	2.91	53.2	6.59	-64.39
512KB	0.97	1.74	53.32	22.41	-78.44
128KB	1.17	-0.35	50.26	38.12	-89.2
32KB	1.03	-0.88	46.03	45.77	-91.94
	1	-0.52	39.04	52.46	-91.98
512MB	0.97	-0.37	31.78	59.65	-92.03
128MB	0.83	-0.23	25.75	65.62	-91.98
32MB	1.02	-0.45	21.19	70.36	-92.12
8MB	0.8	-0.2	17.27	74.22	-92.09
2MB	1.2	-0.51	13.14	78.1	-91.92
512KB	0.74	-0.35	7.82	83.9	-92.12
128KB	0.91	-0.34	2.96	88.57	-92.12
32KB					

(e) Aggregate MPKI



(f) Execution with Prefetching

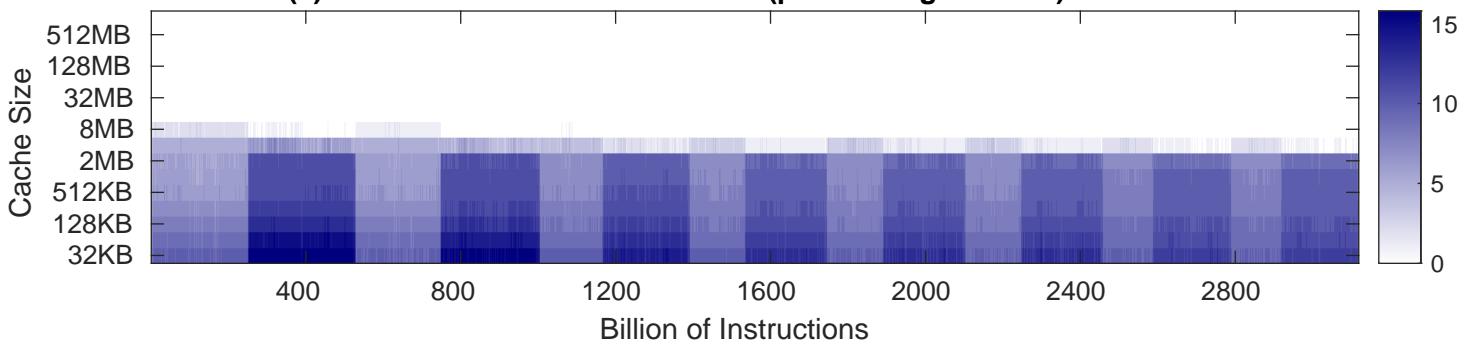
	0-1	1-3	3-10	10-20	20-inf
512MB	13.52	21.84	10.58	54.06	0
128MB	17.78	26.96	55.26	0	0
32MB	4.56	73.04	22.18	0.22	0
8MB	0.19	1.28	53.66	44.76	0.1
2MB	0.14	1.08	49.21	49.47	0.1
512KB	0.11	0.67	47.75	51.3	0.17
128KB	0.1	0.1	43.73	55.9	0.18
32KB	0.1	0.16	39.92	59.68	0.14
	0.08	0.17	34.66	64.44	0.65
512MB	0.08	0.16	28.5	70.3	0.96
128MB	0.07	0.17	23.25	75.07	1.44
32MB	0.08	0.11	19.11	78.36	2.34
8MB	0.07	0.14	15.67	81.26	2.87
2MB	0.08	0.1	11.32	84.92	3.58
512KB	0.06	0.1	6.6	86.5	6.73
128KB	0.09	0.09	2.69	89.46	7.67
32KB					

(g) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	32.38	19.5	27.26	20.86	0
128MB	30.76	21.16	28.6	19.48	0
32MB	0.66	8.91	90.09	0.34	0
8MB	0.09	0.11	1.25	34.5	64.05
2MB	0.08	0.09	0.81	21.42	77.61
512KB	0.07	0.07	0.54	9.34	89.98
128KB	0.07	0.07	0.25	2.19	97.43
32KB	0.05	0.13	0.19	0.73	98.9
8MB	0.04	0.09	0.41	0.69	98.77
2MB	0.04	0.08	0.49	0.72	98.68
512KB	0.03	0.08	0.56	0.76	98.57
128KB	0.03	0.07	0.56	0.64	98.7
32KB	0.03	0.06	0.58	0.63	98.69
8MB	0.03	0.07	0.3	1.13	98.47
2MB	0.03	0.06	0.23	0.6	99.07
512KB	0.03	0.05	0.2	0.57	99.15
128KB					
32KB					

Memory Behavior Analysis: SPEC 2006 - sphinx3 - 3118B instructions

(a) MPKI over time and cache size (prefetching enabled)



(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	100	0	0	0	0
89.27	9.25	1.48	0	0	0
26.5	30.29	43	0.21	0	0
0.08	0	77.4	22.52	0	0
0.08	0	64.35	35.57	0	0
512KB	0.08	0	55.34	44.58	0
0.08	0	49.27	50.65	0	0
0.08	0	45.43	54.49	0	0
0.07	0.01	42.58	57.34	0	0
0.07	0.01	34.89	65.02	0.01	0

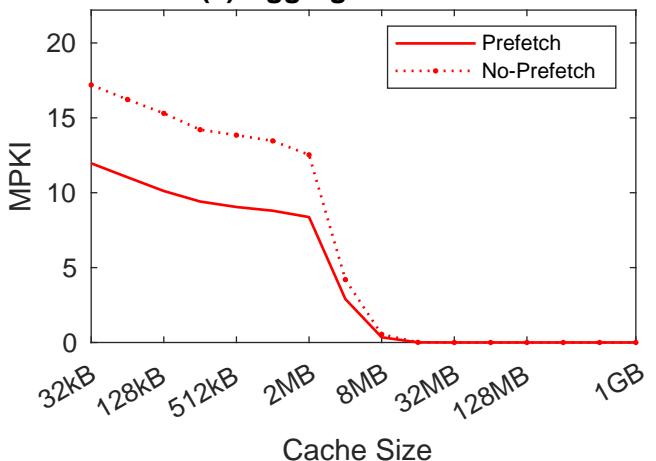
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	99.99	0	0	0	0
128MB	99.99	0	0	0	0
32MB	99.99	0	0	0	0
8MB	99.99	0	0	0	0
86.62	7.87	5.5	0	0	0
27.43	23.99	34.81	13.78	0	0
0.07	0	2.07	97.85	0	0
0.07	0	0.01	99.92	0	0
0.07	0	0.01	99.92	0	0
0.07	0.01	0.01	99.92	0	0
0.07	0.01	0.01	99.49	0.43	0
0.07	0.01	0.01	90.48	9.44	0

(d) Effects of Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	0.01	0	0	0	0
128MB	0.01	0	0	0	0
32MB	0.01	0	0	0	0
8MB	0.01	0	0	0	0
2.65	1.38	-4.02	0	0	0
-0.93	6.3	8.19	-13.57	0	0
0.01	0	75.33	-75.33	0	0
0.01	0	64.34	-64.35	0	0
0.01	0	55.33	-55.34	0	0
0.01	0	49.26	-49.27	0	0
0.01	-0.01	45.42	-45.43	0	0
0	0	42.57	-42.15	-0.43	0
0	0	34.88	-25.46	-9.43	0

(e) Aggregate MPKI



(f) Execution with Prefetching

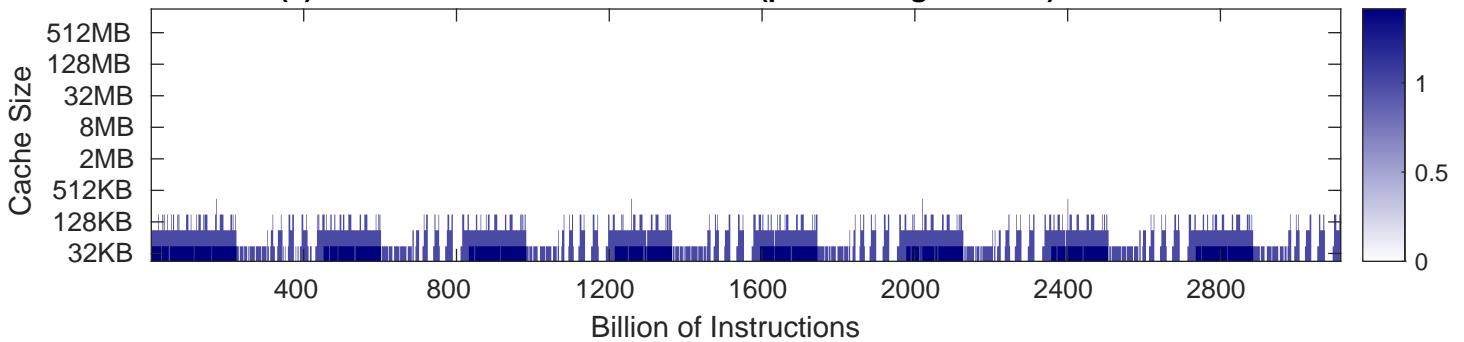
	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	100	0	0	0	0
37.65	47.98	14.37	0	0	0
4.84	19.99	74.45	0.72	0	0
0	0	71.42	28.58	0	0
0	0	57.2	42.8	0	0
0	0	47.21	52.79	0	0
0	0	41.15	58.85	0	0
0	0	37.47	62.53	0	0
0	0	34.45	65.55	0	0
0	0	27.48	72.51	0.01	0

(g) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	72.53	9.06	18.41	0	0
128MB	72.43	9.08	18.49	0	0
32MB	72.52	9.06	18.42	0	0
8MB	72.53	9.06	18.41	0	0
98.33	6.99	17.93	0	0	0
23.29	26.07	50.59	0.06	0	0
3.36	10.92	47.8	37.92	0	0
0	0	1.55	98.44	0	0
0	0	0	100	0	0
0	0	0	100	0	0
0	0	0	100	0	0
0	0	0	99.46	0.54	0
0	0	0	88.52	11.48	0

Memory Behavior Analysis: SPEC 2006 - tonto - 3114B instructions

(a) MPKI over time and cache size (prefetching enabled)



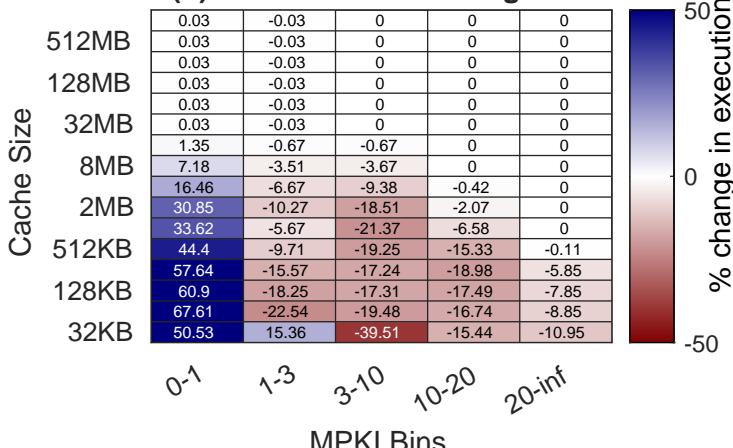
(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	100	0	0	0	0
2MB	99.79	0.21	0	0	0
512KB	99.98	0.02	0	0	0
128KB	99.98	0.02	0	0	0
32KB	99.08	0.92	0	0	0
	75.76	24.24	0	0	0
	55.19	37.55	7.24	0.02	0

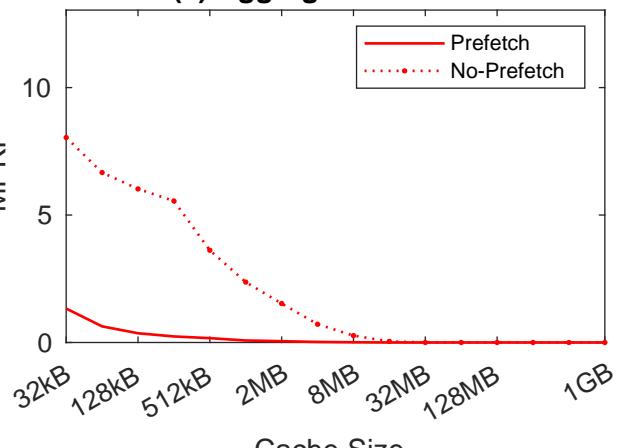
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	99.97	0.03	0	0	0
128MB	99.97	0.03	0	0	0
32MB	99.97	0.03	0	0	0
8MB	98.65	0.67	0.67	0	0
2MB	92.82	3.51	3.67	0	0
512KB	83.54	6.67	9.38	0.42	0
128KB	68.94	10.48	18.51	2.07	0
32KB	66.38	5.67	21.37	6.58	0
	55.58	9.73	19.25	15.33	0.11
	42.34	15.59	17.24	18.98	5.85
	38.18	19.17	17.31	17.49	7.85
	8.15	46.78	19.48	16.74	8.85
	4.66	22.19	46.75	15.46	10.95

(d) Effects of Prefetching



(e) Aggregate MPKI



(f) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	100	0	0	0	0
8MB	100	0	0	0	0
2MB	94.87	5.13	0	0	0
512KB	99.87	0.13	0	0	0
128KB	99.92	0.08	0	0	0
	96.72	3.28	0	0	0
	48.99	51.01	0	0	0
	18.79	62.2	18.85	0.16	0

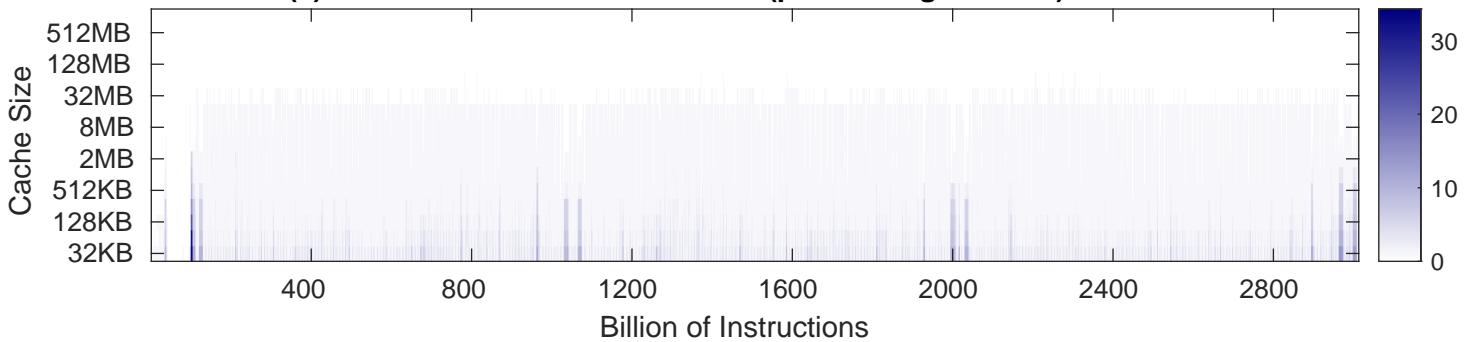
(g) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	42.24	42.24	0	0	0
128MB	42.24	42.24	0	0	0
32MB	57.76	42.24	0	0	0
8MB	57.76	42.24	0	0	0
2MB	57.76	42.24	0	0	0
	59.02	40.98	0	0	0
	6.89	30.05	63.06	0	0
	10.16	22.51	67.33	0	0
	5.17	18.51	70.15	6.17	0
	4.69	13.65	66.55	15.11	0
	4.67	4.86	56.55	33.93	0
	3.54	5.44	33	57.44	0.59
	2.62	4.17	18.57	50.33	24.31
	3.69	4.73	17.89	42.93	30.77
	0.56	11.38	17.69	37.01	33.36
	0.22	5.61	30.1	28.65	35.43

% of misses

Memory Behavior Analysis: SPEC 2006 - wrf - 3013B instructions

(a) MPKI over time and cache size (prefetching enabled)



(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	99.97	0.03	0	0	0
128MB	99.97	0.03	0	0	0
32MB	99.29	0.71	0	0	0
8MB	98.99	1.01	0	0	0
2MB	97.11	2.89	0.01	0	0
512KB	93.74	5.59	0.66	0	0
128KB	91.25	5.56	3.19	0	0
32KB	90.72	6.07	3.22	0	0
512KB	88.41	8.1	3.48	0.01	0
128KB	83.5	12.53	3.97	0	0
32KB	76.1	18.49	5.39	0.03	0
512KB	60.9	30.18	8.69	0.24	0
128KB	48.37	40.46	10.77	0.27	0.13
32KB	36.64	46.47	15.68	0.99	0.23
	35.39	43.81	16.44	4.03	0.33

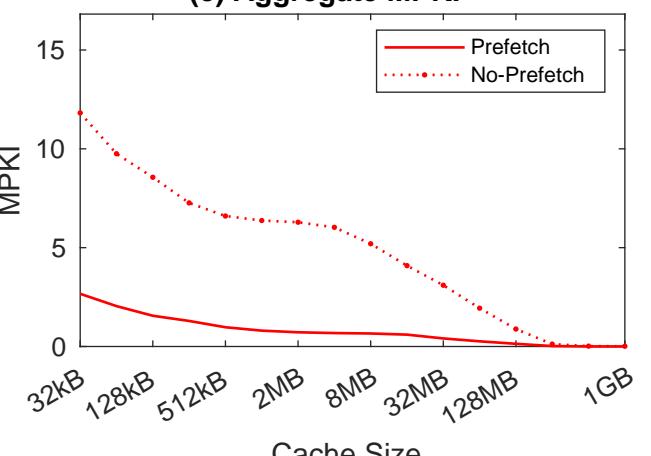
(c) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	99.74	0.17	0.07	0.02	0
128MB	99.73	0.18	0.07	0.02	0
32MB	96.34	2.98	0.67	0.02	0
8MB	69.96	22.83	7.18	0.03	0
2MB	39.35	38.6	21.69	0.36	0
512KB	27.77	30.49	39.01	2.73	0
128KB	16.42	35.16	43.48	4.95	0
32KB	13.95	22.75	53.52	9.78	0
512KB	13.79	11.25	61.26	13.7	0
128KB	12.16	12.01	60.76	15.07	0
32KB	11.85	11.85	60.64	15.66	0
512KB	11.13	11.29	60.33	17.26	0
128KB	10.15	6.24	58.09	25.44	0.08
32KB	9.78	6.35	39.99	43.4	0.48
512KB	5.18	9.87	31.21	52.78	0.96
128KB	4.3	4	20.43	69.22	2.05
32KB					

(d) Effects of Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	0.23	-0.14	-0.07	-0.02	0
128MB	0.24	-0.15	-0.07	-0.02	0
32MB	2.95	-2.27	-0.67	-0.02	0
8MB	29.03	-21.82	-7.18	-0.03	0
2MB	57.76	-35.71	-21.68	-0.36	0
512KB	65.97	-24.9	-38.35	-2.73	0
128KB	74.83	-29.6	-40.29	-4.95	0
32KB	76.77	-16.68	-50.3	-9.78	0
512KB	76.33	-4.59	-58.04	-13.7	0
128KB	76.25	-3.91	-57.28	-15.06	0
32KB	71.65	0.68	-56.67	-15.66	0
512KB	64.97	7.2	-54.94	-17.23	0
128KB	50.75	23.94	-49.4	-25.2	-0.08
32KB	38.59	34.11	-29.22	-43.13	-0.35
512KB	31.46	36.6	-15.53	-51.79	-0.73
128KB	31.09	39.81	-3.99	-65.19	-1.72
32KB					

(e) Aggregate MPKI



(f) Execution with Prefetching

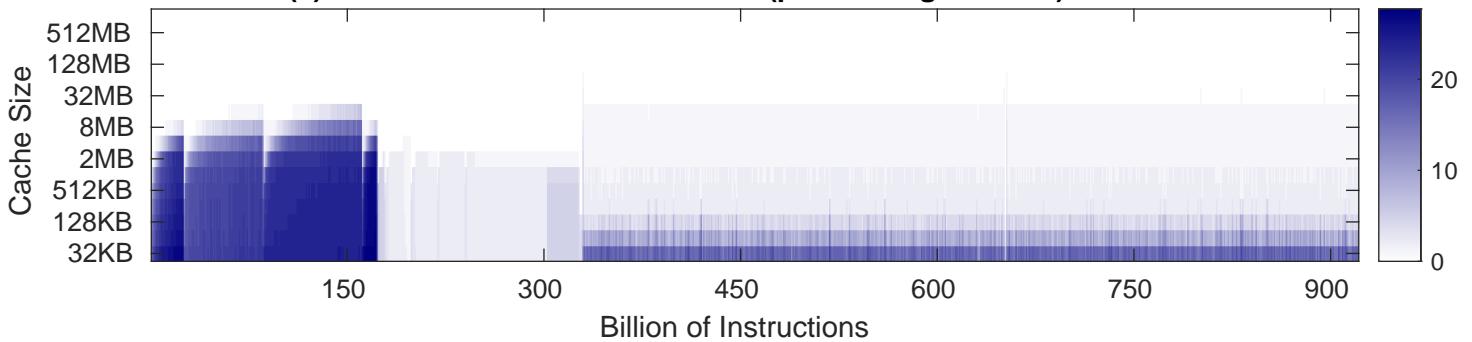
	0-1	1-3	3-10	10-20	20-inf
512MB	70.02	29.98	0	0	0
128MB	84.11	15.89	0	0	0
32MB	56.17	43.83	0	0	0
8MB	89	11	0	0	0
2MB	84.03	15.89	0.09	0	0
512KB	71.02	22.69	6.29	0	0
128KB	61.22	14.5	24.28	0	0
32KB	63.19	14.41	22.4	0	0
512KB	63.13	15.12	21.75	0	0
128KB	60.11	17.16	22.57	0.15	0
32KB	52.4	24.27	23.32	0	0
512KB	41.75	29.07	28.8	0.37	0
128KB	27.64	32.59	37.29	2.48	0
32KB	18.4	38.14	39.2	2.28	1.98
512KB	11.28	34.5	45.17	5.78	3.27
128KB	9.25	26.34	41.76	18.68	3.97
32KB					

(g) Execution without Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	24.04	28.3	30.53	17.13	0
128MB	51.23	18.7	19.27	10.8	0
32MB	29.49	45.16	23.72	1.62	0
8MB	21.59	42.14	35.92	0.35	0
2MB	7.42	35.17	55.3	2.11	0
512KB	4.37	16.41	68.59	10.63	0
128KB	1.72	15.9	66.96	15.42	0
32KB	1.1	9.11	66.54	23.25	0
512KB	1.08	3.23	68.48	27.22	0
128KB	0.9	3.13	67.41	28.56	0
32KB	0.89	3.16	66.61	29.33	0
512KB	0.92	3.71	63.97	31.39	0
128KB	0.85	1.68	55.52	41.7	0.24
32KB	0.8	1.44	33.8	62.5	1.46
512KB	0.33	1.88	23.88	71.04	2.88
128KB	0.22	0.6	13.09	80.77	5.32
32KB					

Memory Behavior Analysis: SPEC 2006 - xalancbmk - 921B instructions

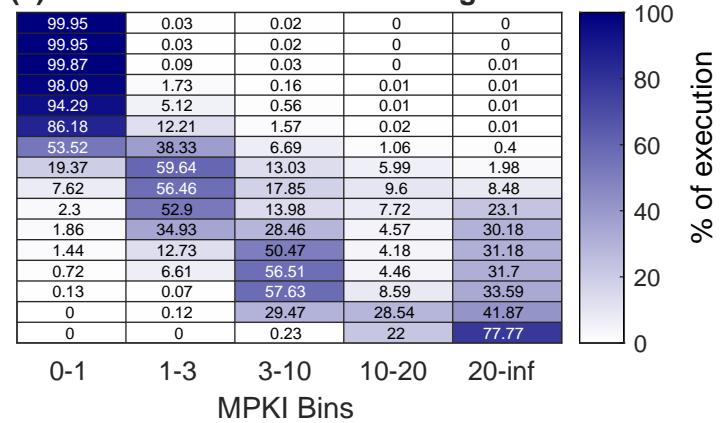
(a) MPKI over time and cache size (prefetching enabled)



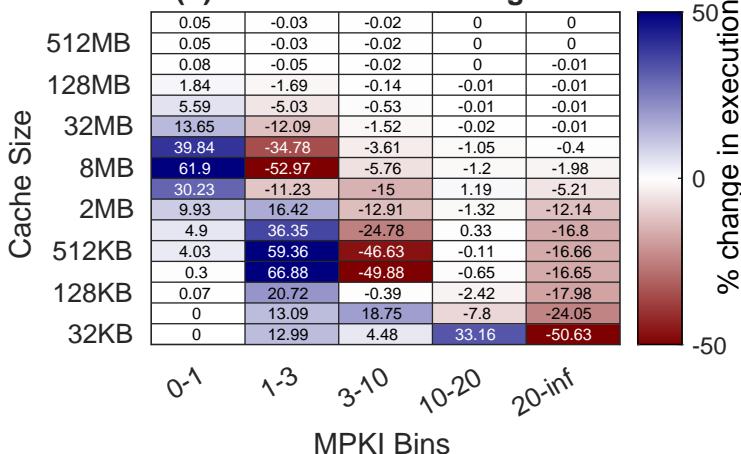
(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	99.95	0.04	0.01	0	0
8MB	99.93	0.04	0.02	0	0
2MB	99.88	0.09	0.03	0	0
512KB	99.83	0.12	0.05	0	0
128KB	93.36	3.55	3.08	0.01	0
32KB	81.27	6.67	7.27	4.79	0
	37.85	45.23	2.85	10.79	3.27
512MB	12.23	69.32	1.07	6.4	10.96
128MB	6.76	71.28	3.68	4.9	13.38
32MB	5.47	72.09	3.84	4.07	14.52
8MB	1.02	73.49	6.63	3.81	15.05
2MB	0.2	20.79	57.24	6.17	15.61
512KB	0	13.21	48.22	20.74	17.82
128KB	0	12.99	4.71	55.16	27.14
32KB	0	12.99	4.71	55.16	27.14

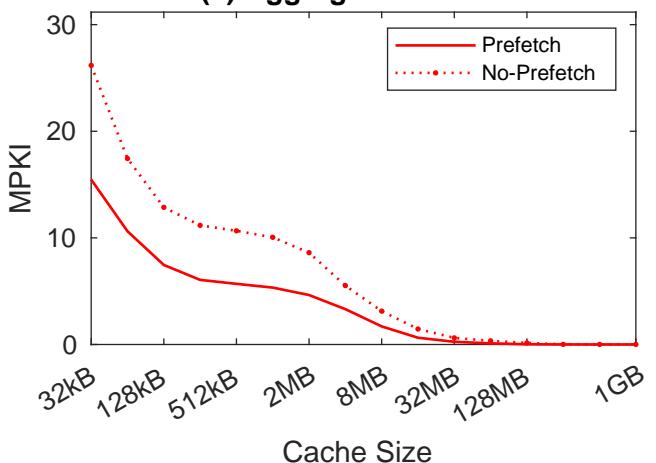
(c) Execution without Prefetching



(d) Effects of Prefetching



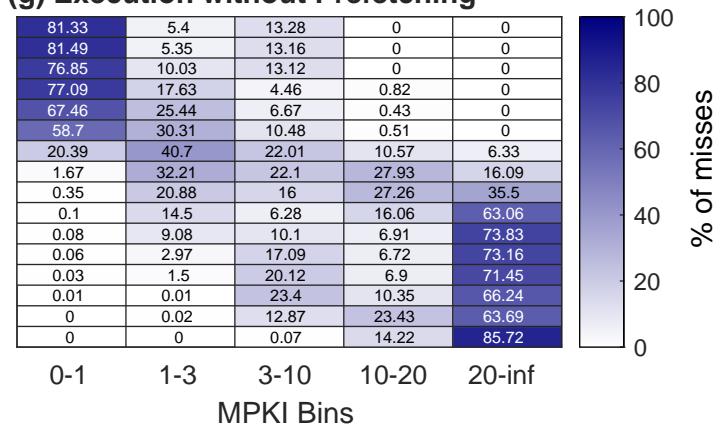
(e) Aggregate MPKI



(f) Execution with Prefetching

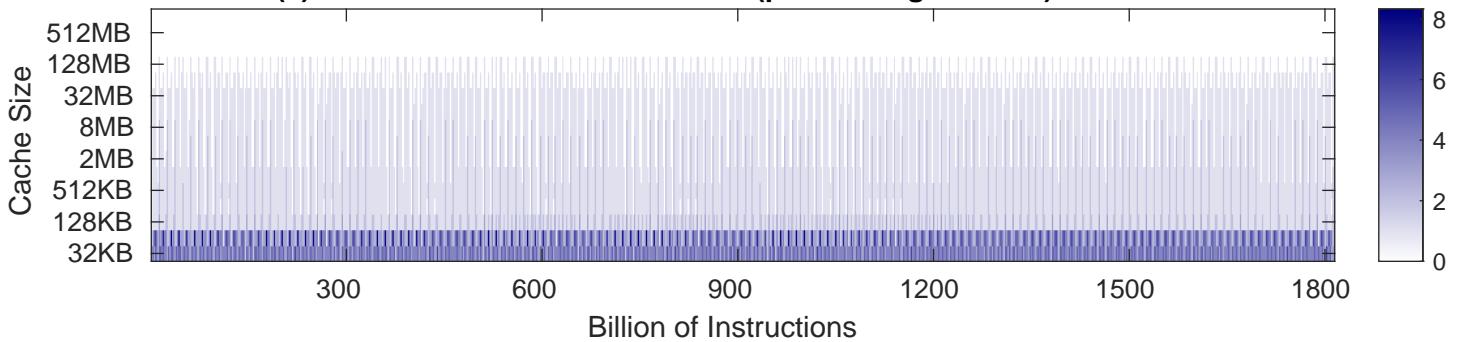
	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	81.56	18.44	0	0	0
8MB	94.83	3.2	1.97	0	0
2MB	97.64	1.37	0.99	0	0
512KB	98.39	0.65	0.96	0	0
128KB	67.67	9.3	22.84	0.18	0
32KB	29.56	5.53	25.63	39.28	0
	6.11	15.45	5.83	52.02	20.58
512MB	1.63	20.54	1.43	23.68	52.72
128MB	0.72	22.22	3.15	16.67	57.24
32MB	0.59	24.11	3.41	13.17	58.73
8MB	0.08	25.77	5.13	11.55	57.47
2MB	0.02	6.34	31.42	13.56	48.67
512KB	0	2.46	30.73	27.58	39.23
128KB	0	1.67	1.68	55.91	40.74
32KB	0	1.67	1.68	55.91	40.74

(g) Execution without Prefetching



Memory Behavior Analysis: SPEC 2006 - zeusmp - 1814B instructions

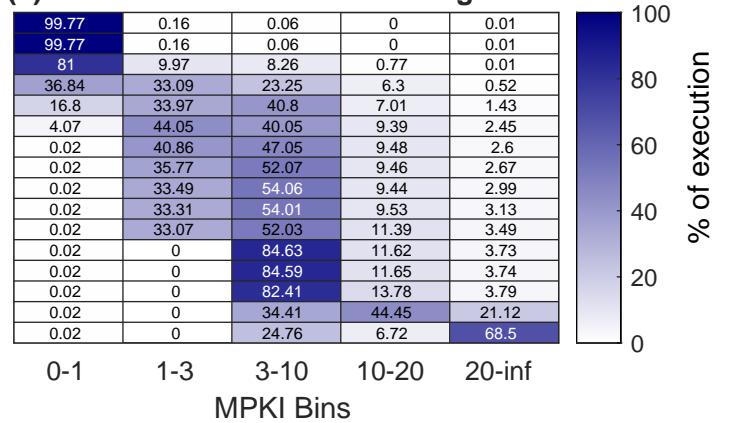
(a) MPKI over time and cache size (prefetching enabled)



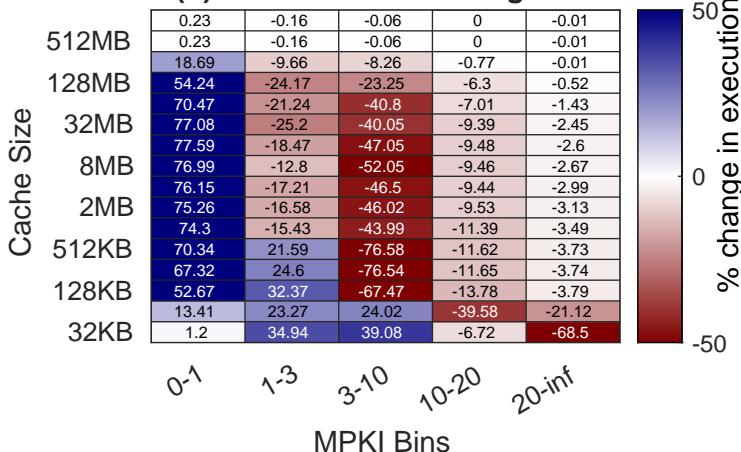
(b) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	99.69	0.31	0	0	0
8MB	91.08	8.92	0	0	0
2MB	87.27	12.73	0	0	0
512KB	81.15	18.85	0	0	0
128KB	77.61	22.39	0	0	0
32KB	77.01	22.97	0.02	0	0
	76.17	16.28	7.56	0	0
	75.28	16.73	7.99	0	0
	74.32	17.64	8.04	0	0
512MB	70.36	21.59	8.05	0	0
128MB	67.34	24.6	8.05	0	0
32MB	52.69	32.37	14.94	0	0
8MB	13.43	23.27	58.43	4.87	0
2MB	1.22	34.94	63.84	0	0

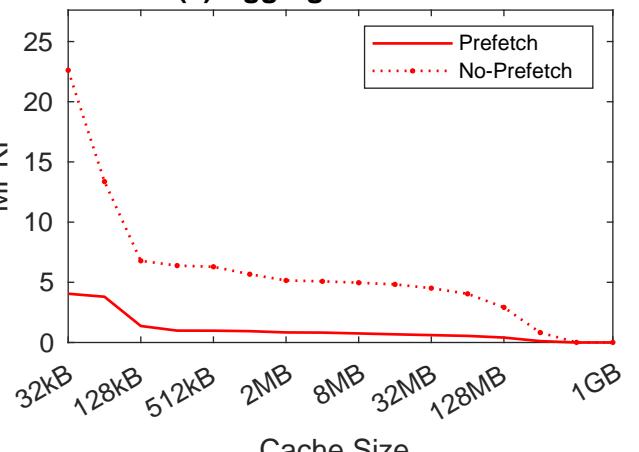
(c) Execution without Prefetching



(d) Effects of Prefetching



(e) Aggregate MPKI



(f) Execution with Prefetching

	0-1	1-3	3-10	10-20	20-inf
512MB	100	0	0	0	0
128MB	100	0	0	0	0
32MB	97.03	2.97	0	0	0
8MB	71.03	28.97	0	0	0
2MB	66.86	33.14	0	0	0
512KB	56.25	43.75	0	0	0
128KB	49.05	50.95	0	0	0
32KB	43.71	56.23	0.07	0	0
	39.04	31.09	29.87	0	0
	38.09	30.91	31	0	0
512MB	43.26	28.94	27.8	0	0
128MB	40.97	32.32	26.71	0	0
32MB	36.75	36.66	26.59	0	0
8MB	24.68	38.41	36.91	0	0
2MB	1.62	10.33	70.43	17.62	0
512KB	0.19	21.22	78.59	0	0

(g) Execution without Prefetching

