MioHash: A Memory-Efficient and I/O-Optimized Hashing Index on Hybrid PMem-DARM Memories

Zixiang Yu Zhirong Shen
Xiamen University
yuzixiang23@foxmail.com Shenzr@xmu.edu.cn

Qingjie ZengYijie ZhongJiwu ShuXiamen UniversityXiamen UniversityTsinghua University,Xiamen Universityqjzeng503@gmail.comyijiezhong@stu.xmu.edu.cnshujw@tsinghua.edu.cn

periment 1	/s) Thread=1	2	4	8	16	24
form Insert Throughput (Mops/ .SH	1.080309792	2 2.067467027	4 3.54139375	8 5.265225163	16 5.601201605	24 5.560437909
EH	0.6927915	1.33181725	2.43652025	4.08677525	5.44514925	5.66926275
vel evel	0.517253332 0.14161	0.566679181 0.272089	0.706762602 0.504664	0.864436573 0.903298	1.014259263 1.399661	1.056101841 1.716833
ısh	0.438103	0.83422125	1.6048145	2.4292295	4.294831	5.97354325
oer oHash	1.916868 2.523302	3.51213 4.3044485	6.477029 7.770145	9.194919 11.19255225	12.335607 16.8236075	13.04946 19.88255167
form Positive Search Through		2	4	8	16	24
SH	3.333146	5.646048	9.280315	13.539036	17.525591	18.408078
EH ⁄el	2.145908 1.050534	4.352373 1.738362	9.02399 3.092409	15.176016 4.906786	19.615334 6.404106	20.702171 7.143704
vel	0.990972	1.81147	3.56415	6.773919	12.12053	16.35713
sh	0.66246525	1.2985415	2.479261	3.4266955	6.18491075	9.49267075
er Hash	2.096916 3.134054	4.012847 6.22590625	8.116097 12.229869	12.593406 14.0550155	25.527122 26.7947485	37.48872 38.912764
orm Negative Search Through		2	4	8	16	24
SH	3.33464	5.642306	9.312879	13.537437	17.621648	18.535994
EH el	0.715493 1.051344	1.414038 1.735256	2.708599 3.113679	4.740526 4.901411	7.459968 6.449082	7.946879 7.051144
rel	0.811196	1.542197	3.005827	5.733635	10.279313	13.616402
h	0.92998575	1.8471755	3.605941	4.82533025	9.25337825	13.745963
r Hash	4.435612 3.62707425	8.763846 7.2290625	17.417176 14.08542675	21.866726 19.298319	42.342509 34.82591625	61.9225 47.20718225
orm Delete Throughput (Mops	s/s) Thread=1	2	4	8	16	24
SH EH	1.898662 1.229131	3.598952 2.490614	5.935547 4.70361	8.094248 7.886595	7.910209 8.918177	8.000926 10.328562
el	0.937153	1.531833	2.772285	4.398251	5.593817	5.666127
el	0.299471	0.559957	1.03137	1.956335	3.418501	4.645158
h r	0.39326175 1.85327	0.77641925 3.519253	1.513762 6.853577	2.283574725 10.342089	4.14544275 15.766681	6.05539775 17.652877
lash	1.690429	3.293858125	6.254388	8.86109575	15.700001	19.60113467
an Insert Throughput (Mops/s		2	4	8	16	24
H	1.053913	2.036119	3.449268	5.292045	5.805819	5.4589
H el	0.589479 0.474362	1.18045 0.757504	2.285433 0.973837	4.021246 1.374645	5.582147 1.461386	5.985942 1.382936
el	0.137404	0.261074	0.491295	0.887227	1.380396	1.717355
1	0.372362 1.918128	0.757704 3.488715	1.534042 6.433229	2.734872 9.637801	3.891831 12.175177	4.608914 12.902454
ash	2.516055	4.243159	7.60807025	11.10811225	17.041096	20.1762295
n Positive Search Throughp	ut (M Thread=1	2	4	8	16	24
H H	3.336167 2.046681	5.586168 4.19717	9.299656 8.781548	13.530452 15.505613	17.573843 19.346186	18.276381 20.01743
H el	1.032295	1.740166	3.093239	4.901955	6.396258	7.103214
el	0.997262	1.877826	3.626865	6.997729	13.112314	18.246416
h r	0.585573 2.102515	1.188494 3.944174	2.514597 8.176301	4.270248 12.950664	7.509008 24.569926	9.457597 36.804304
l lash	3.00255875	5.9849455	11.780668	13.1106245	23.660596	34.29530725
an Negative Search Through	put (N Thread=1	2	4	8	16	24
SH EH	3.332858 0.713374	5.648635 1.405746	9.31015 2.7034	13.563526 4.67963	17.526157 7.465958	18.38305 7.823678
el	1.05248	1.740997	3.098963	4.889724	6.410645	7.096786
el	0.812245	1.534612	2.948581	5.728126	10.174163	12.411457
h r	0.796609 4.47395	1.654961 8.295752	3.517741 17.129539	6.129173 22.372177	10.566435 42.177021	13.902013 60.593687
lash	3.64170925	7.18883175	14.346825	19.3584845	34.70292175	47.010148
an Delete Throughput (Mops/		2	4	8	16	24
SH EH	1.607616 1.224438	3.240823 2.468547	5.494735 4.720928	7.556856 7.922391	7.241076 9.215614	7.64346 10.335044
el	0.809582	1.383746	2.516669	4.048322	5.082029	5.198309
vel	0.295755	0.55504	1.008447	2.030666	3.581514	4.975246
sh	0.337059	0.711316	1.453221	2.597762	3.946841	4.739526 17.574828
er	1.863955	3.492423	6.891585	10.442913	15.672394	
oer oHash	1.863955 1.66992575	3.492423 3.2749535	6.891585 6.235328	8.60868725	15.672394 14.852254	19.423247
						19.423247
						19.423247
Hash Deriment 2 form YCSB-A Throughput (Mo	1.66992575 pps/s) Thread=1	3.2749535	6.235328	8.60868725	14.852254	24
Hash eriment 2 orm YCSB-A Throughput (Mo EH	1.66992575 pps/s) Thread=1 1.941595	3.2749535 2 3.613314	6.235328 4 6.282357	8.60868725 8 9.603273	14.852254 16 10.940991	24 11.432127
eriment 2 orm YCSB-A Throughput (Mo EH el h	1.66992575 pps/s) Thread=1 1.941595 0.215008 0.423265	3.2749535 2 3.613314 0.419314 0.95656	6.235328 4 6.282357 0.809303 1.878408	8 9.603273 1.53451 2.619554	14.852254 16 10.940991 2.702261 5.083122	24 11.432127 3.576111 7.476417
eriment 2 orm YCSB-A Throughput (Mo H el h or	1.66992575 pps/s) Thread=1 1.941595 0.215008 0.423265 1.780937	3.2749535 2 3.613314 0.419314 0.95656 3.28364	6.235328 4 6.282357 0.809303 1.878408 5.034586	8 9.603273 1.53451 2.619554 5.644092	14.852254 16 10.940991 2.702261 5.083122 5.529003	24 11.432127 3.576111 7.476417 4.956198
eriment 2 orm YCSB-A Throughput (Mo El el h or Hash	1.66992575 pps/s) Thread=1 1.941595 0.215008 0.423265 1.780937 1.9295995	3.2749535 2 3.613314 0.419314 0.95656 3.28364 3.779359	6.235328 4 6.282357 0.809303 1.878408 5.034586 7.358267	8 9.603273 1.53451 2.619554	14.852254 16 10.940991 2.702261 5.083122 5.529003 18.3813365	24 11.432127 3.576111 7.476417 4.956198 25.373776
Hash eriment 2 orm YCSB-A Throughput (Mo EH /el sh or Hash Err Hash Err Hash Err Hash	1.66992575 1.66992575 1.941595 0.215008 0.423265 1.780937 1.9295995 pps/s) Thread=1 1.553614	3.2749535 2 3.613314 0.419314 0.95656 3.28364 3.779359 2 3.214115	6.235328 4 6.282357 0.809303 1.878408 5.034586 7.358267 4 6.395054	8 9.603273 1.53451 2.619554 5.644092 9.924119 8 10.17395	14.852254 16 10.940991 2.702261 5.083122 5.529003 18.3813365 16 12.110555	24 11.432127 3.576111 7.476417 4.956198 25.373776 24 13.752623
eriment 2 orm YCSB-A Throughput (Mo H el h r Hash orm YCSB-B Throughput (Mo H	1.66992575 1.941595 0.215008 0.423265 1.780937 1.9295995 pps/s) Thread=1 1.553614 0.547787	3.2749535 2 3.613314 0.419314 0.95656 3.28364 3.779359 2 3.214115 1.032996	6.235328 4 6.282357 0.809303 1.878408 5.034586 7.358267 4 6.395054 1.977721	8 9.603273 1.53451 2.619554 5.644092 9.924119 8 10.17395 3.493462	14.852254 16 10.940991 2.702261 5.083122 5.529003 18.3813365 16 12.110555 4.435138	24 11.432127 3.576111 7.476417 4.956198 25.373776 24 13.752623 5.079593
Hash eriment 2 orm YCSB-A Throughput (Mo Hel h or Hash orm YCSB-B Throughput (Mo H	1.66992575 1.941595 0.215008 0.423265 1.780937 1.9295995 1Dread=1 1.553614 0.547787 0.62971	3.2749535 2 3.613314 0.419314 0.95656 3.28364 3.779359 2 3.214115 1.032996 1.225157	6.235328 4 6.282357 0.809303 1.878408 5.034586 7.358267 4 6.395054 1.977721 2.422948	8 9.603273 1.53451 2.619554 5.644092 9.924119 8 10.17395 3.493462 3.13946	14.852254 16 10.940991 2.702261 5.083122 5.529003 18.3813365 16 12.110555 4.435138 6.263437	24 11.432127 3.576111 7.476417 4.956198 25.373776 24 13.752623 5.079593 9.295119
Hash eriment 2 orm YCSB-A Throughput (Mo Hel h or Hash orm YCSB-B Throughput (Mo H el h r H el h	1.66992575 1.941595 0.215008 0.423265 1.780937 1.9295995 ops/s) Thread=1 1.553614 0.547787 0.62971 1.778103 2.622453	3.2749535 2 3.613314 0.419314 0.95656 3.28364 3.779359 2 3.214115 1.032996 1.225157 3.250971 5.198723	6.235328 4 6.282357 0.809303 1.878408 5.034586 7.358267 4 6.395054 1.977721 2.422948 4.995168 10.266235	8 9.603273 1.53451 2.619554 5.644092 9.924119 8 10.17395 3.493462 3.13946 5.592824 12.136581	14.852254 16 10.940991 2.702261 5.083122 5.529003 18.3813365 16 12.110555 4.435138 6.263437 5.477951 23.401413	24 11.432127 3.576111 7.476417 4.956198 25.373776 24 13.752623 5.079593 9.295119 5.06256 33.741323
Hash eriment 2 orm YCSB-A Throughput (Mo Hel ish or Hash Hel Hel ish Hel Hel Hel Hel Hel Hel Horer Horm YCSB-B Throughput (Mo Hel Horm Throughput (Mo Her) Hesh Orm YCSB-D Throughput (Mo	1.66992575 1.941595 0.215008 0.423265 1.780937 1.9295995 1.78041 0.547787 0.62971 1.778103 2.622453 ops/s) Thread=1	3.2749535 2 3.613314 0.419314 0.95656 3.28364 3.779359 2 3.214115 1.032996 1.225157 3.250971 5.198723 2	6.235328 4 6.282357 0.809303 1.878408 5.034586 7.358267 4 6.395054 1.977721 2.422948 4.995168 10.266235 4	8 9.603273 1.53451 2.619554 5.644092 9.924119 8 10.17395 3.493462 3.13946 5.592824 12.136581 8	14.852254 16 10.940991 2.702261 5.083122 5.529003 18.3813365 16 12.110555 4.435138 6.263437 5.477951 23.401413 16	24 11.432127 3.576111 7.476417 4.956198 25.373776 24 13.752623 5.079593 9.295119 5.06256 33.741323 24
Hash eriment 2 orm YCSB-A Throughput (Mo H el h or Hash OH H el h tr H el h tr H el h tr el dash orr el dash	1.66992575 1.941595 0.215008 0.423265 1.780937 1.9295995 ops/s) Thread=1 1.553614 0.547787 0.62971 1.778103 2.622453	3.2749535 2 3.613314 0.419314 0.95656 3.28364 3.779359 2 3.214115 1.032996 1.225157 3.250971 5.198723	6.235328 4 6.282357 0.809303 1.878408 5.034586 7.358267 4 6.395054 1.977721 2.422948 4.995168 10.266235	8 9.603273 1.53451 2.619554 5.644092 9.924119 8 10.17395 3.493462 3.13946 5.592824 12.136581	14.852254 16 10.940991 2.702261 5.083122 5.529003 18.3813365 16 12.110555 4.435138 6.263437 5.477951 23.401413	24 11.432127 3.576111 7.476417 4.956198 25.373776 24 13.752623 5.079593 9.295119 5.06256 33.741323
Hash eriment 2 corm YCSB-A Throughput (Mo Hel ish er Hash EH Hel ish Horm YCSB-B Throughput (Mo Hel ish er Hash orm YCSB-D Throughput (Mo Hel Hash	1.66992575 1.941595 0.215008 0.423265 1.780937 1.9295995 1.553614 0.547787 0.62971 1.778103 2.622453 ops/s) Thread=1 2.547534 1.519133 0.872114	3.2749535 2 3.613314 0.419314 0.95656 3.28364 3.779359 2 3.214115 1.032996 1.225157 3.250971 5.198723 2 4.556558 3.087774 1.425969	6.235328 4 6.282357 0.809303 1.878408 5.034586 7.358267 4 6.395054 1.977721 2.422948 4.995168 10.266235 4 7.806189 6.070746 1.972523	8 9.603273 1.53451 2.619554 5.644092 9.924119 8 10.17395 3.493462 3.13946 5.592824 12.136581 8 10.655705 9.841329 3.644325	14.852254 16 10.940991 2.702261 5.083122 5.529003 18.3813365 16 12.110555 4.435138 6.263437 5.477951 23.401413 16 9.969395 11.607526 4.716346	24 11.432127 3.576111 7.476417 4.956198 25.373776 24 13.752623 5.079593 9.295119 5.06256 33.741323 24 9.275043 12.588382 5.236053
Hash eriment 2 orm YCSB-A Throughput (Mo EH Hash orm YCSB-B Throughput (Mo EH rel sh er Hash orm YCSB-D Throughput (Mo SH EH EH	1.66992575 1.941595 0.215008 0.423265 1.780937 1.9295995 0ps/s) Thread=1 1.553614 0.547787 0.62971 1.778103 2.622453 0ps/s) Thread=1 2.547534 1.519133 0.872114 0.575072	3.2749535 2 3.613314 0.419314 0.95656 3.28364 3.779359 2 3.214115 1.032996 1.225157 3.250971 5.198723 2 4.556558 3.087774 1.425969 1.102422	6.235328 4 6.282357 0.809303 1.878408 5.034586 7.358267 4 6.395054 1.977721 2.422948 4.995168 10.266235 4 7.806189 6.070746 1.972523 2.145923	8 9.603273 1.53451 2.619554 5.644092 9.924119 8 10.17395 3.493462 3.13946 5.592824 12.136581 8 10.655705 9.841329 3.644325 4.137716	14.852254 16 10.940991 2.702261 5.083122 5.529003 18.3813365 16 12.110555 4.435138 6.263437 5.477951 23.401413 16 9.969395 11.607526 4.716346 7.2416	24 11.432127 3.576111 7.476417 4.956198 25.373776 24 13.752623 5.079593 9.295119 5.06256 33.741323 24 9.275043 12.588382 5.236053 9.988099
Hash eriment 2 orm YCSB-A Throughput (Mo Hel h or Hash EH Hel Hel Hel Hel Hel Hel Hel Hel Hel He	1.66992575 1.941595 0.215008 0.423265 1.780937 1.9295995 pps/s) Thread=1 1.553614 0.547787 0.62971 1.778103 2.622453 0.82915 1.778103 2.622453 0.872114 0.575072 1.16033 3.625560333	3.2749535 2 3.613314 0.419314 0.95656 3.28364 3.779359 2 3.214115 1.032996 1.225157 3.250971 5.198723 2 4.556558 3.087774 1.425969 1.102422 1.20241 7.433447667	6.235328 4 6.282357 0.809303 1.878408 5.034586 7.358267 4 6.395054 1.977721 2.422948 4.995168 10.266235 4 7.806189 6.070746 1.972523 2.145923 2.2662 14.772049	8 9.603273 1.53451 2.619554 5.644092 9.924119 8 10.17395 3.493462 3.13946 5.592824 12.136581 8 10.655705 9.841329 3.644325 4.137716 4.880244 21.772137	14.852254 16 10.940991 2.702261 5.083122 5.529003 18.3813365 16 12.110555 4.435138 6.263437 5.477951 23.401413 16 9.969395 11.607526 4.716346 7.2416 6.240233 25.086287	24 11.432127 3.576111 7.476417 4.966198 25.373776 24 13.752623 5.079593 9.295119 5.06256 33.741323 24 9.275043 12.588382 5.236053 9.988099 9.361369 25.97748067
Hash eriment 2 orm YCSB-A Throughput (Mo EH Hash orm YCSB-B Throughput (Mo EH Hoth orm YCSB-D Throughput (Mo Horm Hash orm YCSB-D Throughput (Mo EH Hash orm YCSB-D Throughput (Mo EH Hash Hash	1.66992575 1.941595 0.215008 0.423265 1.780937 1.9295995 1.553614 0.547787 0.62971 1.778103 2.622453 pps/s) Thread=1 2.547534 1.519133 0.872114 0.575072 1.16033 3.625560333 5.043314	3.2749535 2 3.613314 0.419314 0.95656 3.28364 3.779359 2 3.214115 1.032996 1.225157 3.250971 5.198723 2 4.556558 3.087774 1.425969 1.102422 1.20241 7.433447667 5.3270765	6.235328 4 6.282357 0.809303 1.878408 5.034586 7.358267 4 6.395054 1.977721 2.422948 4.995168 10.266235 4 7.806189 6.070746 1.972523 2.145923 2.2662 14.772049 10.502546	8 9.603273 1.53451 2.619554 5.644092 9.924119 8 10.17395 3.493462 3.13946 5.592824 12.136581 8 10.655705 9.841329 3.644325 4.137716 4.880244 21.772137 20.5088805	14.852254 16 10.940991 2.702261 5.083122 5.529003 18.3813365 16 12.110555 4.435138 6.263437 5.477951 23.401413 16 9.969395 11.607526 4.716346 7.2416 6.240233 25.086287 24.746811	24 11.432127 3.576111 7.476417 4.956198 25.373776 24 13.752623 5.079593 9.295119 5.06256 33.741323 24 9.275043 12.588382 5.286053 9.988099 9.361369 25.97748067 36.508485
Hash eriment 2 orm YCSB-A Throughput (Mo Hel h or Hash Hel Hel h orm YCSB-B Throughput (Mo Hel h or Hash orm YCSB-D Throughput (Mo Hel	1.66992575 1.941595 0.215008 0.423265 1.780937 1.9295995 1.780937 1.553614 0.547787 0.62971 1.778103 2.622453 ops/s) Thread=1 2.547534 1.519133 0.872114 0.875072 1.16033 3.625560333 5.043314 ops/s) Thread=1	3.2749535 2 3.613314 0.419314 0.95656 3.28364 3.779359 2 3.214115 1.032996 1.225157 3.250971 5.198723 2 4.556558 3.087774 1.425969 1.102422 1.20241 7.433447667 5.3270765	6.235328 4 6.282357 0.809303 1.878408 5.034586 7.358267 4 6.395054 1.977721 2.422948 4.995168 10.266235 4 7.806189 6.070746 1.972523 2.145923 2.2662 14.772049 10.502546	8 9.603273 1.53451 2.619554 5.644092 9.924119 8 10.17395 3.493462 3.13946 5.592824 12.136581 8 10.655705 9.841329 3.644325 4.137716 4.880244 21.772137 20.5088805 8	14.852254 16 10.940991 2.702261 5.083122 5.529003 18.3813365 16 12.110555 4.435138 6.263437 5.477951 23.401413 16 9.969395 11.607526 4.716346 7.2416 6.240233 25.086287 24.746811	24 11.432127 3.576111 7.476417 4.956198 25.373776 24 13.752623 5.079593 9.295119 5.06256 33.741323 24 9.275043 12.588382 5.296053 9.988099 9.361369 25.97748067 36.5088485 24
Hash priment 2 prim YCSB-A Throughput (Mo Hel Hash prim YCSB-B Throughput (Mo Hel h h prim YCSB-D Throughput (Mo Hel Hash prim YCSB-D Throughput (Mo Hel Hash prim YCSB-D Throughput (Mo Hel Hash prim YCSB-F Throughput (Mo Hash prim YCSB-F Throughput (Mo Hel Hash prim YCSB-F Throughput (Mo Hel Hash	1.66992575 1.941595 0.215008 0.423265 1.780937 1.9295995 0ps/s) Thread=1 1.553614 0.547787 0.62971 1.778103 2.622453 0ps/s) Thread=1 2.547534 1.519133 0.872114 0.575072 1.16033 3.625560333 5.043314 ups/s) Thread=1 1.361149 0.732373	3.2749535 2 3.613314 0.419314 0.96656 3.28364 3.779359 2 3.214115 1.032996 1.225157 3.250971 5.199723 2 4.556558 3.087774 1.425969 1.102422 1.20241 7.433447667 5.3270765 2 2.770951 1.389933	6.235328 4 6.282357 0.809303 1.878408 5.034586 7.358267 4 6.395054 1.977721 2.422948 4.995168 10.266235 4 7.806189 6.070746 1.972523 2.145923 2.2662 14.772049 10.502546 4 8.811631 2.745591	8 9.603273 1.53451 2.619554 5.644092 9.924119 8 10.17395 3.493462 3.13946 5.592824 12.136581 8 10.655705 9.841329 3.644325 4.137716 4.880244 21.772137 20.5088805 8 7.28332 4.836576	14.852254 16 10.940991 2.702261 5.083122 5.529003 18.3813365 16 12.110555 4.435138 6.263437 5.477951 23.401413 16 9.969395 11.607526 4.716346 7.2416 6.240233 25.086287 24.746811 16 7.353183 6.132695	24 11.432127 3.576111 7.476417 4.956198 25.373776 24 13.752623 5.079593 9.295119 5.06256 33.741323 24 9.275043 12.588382 5.286053 9.988099 9.361369 25.97748067 36.508485
Hash eriment 2 orm YCSB-A Throughput (Mo Hel ish or Hash orm YCSB-B Throughput (Mo H Hel ish orm YCSB-D Throughput (Mo H H H H H H H H H H H H H H H H H H H	1.66992575 1.941595 0.215008 0.423265 1.780937 1.9295995 pps/s) Thread=1 1.553614 0.547787 0.62971 1.778103 2.622453 0ps/s) Thread=1 2.547534 1.519133 0.872114 0.575072 1.16033 3.625560333 5.043314 pps/s) Thread=1 1.361149 0.732373 0.694532	3.2749535 2 3.613314 0.419314 0.95656 3.28364 3.779359 2 3.214115 1.032996 1.225157 3.250971 5.198723 2 4.556558 3.087774 1.425969 1.102422 1.20241 7.433447667 5.3270765 2 2.770951 1.389933 1.239523	6.235328 4 6.282357 0.809303 1.878408 5.034586 7.358267 4 6.395054 1.977721 2.422948 4.995168 10.266235 4 7.806189 6.070746 1.972523 2.145923 2.2662 14.772049 10.502546 4 4.811631 2.745591 2.192028	8 9.603273 1.53451 2.619554 5.644092 9.924119 8 10.17395 3.493462 3.13946 5.592824 12.136581 8 10.655705 9.841329 3.644325 4.137716 4.880244 21.772137 20.5088805 8 7.28332 4.836576 3.537363	14.852254 16 10.940991 2.702261 5.083122 5.529003 18.3813365 16 12.110555 4.435138 6.263437 5.477951 23.401413 16 9.969395 11.607526 4.716346 7.2416 6.240233 25.086287 24.746811 16 7.353183 6.132695 4.236918	24 11.432127 3.576111 7.476417 4.956198 25.373776 24 13.752623 5.079593 9.295119 5.06256 33.741323 24 9.275043 12.588382 5.236053 9.988099 9.361369 25.97748067 36.5088485 24 7.086551 6.397954 4.501145
eriment 2 orm YCSB-A Throughput (Mo EH eri Hash orm YCSB-B Throughput (Mo EH eri Hash orm YCSB-D Throughput (Mo EH eri Hash orm YCSB-D Throughput (Mo EH eri Hash orm YCSB-D Throughput (Mo EH EH el el eri Hash	1.66992575 1.941595 0.215008 0.423265 1.780937 1.9295995 0ps/s) Thread=1 1.553614 0.547787 0.62971 1.778103 2.622453 0ps/s) Thread=1 2.547534 1.519133 0.872114 0.575072 1.16033 3.625560333 5.043314 pps/s) Thread=1 1.361149 0.732373 0.694532 0.237316	3.2749535 2 3.613314 0.419314 0.95656 3.28364 3.779359 2 3.214115 1.032996 1.225157 3.250971 5.198723 2 4.556558 3.087774 1.425969 1.102422 1.20241 7.433447667 5.3270765 2 2.770951 1.389933 1.239523 0.455495	6.235328 4 6.282357 0.809303 1.878408 5.034586 7.358267 4 6.395054 1.977721 2.422948 4.995168 10.266235 4 7.806189 6.070746 1.972523 2.145923 2.2662 14.772049 10.502546 4 4.811631 2.745591 2.192028 0.884652	8 9.603273 1.53451 2.619554 5.644092 9.924119 8 10.17395 3.493462 3.13946 5.592824 12.136581 8 10.655705 9.841329 3.644325 4.137716 4.880244 21.772137 20.5088805 8 7.28332 4.836576 3.537363 1.651285	14.852254 16 10.940991 2.702261 5.083122 5.529003 18.3813365 16 12.110555 4.435138 6.263437 5.477951 23.401413 16 9.969395 11.607526 4.716346 7.2416 6.240233 25.086287 24.746811 16 7.353183 6.132695 4.236918 2.836115	24 11.432127 3.576111 7.476417 4.956198 25.373776 24 13.752623 5.079593 9.295119 5.06256 33.741323 24 9.275043 12.588382 5.236053 9.988099 9.361369 25.97748067 36.5088485 24 7.086551 6.397954 4.501145 3.920888
Hash eriment 2 orm YCSB-A Throughput (Mo EH rer Hash orm YCSB-B Throughput (Mo EH rel sh er Hash orm YCSB-D Throughput (Mo SH EH EH el el el rorn TCSB-F Throughput (Mo SH EH EH EH EH EH EH EH EH EH	1.66992575 1.941595 0.215008 0.423265 1.780937 1.9295995 1.780937 1.9295995 0ps/s) Thread=1 1.553614 0.547787 0.62971 1.778103 2.622453 0ps/s) Thread=1 2.547534 1.519133 0.872114 0.575072 1.16033 3.825560333 5.043314 0ps/s) Thread=1 1.361149 0.732373 0.694532 0.237316 0.446808 1.959922	3.2749535 2 3.613314 0.419314 0.95656 3.28364 3.779359 2 3.214115 1.032996 1.225157 3.250971 5.198723 2 4.556558 3.087774 1.425969 1.102422 1.20241 7.433447667 5.3270765 2 2.770951 1.389933 1.239523 0.453495 0.89648 4.22807	6.235328 4 6.282357 0.809303 1.878408 5.034586 7.358267 4 6.395054 1.977721 2.422948 4.995168 10.266235 4 7.806189 6.070746 1.972523 2.145923 2.2662 14.772049 10.502546 4 4.811631 2.745591 2.192028 0.884652 1.7672665 8.227409	8	14.852254 16 10.940991 2.702261 5.083122 5.529003 18.3813365 16 12.110555 4.435138 6.263437 5.477951 23.401413 16 9.969395 11.607526 4.716346 7.2416 6.240233 25.086287 24.746811 16 7.353183 6.132695 4.236918 2.836115 4.704921 11.3979743	24 11.432127 3.576111 7.476417 4.966198 25.373776 24 13.752623 5.079593 9.295119 5.06256 33,741323 24 9.275043 12.588382 5.236053 9.988099 9.361369 25.97748067 36.5088485 24 7.086551 6.397954 4.501145 3.920888 6.940909 10.901977
Hash priment 2 prim YCSB-A Throughput (Mo Hel Hash prim YCSB-B Throughput (Mo Hel h h prim YCSB-D Throughput (Mo Hel Hash prim YCSB-D Throughput (Mo Hel Hash prim YCSB-D Throughput (Mo Hel	1.66992575 1.941595 0.215008 0.423265 1.780937 1.9295995 0.95/s) Thread=1 1.553614 0.547787 0.62971 1.778103 2.622453 0.95/s) Thread=1 2.547534 1.519133 0.872114 0.575072 1.16033 3.625560333 5.043314 ups/s) Thread=1 1.361149 0.732373 0.694532 0.237316 0.446808	3.2749535 2 3.613314 0.419314 0.96656 3.28364 3.779359 2 3.214115 1.032996 1.225157 3.250971 5.198723 2 4.556558 3.087774 1.425969 1.102422 1.20241 7.433447667 5.3270765 2 2.770951 1.389933 1.299523 0.453495 0.89648	6.235328 4 6.282357 0.809303 1.878408 5.034586 7.358267 4 6.395054 1.977721 2.422948 4.995168 10.266235 4 7.806189 6.070746 1.972523 2.145923 2.2662 14.772049 10.502546 4 4.811631 2.745591 2.192028 0.884652 1.7672565	8 9.603273 1.53451 2.619554 5.644092 9.924119 8 10.17395 3.493462 3.13946 5.592824 12.136581 8 10.655705 9.841329 3.644325 4.137716 4.880244 21.772137 20.508805 8 7.28332 4.836576 3.537363 1.651285 2.413629	14.852254 16 10.940991 2.702261 5.083122 5.529003 18.3813365 16 12.110555 4.435138 6.263437 5.477951 23.401413 16 9.969395 11.607526 4.716346 7.2416 6.240233 25.086287 24.746811 16 7.353183 6.132695 4.236918 2.836115 4.704921	24 11.432127 3.576111 7.476417 4.956198 25.373776 24 13.752623 5.079593 9.295119 5.06256 33.741323 24 9.275043 12.588382 5.236053 9.988099 9.361369 25.97748067 36.508485 24 7.086551 6.397954 4.501145 3.920888 6.940909
Hash eriment 2 orm YCSB-A Throughput (Mo Hel Hash orm YCSB-B Throughput (Mo Hel hish orm YCSB-D Throughput (Mo Hel	1.66992575 1.941595 0.215008 0.423265 1.780937 1.9295995 1.780937 1.9295995 0ps/s) Thread=1 1.553614 0.547787 0.62971 1.778103 2.622453 0ps/s) Thread=1 2.547534 1.519133 0.872114 0.575072 1.16033 3.825560333 5.043314 0ps/s) Thread=1 1.361149 0.732373 0.694532 0.237316 0.446808 1.959922	3.2749535 2 3.613314 0.419314 0.95656 3.28364 3.779359 2 3.214115 1.032996 1.225157 3.250971 5.198723 2 4.556558 3.087774 1.425969 1.102422 1.20241 7.433447667 5.3270765 2 2.770951 1.389933 1.239523 0.453495 0.89648 4.22807	6.235328 4 6.282357 0.809303 1.878408 5.034586 7.358267 4 6.395054 1.977721 2.422948 4.995168 10.266235 4 7.806189 6.070746 1.972523 2.145923 2.2662 14.772049 10.502546 4 4.811631 2.745591 2.192028 0.884652 1.7672665 8.227409	8	14.852254 16 10.940991 2.702261 5.083122 5.529003 18.3813365 16 12.110555 4.435138 6.263437 5.477951 23.401413 16 9.969395 11.607526 4.716346 7.2416 6.240233 25.086287 24.746811 16 7.353183 6.132695 4.236918 2.836115 4.704921 11.3979743	24 11.432127 3.576111 7.476417 4.966198 25.373776 24 13.752623 5.079593 9.295119 5.06256 33,741323 24 9.275043 12.588382 5.236053 9.988099 9.361369 25.97748067 36.5088485 24 7.086551 6.397954 4.501145 3.920888 6.940909 10.901977
Hash priment 2 prim YCSB-A Throughput (Mo Hel h r Hash prim YCSB-B Throughput (Mo HH el h r Hash prim YCSB-D Throughput (Mo HH el h r Hash prim YCSB-D Throughput (Mo HH el H el H el H h r H el H el H h r H el H el H h r H el H	1.66992575 1.941595 0.215008 0.423265 1.780937 1.9295995 0.92/5) Thread=1 1.553614 0.547787 0.62971 1.778103 2.622453 0.95/5) Thread=1 2.547534 1.519133 0.872114 0.575072 1.16033 3.025560333 5.043314 0.95/5) Thread=1 1.361149 0.732373 0.694532 0.237316 0.446808 1.959922 1.8972135	3.2749535 2 3.613314 0.419314 0.95656 3.28364 3.779359 2 3.214115 1.032996 1.225157 3.250971 5.198723 2 4.556558 3.087774 1.425969 1.102422 1.20241 7.433447667 5.3270765 2 2.770951 1.389933 1.239523 0.453495 0.89648 4.22807 3.5556535	6.235328 4 6.282357 0.809303 1.878408 5.034586 7.358267 4 6.395054 1.977721 2.422948 4.995168 10.266235 4 7.806189 6.070746 1.972523 2.145923 2.2662 14.772049 10.502546 4 4.811631 2.745591 2.192028 0.884652 1.7672565 8.227409 6.6841395	8 9.603273 1.53451 2.619554 5.644092 9.924119 8 10.17395 3.493462 3.13946 5.592824 12.136581 8 10.655705 9.841329 3.644325 4.137716 4.880244 21.772137 20.5088805 8 7.28332 4.836576 3.537363 1.651285 2.413629 10.98181 9.6083835	14.852254 16 10.940991 2.702261 5.083122 5.529003 18.3813365 16 12.110555 4.435138 6.263437 5.477951 23.401413 16 9.969395 11.607526 4.716346 7.2416 6.240233 25.086287 24.746811 16 7.353183 6.132695 4.236918 2.836115 4.704921 11.3979743	24 11.432127 3.576111 7.476417 4.966198 25.373776 24 13.752623 5.079593 9.295119 5.06256 33,741323 24 9.275043 12.588382 5.236053 9.988099 9.361369 25.97748067 36.5088485 24 7.086551 6.397954 4.501145 3.920888 6.940909 10.901977
Hash priment 2 priment 2 priment 2 priment 2 priment 2 priment 4	1.66992575 1.941595 0.215008 0.423265 1.780937 1.9295995 1.780937 1.553614 0.547787 0.62971 1.778103 2.622453 0.9s/s) Thread=1 2.547534 1.519133 0.872114 0.872114 0.875072 1.16033 3.625560333 5.043314 ops/s) Thread=1 1.361149 0.732373 0.694532 0.237316 0.446808 1.959922 1.8972135	3.2749535 2 3.613314 0.419314 0.96656 3.28364 3.779359 2 3.214115 1.032996 1.225157 3.250971 5.198723 2 4.556558 3.087774 1.425969 1.102422 1.20241 7.433447667 5.3270765 2 2.770951 1.389933 1.239523 0.453495 0.89648 4.22807 3.5556635	6.235328 4 6.282357 0.809303 1.878408 5.034586 7.358267 4 6.395054 1.977721 2.422948 4.995168 10.266235 4 7.806189 6.070746 1.972523 2.145923 2.2662 14.772049 10.502546 4 4.811631 2.745591 2.192028 0.884652 1.7672565 8.227409 6.6841395	8 9.603273 1.53451 2.619554 5.644092 9.924119 8 10.17395 3.493462 3.13946 5.592824 12.136581 8 10.655705 9.841329 3.644325 4.137716 4.880244 21.772137 20.508805 8 7.28332 4.836576 3.537363 1.651285 2.413629 10.98181 9.6083835	14.852254 16 10.940991 2.702261 5.083122 5.529003 18.3813365 16 12.110555 4.435138 6.263437 5.477951 23.401413 16 9.969395 11.607526 4.716346 7.2416 6.240233 25.086287 24.746811 16 7.353183 6.132695 4.236918 2.836115 4.704921 11.3979743	24 11.432127 3.576111 7.476417 4.966198 25.373776 24 13.752623 5.079593 9.295119 5.06256 33,741323 24 9.275043 12.588382 5.236053 9.988099 9.361369 25.97748067 36.5088485 24 7.086551 6.397954 4.501145 3.920888 6.940909 10.901977
Hash eriment 2 orm YCSB-A Throughput (Mo EH Hash orm YCSB-B Throughput (Mo EH Hash orm YCSB-D Throughput (Mo EH Hash orm YCSB-D Throughput (Mo EH Hash orm YCSB-T Throughput (Mo EH Hash orm YCSB-F Throughput (Mo EH Hash	1.66992575 1.941595 0.215008 0.423265 1.780937 1.9295995 0.781601 1.553614 0.547787 0.62971 1.778103 2.622453 0.95/5) Thread=1 2.547534 1.519133 0.872114 0.575072 1.6033 3.625560333 5.043314 0.95/5) Thread=1 1.361149 0.732373 0.694532 0.237316 0.446808 1.959922 1.8972135	3.2749535 2 3.613314 0.419314 0.96656 3.28364 3.779359 2 3.214115 1.032996 1.225157 3.250971 5.199723 2 4.556558 3.087774 1.425969 1.102422 1.20241 7.433447667 5.3270765 2 2.770951 1.389933 1.239523 0.453495 0.89648 4.22807 3.5556535	6.235328 4 6.282357 0.809303 1.878408 5.034586 7.358267 4 6.395054 1.977721 2.422948 4.995168 10.266235 4 7.806189 6.070746 1.972523 2.145923 2.2662 14.772049 10.502546 4 4.811631 2.745591 2.192028 0.884652 1.7672565 8.227409 6.6841395 Negative Search 0.500925 1.176881667	8 9.603273 1.53451 2.619554 5.644092 9.924119 8 10.17395 3.493462 3.13946 5.592824 12.136581 8 10.655705 9.841329 3.644325 4.137716 4.880244 21.772137 20.5088805 8 7.28332 4.836576 3.537363 1.651285 2.413629 10.98181 9.6083835	14.852254 16 10.940991 2.702261 5.083122 5.529003 18.3813365 16 12.110555 4.435138 6.263437 5.477951 23.401413 16 9.969395 11.607526 4.716346 7.2416 6.240233 25.086287 24.746811 16 7.353183 6.132695 4.236918 2.836115 4.704921 11.3979743	24 11.432127 3.576111 7.476417 4.966198 25.373776 24 13.752623 5.079593 9.295119 5.06256 33,741323 24 9.275043 12.588382 5.236053 9.988099 9.361369 25.97748067 36.5088485 24 7.086551 6.397954 4.501145 3.920888 6.940909 10.901977
Hash Priment 2 Imm YCSB-A Throughput (Mo H el h r Idash Imm YCSB-B Throughput (Mo H el h h r Idash Imm YCSB-D Throughput (Mo H H H H H H H H H H H H H H H H H H H	1.66992575 1.941595 0.215008 0.423265 1.780937 1.9295995 1.780937 1.9295995 1.778103 2.622453 2.622453 2.622453 2.622453 2.622453 2.547534 1.519133 0.872114 0.575072 1.16033 3.825560333 5.043314 2.54566333 5.043314 2.54568333 1.559922 1.8972135	3.2749535 2 3.613314 0.419314 0.95656 3.28364 3.779359 2 3.214115 1.032996 1.225157 3.250971 5.198723 2 4.556558 3.087774 1.425969 1.102422 1.20241 7.433447667 5.3270765 2 2.770951 1.389933 1.239523 0.453495 0.89648 4.22807 3.5556535	6.235328 4 6.282357 0.809303 1.878408 5.034586 7.358267 4 6.395054 1.977721 2.422948 4.995168 10.266235 4 7.806189 6.070746 1.972523 2.145923 2.2662 14.772049 10.502546 4 4.811631 2.745591 2.192028 0.884652 1.7672565 8.227409 6.6841395 Negative Search 0.5000925 1.176861667 1.077073333	8	14.852254 16 10.940991 2.702261 5.083122 5.529003 18.3813365 16 12.110555 4.435138 6.263437 5.477951 23.401413 16 9.969395 11.607526 4.716346 7.2416 6.240233 25.086287 24.746811 16 7.353183 6.132695 4.236918 2.836115 4.704921 11.3979743	24 11.432127 3.576111 7.476417 4.966198 25.373776 24 13.752623 5.079593 9.295119 5.06256 33,741323 24 9.275043 12.588382 5.236053 9.988099 9.361369 25.97748067 36.5088485 24 7.086551 6.397954 4.501145 3.920888 6.940909 10.901977
Hash priment 2 prim YCSB-A Throughput (Mo H el h r Hash prim YCSB-B Throughput (Mo H el h r r Hash prim YCSB-D Throughput (Mo H H H el el h r r H el h r r H el el h r r tash prim YCSB-F Throughput (Mo H H H el el el h h r r tash prim YCSB-F Throughput (Mo H H H el el el h h r r tash prim YCSB-F Throughput (Mo H H H el el el h h r tash priment 4 age Latency (µs) H H H H el el el	1.66992575 1.941595 0.215008 0.423265 1.780937 1.9295995 0.781601 1.553614 0.547787 0.62971 1.778103 2.622453 0.95/5) Thread=1 2.547534 1.519133 0.872114 0.575072 1.6033 3.625560333 5.043314 0.95/5) Thread=1 1.361149 0.732373 0.694532 0.237316 0.446808 1.959922 1.8972135	3.2749535 2 3.613314 0.419314 0.96656 3.28364 3.779359 2 3.214115 1.032996 1.225157 3.250971 5.199723 2 4.556558 3.087774 1.425969 1.102422 1.20241 7.433447667 5.3270765 2 2.770951 1.389933 1.239523 0.453495 0.89648 4.22807 3.5556535	6.235328 4 6.282357 0.809303 1.878408 5.034586 7.358267 4 6.395054 1.977721 2.422948 4.995168 10.266235 4 7.806189 6.070746 1.972523 2.145923 2.2662 14.772049 10.502546 4 4.811631 2.745591 2.192028 0.884652 1.7672565 8.227409 6.6841395 Negative Search 0.500925 1.176881667	8 9.603273 1.53451 2.619554 5.644092 9.924119 8 10.17395 3.493462 3.13946 5.592824 12.136581 8 10.655705 9.841329 3.644325 4.137716 4.880244 21.772137 20.5088805 8 7.28332 4.836576 3.537363 1.651285 2.413629 10.98181 9.6083835	14.852254 16 10.940991 2.702261 5.083122 5.529003 18.3813365 16 12.110555 4.435138 6.263437 5.477951 23.401413 16 9.969395 11.607526 4.716346 7.2416 6.240233 25.086287 24.746811 16 7.353183 6.132695 4.236918 2.836115 4.704921 11.3979743	24 11.432127 3.576111 7.476417 4.966198 25.373776 24 13.752623 5.079593 9.295119 5.06256 33,741323 24 9.275043 12.588382 5.236053 9.988099 9.361369 25.97748067 36.5088485 24 7.086551 6.397954 4.501145 3.920888 6.940909 10.901977
Hash priment 2 prim YCSB-A Throughput (Mo Hel h r Hash prim YCSB-B Throughput (Mo H H H H H H H H H H H H H H H H H H H	1.66992575 1.941595 0.215008 0.423265 1.780937 1.9295995 0.59/s) Thread=1 1.553614 0.547787 0.62971 1.778103 2.622453 0.59/s) Thread=1 2.547534 1.519133 0.872114 0.575072 1.16033 3.625560333 5.043514 0.732373 0.694532 0.237316 0.446808 1.959922 1.8972135 Insert 1.044361667 1.524968333 1.570881667 7.030871667 2.420722 0.62575	3.2749535 2 3.613314 0.419314 0.95656 3.28364 3.779359 2 3.214115 1.032996 1.225157 3.250971 5.198723 2 4.556558 3.087774 1.425969 1.102422 1.20241 7.433447667 5.3270765 2 2.770951 1.389933 1.299523 0.455495 0.89648 4.22807 3.5556635	6.235328 4 6.282357 0.809303 1.878408 5.034586 7.358267 4 6.395054 1.977721 2.422948 4.995168 10.266235 4 7.806189 6.070746 1.972523 2.145923 2.2662 14.772049 10.502546 4 4.811631 2.745591 2.192028 0.884652 1.7672565 8.227409 6.6841395	8 9.603273 1.53451 2.619554 5.644092 9.924119 8 10.17395 3.493462 3.13946 5.592824 12.136581 8 10.655705 9.841329 3.644325 4.137716 4.880244 21.772137 20.508805 8 7.2832 4.836576 3.537363 1.651285 2.413629 10.98181 9.6083835 1.039588333 3.415083333 2.629362 0.5745	14.852254 16 10.940991 2.702261 5.083122 5.529003 18.3813365 16 12.110555 4.435138 6.263437 5.477951 23.401413 16 9.969395 11.607526 4.716346 7.2416 6.240233 25.086287 24.746811 16 7.353183 6.132695 4.236918 2.836115 4.704921 11.3979743	24 11.432127 3.576111 7.476417 4.966198 25.373776 24 13.752623 5.079593 9.295119 5.06256 33,741323 24 9.275043 12.588382 5.236053 9.988099 9.361369 25.97748067 36.5088485 24 7.086551 6.397954 4.501145 3.920888 6.940909 10.901977
eriment 2 rm YCSB-A Throughput (Mo H el h r r Hash rm YCSB-B Throughput (Mo H el h r r H dash rm YCSB-D Throughput (Mo H H d el h r r tash rm YCSB-F Throughput (Mo H H d el h r r tash rm YCSB-F Throughput (Mo H H d el h r r tash	1.66992575 1.941595 0.215008 0.423265 1.780937 1.9295995 0.757644 0.547787 0.62971 1.778103 2.622453 0.92/5) Thread=1 2.547534 1.519133 0.872114 0.575072 1.16033 3.025560333 5.043314 0.95/5) Thread=1 1.361149 0.732373 0.694532 0.237316 0.446808 1.959922 1.8972135	3.2749535 2 3.613314 0.419314 0.95656 3.28364 3.779359 2 3.214115 1.032996 1.225157 3.250971 5.198723 2 4.556558 3.087774 1.425969 1.102422 1.20241 7.433447667 5.3270765 2 2.770951 1.389933 1.239523 0.453495 0.89648 4.22807 3.5556535 Positive Search 0.373066833 0.386246 0.5450395 1.033883333 1.583204 0.328 0.5871938	6.235328 4 6.282357 0.809303 1.878408 5.034586 7.358267 4 6.395054 1.977721 2.422948 4.995168 10.266235 4 7.806189 6.070746 1.972523 2.145923 2.2662 14.772049 10.502546 4 4.811631 2.745591 2.192028 0.884652 1.7672565 8.227409 6.6841395 Negative Search 0.5000925 1.176861667 1.077073333 1.2635033333 1.154294 0.327 0.348968	8 9.603273 1.53451 2.619554 5.644092 9.924119 8 10.17395 3.493462 3.13946 5.592824 12.136581 8 10.655705 9.841329 3.644325 4.137716 4.880244 21.772137 20.5088805 8 7.28332 4.836576 3.537363 1.651285 2.413629 10.98181 9.6083835 Delete 0.718684667 0.728425333 1.039588333 3.415083333 2.629362 0.5745 0.6487288	14.852254 16 10.940991 2.702261 5.083122 5.529003 18.3813365 16 12.110555 4.435138 6.263437 5.477951 23.401413 16 9.969395 11.607526 4.716346 7.2416 6.240233 25.086287 24.746811 16 7.353183 6.132695 4.236918 2.836115 4.704921 11.3979743	24 11.432127 3.576111 7.476417 4.966198 25.373776 24 13.752623 5.079593 9.295119 5.06256 33,741323 24 9.275043 12.588382 5.236053 9.988099 9.361369 25.97748067 36.5088485 24 7.086551 6.397954 4.501145 3.920888 6.940909 10.901977
eriment 2 rm YCSB-A Throughput (Mo H el h r tash rm YCSB-B Throughput (Mo H el h r flash rm YCSB-D Throughput (Mo H H H el h r r tash rm YCSB-F Throughput (Mo H H H H H H H H H H H H H H H H H H H	1.66992575 1.941595 0.215008 0.423265 1.780937 1.9295995 1.78103 0.62971 1.778103 2.622453 0.78178103 2.622453 0.78178103 0.872114 0.575072 1.16033 3.625560333 5.043314 0.79178 0.732373 0.694532 0.237316 0.446808 1.959922 1.8972135	3.2749535 2 3.613314 0.419314 0.95656 3.28364 3.779359 2 3.214115 1.032996 1.225157 3.250971 5.198723 2 4.556558 3.087774 1.425969 1.102422 1.20241 7.433447667 5.3270765 2 2.770951 1.389933 1.239523 0.453495 0.89648 4.22807 3.5556535 Positive Search 0.373066833 0.386246 0.5450395 1.033883333 1.583204 0.328 0.5871938 Positive Search	6.235328 4 6.282357 0.809303 1.878408 5.034586 7.358267 4 6.395054 1.977721 2.422948 4.995168 10.266235 4 7.806189 6.070746 1.972523 2.145923 2.2662 14.772049 10.502546 4 4.811631 2.745591 2.192028 0.884652 1.7672565 8.227409 6.6841395 Negative Search 0.5000925 1.176861667 1.077073333 1.263503333 1.263503333 1.154294 0.327 0.34868 Negative Search	8 9.603273 1.53451 2.619554 5.644092 9.924119 8 10.17395 3.493462 3.13946 5.592824 12.136581 8 10.655705 9.841329 3.644325 4.137716 4.880244 21.772137 20.5088805 8 7.28332 4.836576 3.537363 1.651285 2.413629 10.98181 9.6083835 Delete 0.718684667 0.728425333 1.039588333 3.415083333 2.629362 0.5745 0.6487288 Delete	14.852254 16 10.940991 2.702261 5.083122 5.529003 18.3813365 16 12.110555 4.435138 6.263437 5.477951 23.401413 16 9.969395 11.607526 4.716346 7.2416 6.240233 25.086287 24.746811 16 7.353183 6.132695 4.236918 2.836115 4.704921 11.3979743	24 11.432127 3.576111 7.476417 4.966198 25.373776 24 13.752623 5.079593 9.295119 5.06256 33,741323 24 9.275043 12.588382 5.236053 9.988099 9.361369 25.97748067 36.5088485 24 7.086551 6.397954 4.501145 3.920888 6.940909 10.901977
Hash priment 2 priment 2 priment 2 priment 2 priment 2 priment 4 prime	1.66992575 1.941595 0.215008 0.423265 1.780937 1.9295995 0.78164 0.547787 0.62971 1.778103 2.622453 0.92/5) Thread=1 2.547534 1.519133 0.872114 0.575072 1.16033 3.625560333 5.043314 0.92/5) Thread=1 1.361149 0.732373 0.694532 0.237316 0.446808 1.959922 1.8972135	3.2749535 2 3.613314 0.419314 0.96656 3.28364 3.779359 2 3.214115 1.032996 1.225157 3.250971 5.199723 2 4.556558 3.087774 1.425969 1.102422 1.20241 7.433447667 5.3270765 2 2.770951 1.389933 1.239523 0.453495 0.89648 4.22807 3.5556535 Positive Search 0.373066833 0.386246 0.5450395 1.033883333 1.583204 0.328 0.5871938 Positive Search 0.924166667 1.098333333	6.235328 4 6.282357 0.809303 1.878408 5.034586 7.358267 4 6.395054 1.977721 2.422948 4.995168 10.266235 4 7.806189 6.070746 1.972523 2.145923 2.2662 14.772049 10.502546 4 4.811631 2.745591 2.192028 0.884652 1.7672565 8.227409 6.6841395 Negative Search 0.500925 1.176833333 1.263503333 1.154294 0.327 0.348968 Negative Search 0.814833333 1.776166667	8 9.603273 1.53451 2.619554 5.644092 9.924119 8 10.17395 3.493462 3.13946 5.592824 12.136581 8 10.655705 9.841329 3.644325 4.137716 4.880244 21.772137 20.5088805 8 7.28332 4.836576 3.537363 1.651285 2.413629 10.98181 9.6083835 Delete 0.718684667 0.728425333 1.039588333 3.415083333 2.629362 0.5745 0.6487288 Delete 1.379166667 1.322833333	14.852254 16 10.940991 2.702261 5.083122 5.529003 18.3813365 16 12.110555 4.435138 6.263437 5.477951 23.401413 16 9.969395 11.607526 4.716346 7.2416 6.240233 25.086287 24.746811 16 7.353183 6.132695 4.236918 2.836115 4.704921 11.3979743	24 11.432127 3.576111 7.476417 4.966198 25.373776 24 13.752623 5.079593 9.295119 5.06256 33,741323 24 9.275043 12.588382 5.236053 9.988099 9.361369 25.97748067 36.5088485 24 7.086551 6.397954 4.501145 3.920888 6.940909 10.901977
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Hash Periment 2 Torm YCSB-A Throughput (Mo EH vel sh her my CSB-B Throughput (Mo EH vel sh her my CSB-D Throughput (Mo EH vel sh her my CSB-D Throughput (Mo EH vel sh her my CSB-F Throughput (Mo SH Latency (µs) SH EH el vel sh her my CSB-F Throughput (Mo SH Latency (µs) SH EH el vel sh her my CSB-F Throughput (Mo SH Latency (µs) SH EH el vel sh her my CSB-F Throughput (Mo SH Latency (µs) SH EH el vel sh her my CSB-F Throughput (Mo SH Latency (µs) SH Latenc	1.66992575 1.941595 0.215008 0.423265 1.780937 1.9295995 1.553614 0.547787 0.62971 1.778103 2.622453 1.519133 0.872114 0.575072 1.16033 3.625560333 5.043314 1.519133 0.872114 0.575072 1.16033 1.629560333 5.043314 1.519133 1.625560333 5.043314 1.519133 1.750871667 1.524968333 1.570881667 1.044361667 1.524968333 1.570881667 7.030871667 2.442722 0.62575 0.442224 Insert 1.835166667 2.24333333 3.057166667 9.195833333 248.0072 41.24025 6.6324	3.2749535 2 3.613314 0.419314 0.95656 3.28364 3.779359 2 3.214115 1.032996 1.225157 3.250971 5.198723 2 4.556558 3.087774 1.425969 1.102422 1.20241 7.433447667 5.3270765 2 2.770951 1.389933 1.239523 0.453495 0.89648 4.22807 3.5556535 Positive Search 0.373066833 0.386246 0.5450395 1.033883333 1.583204 0.328 0.5871938 Positive Search 0.924166667 1.098333333 1.446333333 1.446333333 1.446333333 2.0745 3.3296 2.37875 1.2416	6.235328 4 6.282357 0.809303 1.878408 5.034586 7.358267 4 6.395054 1.977721 2.422948 4.995168 10.266235 4 7.806189 6.070746 1.972523 2.145923 2.2662 14.772049 10.502546 4 4.811631 2.745591 2.192028 0.884652 1.7672565 8.227409 6.6841395 Negative Search 0.5000925 1.17686667 1.077073333 1.263503333 1.263503333 1.776166667 1.527166667 1.577166667 1.577166667 1.577166667 1.577166667 1.770333333 2.7224 2.37925 1.0794	8 9.603273 1.53451 2.619554 5.644092 9.924119 8 10.17395 3.493462 3.13946 5.592824 12.136581 8 10.655705 9.841329 3.644325 4.137716 4.880244 21.772137 20.5088805 8 7.28332 4.836576 3.537363 1.651285 2.413629 10.98181 9.6083835 Delete 0.718684667 0.728425333 1.039588333 3.415083333 2.629362 0.5745 0.6487288 Delete 1.379166667 1.322833333 1.833166667 4.414666667 261.3952 4.132 1.452	14.852254 16 10.940991 2.702261 5.083122 5.529003 18.3813365 16 12.110555 4.435138 6.263437 5.477951 23.401413 16 9.969395 11.607526 4.716346 7.2416 6.240233 25.086287 24.746811 16 7.353183 6.132695 4.236918 2.836115 4.704921 11.3979743 15.8329955	24 11.432127 3.576111 7.476417 4.956198 25.373776 24 13.752623 5.079593 9.295119 5.06256 33.741323 24 9.275043 12.588382 5.286053 9.988099 9.361369 25.97748067 36.508485 24 7.086551 6.397954 4.501145 3.920888 6.940909 10.901977 20.028024
eriment 2 orm YCSB-A Throughput (Mo EH erl sh err Hash orm YCSB-B Throughput (Mo EH erl sh err Hash orm YCSB-D Throughput (Mo EH erl Hash orm YCSB-F Throughput (Mo EH erl Hash orm YCSB-F Throughput (Mo EH EH EH EH EH EH EH ER EH ER	1.66992575 1.941595 0.215008 0.423265 1.780937 1.9295995 0.59/s) Thread=1 1.553614 0.547787 0.62971 1.778103 2.622453 0.9s/s) Thread=1 2.547534 1.519133 0.872114 0.575072 1.16033 3.625560333 5.043314 0.9s/s) Thread=1 1.361149 0.732373 0.694532 0.237316 0.446808 1.95992 1.8972135 Insert 1.044361667 1.524968333 1.570881667 7.030871667 2.420722 0.62575 0.442224 Insert 1.835166667 2.243333333 3.057166667 2.243333333 3.057166667 2.243333333 3.057166667 2.243333333 3.057166667 2.243333333 3.057166667 2.243333333 3.057166667 2.243333333 3.057166667 2.195833333 3.057166667 2.243333333 3.057166667 2.195833333 3.057166667 2.195833333 3.057166667 2.195833333 3.057166667 2.195833333 3.057166667 2.195833333 2.48.0072 41.24025	3.2749535 2 3.613314 0.419314 0.95656 3.28364 3.779359 2 3.214115 1.032996 1.225157 3.250971 5.198723 2 4.556558 3.087774 1.425969 1.102422 1.20241 7.433447667 5.3270765 2 2.770951 1.389933 1.239523 0.453495 0.89648 4.22807 3.5556535 Positive Search 0.373066833 0.386246 0.5450395 1.033883333 1.583204 0.328 0.5871938 Positive Search 0.924166667 1.098333333 1.446333333	6.235328 4 6.282357 0.809303 1.878408 5.034586 7.358267 4 6.395054 1.977721 2.422948 4.995168 10.266235 4 7.806189 6.070746 1.972523 2.145923 2.2662 14.772049 10.502546 4 4.811631 2.745591 2.192028 0.884652 1.7672565 8.227409 6.6841395 Negative Search 0.5000925 1.176861667 1.077073333 1.263503333 1.154294 0.327 0.348968 Negative Search 0.814833333 1.776166667 1.57194	8	14.852254 16 10.940991 2.702261 5.083122 5.529003 18.3813365 16 12.110555 4.435138 6.263437 5.477951 23.401413 16 9.969395 11.607526 4.716346 7.2416 6.240233 25.086287 24.746811 16 7.353183 6.132695 4.236918 2.836115 4.704921 11.3979743 15.8329955	24 11.432127 3.576111 7.476417 4.966198 25.373776 24 13.752623 5.079593 9.295119 5.06256 33,741323 24 9.275043 12.588382 5.236053 9.988099 9.361369 25.97748067 36.5088485 24 7.086551 6.397954 4.501145 3.920888 6.940909 10.901977
eriment 2 corm YCSB-A Throughput (Mo EH rel sh borm YCSB-B Throughput (Mo EH rel sh corm YCSB-B Throughput (Mo EH rel sh corm YCSB-D Throughput (Mo EH el	1.66992575 1.905/s) Thread=1 1.941595 0.215008 0.423265 1.780937 1.9295995 1.553614 0.547787 0.62971 1.778103 2.622453 1.519133 0.872114 0.575072 1.16033 3.625560333 5.043314 1.519133 0.872114 0.575072 1.16033 0.872514 0.46808 1.95992 1.8972135 Insert 1.044361667 1.524968333 1.570881667 7.030871667 2.420722 0.62575 0.442224 Insert 1.835166667 9.195833333 3.057166667 9.195833333 3.057166667 9.195833333 248.0072 41.24025 6.6324 Thread=1 1.080309792 0.6927915	3.2749535 2 3.613314 0.419314 0.95656 3.28364 3.779359 2 3.214115 1.032996 1.225157 3.250971 5.198723 2 4.556558 3.087774 1.425969 1.102422 1.20241 7.433447667 5.3270765 2 2.770951 1.389933 1.239523 0.453495 0.89648 4.22807 3.5556535 Positive Search 0.373066833 0.386246 0.5450395 1.033883333 1.583204 0.328 0.5871938 Positive Search 0.924166667 1.098333333 1.583204 0.328 0.5871938 Positive Search 0.924166667 1.098333333 1.446333333 1.446333333 1.446333333 2.0745 3.3296 2.37875 1.2416	6.235328 4 6.282357 0.809303 1.878408 5.034586 7.358267 4 6.395054 1.977721 2.422948 4.995168 10.266235 4 7.806189 6.070746 1.972523 2.145923 2.2662 14.772049 10.502546 4 4.811631 2.745591 2.192028 0.884652 1.7672565 8.227409 6.6841395 Negative Search 0.5000925 1.176861667 1.077073333 1.263503333 1.1264294 0.327 0.348968 Negative Search 0.814833333 1.776166667 1.571666667 1.770333333 2.7224 2.37925 1.0794	8	14.852254 16 10.940991 2.702261 5.083122 5.529003 18.3813365 16 12.110555 4.435138 6.263437 5.477951 23.401413 16 9.969395 11.607526 4.7716346 7.2416 6.240233 25.086287 24.746811 16 7.353183 6.132695 4.236918 2.836115 4.704921 11.3979743 15.8329955	24 11.432127 3.576111 7.476417 4.956198 25.373776 24 13.752623 5.079593 9.295119 5.06256 33.741323 24 9.275043 12.588382 5.28063 9.988099 9.361369 25.97748067 36.5088485 24 7.086551 6.397954 4.501145 3.920888 6.940909 10.901977 20.028024
Hash Deriment 2 Form YCSB-A Throughput (Mo EH vel sh er Hash Form YCSB-B Throughput (Mo EH vel sh er Hash Form YCSB-D Throughput (Mo EH vel sh er Hash FEH el vel sh er er Hash	1.66992575 1.66992575 1.941595 0.215008 0.423265 1.780937 1.9295995 1.59595 1.553614 0.547787 0.62971 1.778103 2.622453 1.59133 0.872114 0.575072 1.16033 3.625560333 5.043314 1.95/91 1.361149 0.732373 0.694532 0.237316 0.446808 1.95992 1.8972135 Insert 1.044361667 1.524968333 1.570881667 7.030871667 2.420722 0.62575 0.442224 Insert 1.835166667 2.243333333 3.057166667 2.243333333 3.057166667 2.243333333 3.057166667 2.243333333 3.057166667 2.243333333 3.057166667 2.243333333 3.057166667 2.243333333 3.057166667 2.243333333 3.057166667 2.243333333 3.057166667 2.243333333 3.057166667 2.243333333 3.057166667 2.243333333 3.057166667 2.243333333 3.057166667 2.243333333 3.057166667 2.243333333 3.057166667 2.243333333 2.48.0072 41.24025 6.6324	3.2749535 2 3.613314 0.419314 0.95656 3.28364 3.779359 2 3.214115 1.032996 1.225157 3.250971 5.198723 2 4.556558 3.087774 1.425969 1.102422 1.20241 7.433447667 5.3270765 2 2.770951 1.389933 1.239523 0.453495 0.89648 4.22807 3.5556535 Positive Search 0.373066833 0.386246 0.5450395 1.033883333 1.583204 0.328 0.5871938 Positive Search 0.924166667 1.098333333 1.446333333 1.446333333 1.446333333 1.446333333 2.0745 3.3296 2.37875 1.2416	6.235328 4 6.282357 0.809303 1.878408 5.034586 7.358267 4 6.395054 1.977721 2.422948 4.9951688 10.266235 4 7.806189 6.070746 1.972523 2.145923 2.2662 14.772049 10.502546 4 4.811631 2.745591 2.192028 0.884652 1.7672565 8.227409 6.6841395 Negative Search 0.5000925 1.176861667 1.077073333 1.263503333 1.154294 0.327 0.348968 Negative Search 0.814833333 1.776166667 1.52166667 1.5710333333 1.776166667 1.52166667 1.52166667 1.52166667 1.710333333 2.7224 2.37925 1.0794	8	14.852254 16 10.940991 2.702261 5.083122 5.529003 18.3813365 16 12.110555 4.435138 6.263437 5.477951 23.401413 16 9.969395 11.607526 4.716346 7.2416 6.240233 25.086287 24.746811 16 7.353183 6.132695 4.236918 2.836115 4.704921 11.3979743 15.8329955	24 11.432127 3.576111 7.476417 4.956198 25.373776 24 13.752623 5.079593 9.295119 5.06256 33.741323 24 9.275043 12.588382 5.236053 9.988099 9.361369 25.97748067 36.5088485 24 7.086551 6.397954 4.501145 3.920888 6.940909 10.901977 20.028024
Hash Periment 2 orm YCSB-A Throughput (Mo EH vel sh er Hash orm YCSB-B Throughput (Mo EH vel sh er Hash orm YCSB-D Throughput (Mo SH EH EH el el vel sh her Hash orm YCSB-F Throughput (Mo SH EH EH EH el vel sh her Hash orm YCSB-F Throughput (Mo SH EH EH EH el vel sh her Hash Periment 4 rage Latency (µs) SH EH	1.66992575 1.941595 0.215008 0.423265 1.780937 1.9295995 1.553614 0.547787 0.62971 1.778103 2.622453 1.781033 0.872114 0.575072 1.16033 3.625560333 5.043314 1.95/5) Thread=1 1.361149 0.732373 0.894532 0.237316 0.446808 1.959922 1.8972135 Insert 1.044361667 1.524968333 1.570881667 7.030871667 2.442722 0.62575 0.442224 Insert 1.835166667 9.195833333 248.0072 41.24025 6.6324 Thread=1 1.080309792 0.6927915 0.517253332 0.14161	3.2749535 2 3.613314 0.419314 0.95656 3.28364 3.779359 2 3.214115 1.032996 1.225157 3.250971 5.198723 2 4.556558 3.087774 1.425969 1.102422 1.20241 7.433447667 5.3270765 2 2.770951 1.389933 1.239523 0.453495 0.89648 4.22807 3.5556535 Positive Search 0.373066833 0.386246 0.5450395 1.033883333 1.58627938 Positive Search 0.924166667 1.098833333 1.583204 0.328 0.5871938 Positive Search 0.924166667 1.098833333 1.446333333 1.446333333 1.446333333 1.446333333 1.446333333 1.446333333 1.446333333 1.446333333 1.446333333 1.446333333 1.446333333 1.446333333 1.446333333 1.446333335 1.5556679181 0.272089	6.235328 4 6.282357 0.809303 1.878408 5.034586 7.358267 4 6.395054 1.977721 2.422948 4.995168 10.266235 4 7.806189 6.070746 1.972523 2.145923 2.2662 14.772049 10.502546 4 4.811631 2.745591 2.192028 0.884652 1.767265 8.227409 6.6841395 Negative Search 0.5000925 1.17686667 1.077073333 1.263503333 1.263503333 1.76166667 1.770333333 1.76166667 1.527166667 1.576166667 1.770333333 2.7224 2.37925 1.0794	8	14.852254 16 10.940991 2.702261 5.083122 5.529003 18.3813365 16 12.110555 4.435138 6.263437 5.477951 23.401413 16 9.969395 11.607526 4.716346 7.2416 6.240233 25.086287 24.746811 16 7.353183 6.132695 4.236918 2.836115 4.709491 1.1.9979743 15.8329955	24 11.432127 3.576111 7.476417 4.956198 25.373776 24 13.752623 5.079593 9.295119 5.06256 33.741323 24 9.275043 12.588382 5.286053 9.988099 9.361369 25.97748067 36.508485 24 7.086551 6.397954 4.501145 3.920888 6.940909 10.901977 20.028024
eriment 2 orm YCSB-A Throughput (Mo EH vel sh er Hash orm YCSB-B Throughput (Mo EH vel sh er Hash orm YCSB-D Throughput (Mo EH el	1.66992575 1.66992575 1.941595 0.215008 0.423265 1.780937 1.9295995 1.59595 1.553614 0.547787 0.62971 1.778103 2.622453 1.59133 0.872114 0.575072 1.16033 3.625560333 5.043314 1.95/91 1.361149 0.732373 0.694532 0.237316 0.446808 1.95992 1.8972135 Insert 1.044361667 1.524968333 1.570881667 7.030871667 2.420722 0.62575 0.442224 Insert 1.835166667 2.243333333 3.057166667 2.243333333 3.057166667 2.243333333 3.057166667 2.243333333 3.057166667 2.243333333 3.057166667 2.243333333 3.057166667 2.243333333 3.057166667 2.243333333 3.057166667 2.243333333 3.057166667 2.243333333 3.057166667 2.243333333 3.057166667 2.243333333 3.057166667 2.243333333 3.057166667 2.243333333 3.057166667 2.243333333 3.057166667 2.243333333 2.48.0072 41.24025 6.6324	3.2749535 2 3.613314 0.419314 0.95656 3.28364 3.779359 2 3.214115 1.032996 1.225157 3.250971 5.198723 2 4.556558 3.087774 1.425969 1.102422 1.20241 7.433447667 5.3270765 2 2.770951 1.389933 1.239523 0.453495 0.89648 4.22807 3.5556535 Positive Search 0.373066833 0.386246 0.5450395 1.033883333 1.583204 0.328 0.5871938 Positive Search 0.924166667 1.098333333 1.446333333 1.446333333 1.446333333 1.446333333 2.0745 3.3296 2.37875 1.2416	6.235328 4 6.282357 0.809303 1.878408 5.034586 7.358267 4 6.395054 1.977721 2.422948 4.9951688 10.266235 4 7.806189 6.070746 1.972523 2.145923 2.2662 14.772049 10.502546 4 4.811631 2.745591 2.192028 0.884652 1.7672565 8.227409 6.6841395 Negative Search 0.5000925 1.176861667 1.077073333 1.263503333 1.154294 0.327 0.348968 Negative Search 0.814833333 1.776166667 1.52166667 1.5710333333 1.776166667 1.52166667 1.52166667 1.52166667 1.710333333 2.7224 2.37925 1.0794	8	14.852254 16 10.940991 2.702261 5.083122 5.529003 18.3813365 16 12.110555 4.435138 6.263437 5.477951 23.401413 16 9.969395 11.607526 4.716346 7.2416 6.240233 25.086287 24.746811 16 7.353183 6.132695 4.236918 2.836115 4.704921 11.3979743 15.8329955	24 11.432127 3.576111 7.476417 4.956198 25.373776 24 13.752623 5.079593 9.295119 5.06256 33.741323 24 9.275043 12.588382 5.236053 9.988099 9.361369 25.97748067 36.5088485 24 7.086551 6.397954 4.501145 3.920888 6.940909 10.901977 20.028024

Speciment 16	40M 0.249999771 4.249998931 1.587265016 0.603103638 0.264400391 1.155664063 100M 0.250000352 4.250002624 4.030708313 1.507781982 0.529323242 2.298916016 160M 0.249999777 4.250003048 6.344173432 2.412437439 1.057610352 4.595058594 220M 0.250000245 68.24978246 8.168132782 3.317115784 1.068192383 4.645605469 280M 0.249999916 68.24994929 9.708759309 4.221820831 2.115224609 9.113857422 128B 3.648672 1.771669775 3.36415675 7.12537625 7.34719125	50M 0.249999632 4.25000808 2.0145507 0.753890991 0.264400391 1.153710938 110M 0.249970499 4.250003643 4.082023621 1.658546448 0.533805664 2.333466797 170M 0.249999709 4.249998202 7.139011384 2.563224793 1.057609375 4.595058594 230M 0.249999726 68.24991443 8.254638672 3.467903137 1.145938477 5.025908203 290M 0.250000147 68.250072 10.31484985 4.372585297 2.1152224609 9.167568359 256B 2.531003 1.741172375 3.05871875 4.50371775 4.3792125	60M 0.250000264 4.250006269 2.093997956 0.904655457 0.367154297 1.586894531 120M 0.249999636 4.25000454 4.193206787 1.809333802 0.739245117 3.203115234 180M 0.249999666 4.25003074 7.690620423 2.714005627 1.057608398 4.597988281 240M 0.250000213 68.24981132 8.382823944 3.618667603 1.476976563 6.390634766 300M 0.250000207 68.25005004 11.03757095 4.52337265 2.115224609 9.184169922
CCEH 21.9654815 122.235202	0.249999771 4.24998931 1.587265016 0.603103638 0.264400391 1.155664063 100M 0.250000352 4.250002624 4.030708313 1.507781982 0.529323242 2.298916016 160M 0.249999777 4.250003048 6.344173432 2.412437439 1.057610352 4.595058594 220M 0.250000245 68.24978246 8.168132782 3.317115784 1.068192383 4.645605469 280M 0.249999916 68.24994929 9.708759309 4.221820831 2.115224609 9.113857422 128B 3.648672 1.771669775 3.36415675 7.12537625 7.34719125	0.24999632 4.25000808 2.0145607 0.753890991 0.264400391 1.153710938 110M 0.249970499 4.250003643 4.082023621 1.658546448 0.533805664 2.333466797 170M 0.249999799 4.249998202 7.139011384 2.563224793 1.057509375 4.595058594 230M 0.249999726 68.24991443 8.254638672 3.467903137 1.145938477 5.025908203 290M 0.250000147 68.250072 10.31484985 4.372585297 2.115224609 9.167568359 256B 2.531003 1.741172375 3.05871875 4.50371775 4.3792125	0.250000264 4.250006269 2.093997956 0.904655457 0.367154297 1.586894531 120M 0.249999636 4.25000454 4.193206787 1.809333802 0.739245117 3.203115234 180M 0.249999666 4.250003074 7.690620423 2.714005627 1.057608398 4.597988281 240M 0.250000213 68.24981132 8.38283944 3.618667603 1.476976563 6.390634766 300M 0.250000207 68.25005004 11.03757095 4.52337265 2.115224609 9.184169922
Clevel	0.249999771 4.24998931 1.587265016 0.603103638 0.264400391 1.155664063 100M 0.250000352 4.250002624 4.030708313 1.507781982 0.529323242 2.298916016 160M 0.249999777 4.250003048 6.344173432 2.412437439 1.057610352 4.595058594 220M 0.250000245 68.24978246 8.168132782 3.317115784 1.068192383 4.645605469 280M 0.249999916 68.24994929 9.708759309 4.221820831 2.115224609 9.113857422 128B 3.648672 1.771669775 3.36415675 7.12537625 7.34719125	0.24999632 4.25000808 2.0145607 0.753890991 0.264400391 1.153710938 110M 0.249970499 4.250003643 4.082023621 1.658546448 0.533805664 2.333466797 170M 0.249999799 4.249998202 7.139011384 2.563224793 1.057509375 4.595058594 230M 0.249999726 68.24991443 8.254638672 3.467903137 1.145938477 5.025908203 290M 0.250000147 68.250072 10.31484985 4.372585297 2.115224609 9.167568359 256B 2.531003 1.741172375 3.05871875 4.50371775 4.3792125	0.250000264 4.250006269 2.093997956 0.904655457 0.367154297 1.586894531 120M 0.249999636 4.25000454 4.193206787 1.809333802 0.739245117 3.203115234 180M 0.249999666 4.250003074 7.690620423 2.714005627 1.057608398 4.597988281 240M 0.250000213 68.24981132 8.382823944 3.618667603 1.476976563 6.390634766 300M 0.250000207 68.2505004 11.03757095 4.52337265 2.115224609 9.184169922
Victor 7,8515625	0.249999771 4.24998931 1.587265016 0.603103638 0.264400391 1.155664063 100M 0.250000352 4.250002624 4.030708313 1.507781982 0.529323242 2.298916016 160M 0.249999777 4.250003048 6.344173432 2.412437439 1.057610352 4.595058594 220M 0.250000245 68.24978246 8.168132782 3.317115784 1.068192383 4.645605469 280M 0.249999916 68.24994929 9.708759309 4.221820831 2.115224609 9.113857422 128B 3.648672 1.771669775 3.36415675 7.12537625 7.34719125	0.24999632 4.25000808 2.0145607 0.753890991 0.264400391 1.153710938 110M 0.249970499 4.250003643 4.082023621 1.658546448 0.533805664 2.333466797 170M 0.249999799 4.249998202 7.139011384 2.563224793 1.057509375 4.595058594 230M 0.249999726 68.24991443 8.254638672 3.467903137 1.145938477 5.025908203 290M 0.250000147 68.250072 10.31484985 4.372585297 2.115224609 9.167568359 256B 2.531003 1.741172375 3.05871875 4.50371775 4.3792125	0.250000264 4.250006269 2.093997956 0.904655457 0.367154297 1.586894531 120M 0.249999636 4.25000454 4.193206787 1.809333802 0.739245117 3.203115234 180M 0.249999666 4.250003074 7.690620423 2.714005627 1.057608398 4.597988281 240M 0.250000213 68.24981132 8.38283944 3.618667603 1.476976563 6.390634766 300M 0.250000207 68.25005004 11.03757095 4.52337265 2.115224609 9.184169922
Specified Number of insanted items=10M 20M 30M 30M 1,	0.249999771 4.24998931 1.587265016 0.603103638 0.264400391 1.155664063 100M 0.250000352 4.250002624 4.030708313 1.507781982 0.529323242 2.298916016 160M 0.249999777 4.250003048 6.344173432 2.412437439 1.057610352 4.595058594 220M 0.250000245 68.24978246 8.168132782 3.317115784 1.068192383 4.645605469 280M 0.249999916 68.24994929 9.708759309 4.221820831 2.115224609 9.113857422 128B 3.648672 1.771669775 3.36415675 7.12537625 7.34719125	0.24999632 4.25000808 2.0145607 0.753890991 0.264400391 1.153710938 110M 0.249970499 4.250003643 4.082023621 1.658546448 0.533805664 2.333466797 170M 0.249999799 4.249998202 7.139011384 2.563224793 1.057509375 4.595058594 230M 0.249999726 68.24991443 8.254638672 3.467903137 1.145938477 5.025908203 290M 0.250000147 68.250072 10.31484985 4.372585297 2.115224609 9.167568359 256B 2.531003 1.741172375 3.05871875 4.50371775 4.3792125	0.250000264 4.250006269 2.093997956 0.904655457 0.367154297 1.586894531 120M 0.249999636 4.25000454 4.193206787 1.809333802 0.739245117 3.203115234 180M 0.249999666 4.250003074 7.690620423 2.714005627 1.057608398 4.597988281 240M 0.250000213 68.24981132 8.38283944 3.618667603 1.476976563 6.390634766 300M 0.250000207 68.2505004 11.03757095 4.52337265 2.115224609 9.184169922
Seace(B S	0.249999771 4.24998931 1.587265016 0.603103638 0.264400391 1.155664063 100M 0.250000352 4.250002624 4.030708313 1.507781982 0.529323242 2.298916016 160M 0.249999777 4.250003048 6.344173432 2.412437439 1.057610352 4.595058594 220M 0.250000245 68.24978246 8.168132782 3.317115784 1.068192383 4.645605469 280M 0.249999916 68.24994929 9.708759309 4.221820831 2.115224609 9.113857422 128B 3.648672 1.771669775 3.36415675 7.12537625 7.34719125	0.24999632 4.25000808 2.0145607 0.753890991 0.264400391 1.153710938 110M 0.249970499 4.250003643 4.082023621 1.658546448 0.533805664 2.333466797 170M 0.249999799 4.249998202 7.139011384 2.563224793 1.057509375 4.595058594 230M 0.249999726 68.24991443 8.254638672 3.467903137 1.145938477 5.025908203 290M 0.250000147 68.250072 10.31484985 4.372585297 2.115224609 9.167568359 256B 2.531003 1.741172375 3.05871875 4.50371775 4.3792125	0.250000264 4.250006269 2.093997956 0.904655457 0.367164297 1.586894531 120M 0.249999636 4.25000454 4.193206787 1.809333802 0.739245117 3.203115234 180M 0.249999666 4.250003074 7.690620423 2.714005627 1.057608398 4.597988281 240M 0.250000213 68.24981132 8.38283944 3.618667603 1.476976563 6.390634766 300M 0.250000207 68.25005004 11.03757095 4.52337265 2.115224609 9.184169922
Pillah-DRAM	4.249998931 1.587265016 0.603103638 0.264400391 1.155664063 100M 0.250000352 4.250002624 4.030708313 1.507781982 0.529323242 2.298916016 160M 0.249999777 4.250003048 6.344173432 2.412437439 1.057610352 4.595058594 220M 0.250000245 68.24978246 8.168132782 3.317115784 1.068192383 4.645605469 280M 0.249999916 68.24994929 9.708759309 4.221820831 2.115224609 9.113857422 128B 3.648672 1.771669775 3.36415675 7.12537625 7.34719125	4 25000808 2.0145607 0.753890991 0.264400391 1.153710938 110M 0.249970499 4.250003643 4.082023621 1.658546448 0.533805664 2.333466797 170M 0.249999799 4.249998202 7.139011384 2.563224793 1.057609375 4.595058594 230M 0.249999726 68.24991443 8.254638672 3.467903137 1.145938477 5.025908203 290M 0.250000147 68.250072 10.314849985 4.372585297 2.1152224609 9.167568359	4.250006269 2.093997956 0.904655457 0.367154297 1.586894531 120M 0.249999636 4.25000454 4.193206787 1.809333802 0.739245117 3.203115234 180M 0.249999666 4.250003074 7.690620423 2.714005627 1.057608398 4.597988281 240M 0.250000213 68.24981132 8.382823944 3.618667603 1.476976563 6.390634766 300M 0.250000207 68.25005004 11.03757095 4.52337265 2.115224609 9.184169922
Viger-DPAM	1.587265016 0.603103638 0.264400391 1.155664063 100M 0.250000352 4.250002624 4.030708313 1.507781982 0.529323242 2.298916016 160M 0.249999777 4.250003048 6.344173432 2.412437439 1.057610352 4.595058594 220M 0.250000245 68.24978246 8.168132782 3.317115784 1.068192383 4.645605469 280M 0.249999916 68.24994929 9.708759309 4.221820831 2.115224609 9.113857422 128B 3.648672 1.771669775 3.36415675 7.12537625 7.34719125	2.0145607 0.753890991 0.264400391 1.153710938 110M 0.249970499 4.250003643 4.082023621 1.658546448 0.533805664 2.333466797 170M 0.249999799 4.249998202 7.139011384 2.563224793 1.057609375 4.595058594 230M 0.249999726 68.24991443 8.254638672 3.467903137 1.145938477 5.025908203 290M 0.250000147 68.250072 10.31484985 4.372585297 2.115224609 9.167568359 256B 2.531003 1.741172375 3.05871875 4.50371775 4.3792125	2.093997956 0.904655457 0.367154297 1.586894531 120M 0.249999636 4.25000454 4.193206787 1.809333802 0.739245117 3.203115234 180M 0.249999666 4.25003074 7.690620423 2.714005627 1.057608398 4.597988281 240M 0.250000213 68.24981132 8.382823944 3.618667603 1.476975653 6.390634766 300M 0.250000207 68.25005004 11.03757095 4.52337265 2.115224609 9.184169922
Michaels-DRAM 0.066098828	0.264400391 1.155664063 100M 0.250000352 4.250002624 4.030708313 1.507781982 0.529323242 2.298916016 160M 0.249999777 4.250003048 6.344173432 2.412437439 1.057610352 4.595058594 220M 0.250000245 68.24978246 8.168132782 3.317115784 1.068192383 4.645605469 280M 0.249999916 68.24994929 9.708759309 4.221820831 2.115224609 9.113857422 128B 3.648672 1.771669775 3.36415675 7.12537625 7.34719125	0.264400391 1.153710938 110M 0.249970499 4.250003643 4.082023621 1.658546448 0.533805664 2.333466797 170M 0.2499999799 4.249998202 7.139011384 2.563224793 1.057609375 4.595058594 230M 0.249999776 68.24991443 8.254638672 3.467903137 1.145938477 5.025908203 290M 0.250000147 68.250072 10.31484985 4.372585297 2.1152224609 9.167568359 256B 2.531003 1.741172375 3.05871875 4.50371775 4.3792125	0.367154297 1.586894531 120M 0.249999636 4.25000454 4.193206787 1.809333802 0.739245117 3.203115234 180M 0.249999666 4.250003074 7.690620423 2.714005627 1.057608398 4.597988281 240M 0.250000213 68.24981132 8.382823944 3.618667603 1.476976563 6.390634766 300M 0.250000207 68.25005004 11.03757095 4.52337265 2.115224609 9.184169922
Space(SB)	100M 0.250000352 4.250002624 4.030708313 1.507781982 0.529323242 2.298916016 160M 0.249999777 4.250003048 6.344173432 2.412437439 1.057610352 4.595058594 220M 0.250000245 68.24978246 8.168132782 3.317115784 1.068192383 4.645605469 280M 0.249999916 68.2494929 9.708759309 4.221820831 2.115224609 9.113857422 128B 3.648672 1.771669775 3.36415675 7.12537625 7.34719125	110M 0.249970499 4.250003643 4.082023621 1.658546448 0.533805664 2.333466797 170M 0.249999799 4.249998202 7.139011384 2.563224793 1.057609375 4.595058594 230M 0.249999726 68.24991443 8.254638672 3.467903137 1.145938477 5.025908203 290M 0.250000147 68.250072 10.31484998 4.372585297 2.115224609 9.167568359 256B 2.531003 1.741172375 3.05871875 4.50371775 4.3792125	120M 0.24999636 4.25000454 4.193206787 1.809333802 0.739245117 3.203115234 180M 0.24999666 4.25003074 7.690620423 2.714005627 1.057608398 4.597988281 240M 0.250000213 68.24981132 8.382823944 3.618667603 1.476976563 6.390634766 300M 0.250000207 68.25005004 11.03757095 4.52337265 2.115224609 9.184169922
Plush-PM	4.250002624 4.030708313 1.507781982 0.529323242 2.298916016 160M 0.249999777 4.250003048 6.344173432 2.412437439 1.057610352 4.595058594 220M 0.250000245 68.24978246 8.168132782 3.317115784 1.068192383 4.645605469 280M 0.249999916 68.24994929 9.708759309 4.221820831 2.115224609 9.113857422 128B 3.648672 1.771669775 3.36415675 7.12537625 7.34719125	4.250003643 4.082023621 1.658546448 0.533805664 2.333406797 170M 0.249999709 4.249998202 7.139011384 2.563224793 1.057609375 4.595058594 230M 0.249999726 68.24991443 8.254638672 3.467903137 1.145938477 5.025908203 290M 0.250000147 68.250072 10.31484985 4.372585297 2.115224609 9.167568359 256B 2.531003 1.741172375 3.05871875 4.50371775 4.3792125	4.25000454 4.193206787 1.809333802 0.739245117 3.203115234 180M 0.249999666 4.250003074 7.690620423 2.714005627 1.057608398 4.597988281 240M 0.250000213 68.24981132 8.382823944 3.618667603 1.476976563 6.390634766 300M 0.250000207 68.25005004 11.03757095 4.52337265 2.115224609 9.184169922
Vigen-DRAM	4.030708313 1.507781982 0.529323242 2.298916016 160M 0.249999777 4.250003048 6.344173432 2.412437439 1.057610352 4.595058594 220M 0.250000245 68.24978246 8.168132782 3.317115784 1.068192383 4.645605469 280M 0.249999916 68.24994929 9.708759309 4.221820831 2.115224609 9.113857422 128B 3.648672 1.771669775 3.36415675 7.12537625 7.34719125	4.082023621 1.658546448 0.533805664 2.333466797 170M 0.249999799 4.249998202 7.139011384 2.563224793 1.057609375 4.595038594 230M 0.249999726 68.24991443 8.254638672 3.467903137 1.145938477 5.025908203 290M 0.250000147 68.250072 10.31484995 4.372585297 2.1152224609 9.167568359 256B 2.531003 1.741172375 3.05871875 4.3792125	4.193206787 1.809333802 0.739245117 3.203115234 180M 0.249999666 4.250003074 7.690620423 2.714005627 1.057608398 4.597988281 240M 0.250000213 68.24981132 8.382823944 3.618667603 1.476976563 6.390634766 300M 0.250000207 68.25005004 11.03757095 4.52337265 2.115224609 9.184169922
Michaels-DRAM	0.529323242 2.298916016 160M 0.249999777 4.250003048 6.344173432 2.412437439 1.057610352 4.595058594 220M 0.250000245 68.24978246 8.168132782 3.317115784 1.068192383 4.645605469 280M 0.249999916 68.24994929 9.708759309 4.221820831 2.115224609 9.113857422 128B 3.648672 1.771669775 3.36415675 7.12537625 7.34719125	0.533805664 2.333466797 170M 0.249999799 4.249998202 7.139011384 2.563224793 1.057609375 4.595058594 230M 0.249999726 68.24991443 8.254638672 3.467903137 1.145938477 5.025908203 290M 0.250000147 68.250072 10.31484985 4.372585297 2.115224609 9.167568359 256B 2.531003 1.741172375 3.05871875 4.50371775 4.3792125	0.739245117 3.203115234 180M 0.249999666 4.250003074 7.690620423 2.714005627 1.057608398 4.597988281 240M 0.250000213 68.24981132 8.382823944 3.618667603 1.476976563 6.390634766 300M 0.250000207 68.25005004 11.03757095 4.52337265 2.115224609 9.184169922
Mochash-PM 2.282020868	2.298916016 160M 0.249999777 4.250003048 6.344173432 2.412437439 1.057610352 4.595058594 220M 0.250000245 68.24978246 8.168132782 3.317115784 1.068192383 4.645605469 280M 0.249999916 68.24994929 9.708759309 4.221820831 2.115224609 9.113857422 128B 3.648672 1.771669775 3.36415675 7.12537625 7.34719125	2.333466797 170M 0.249999799 4.249998202 7.139011384 2.563224793 1.057609375 4.595058594 230M 0.249999726 68.24991443 8.254638672 3.467903137 1.145938477 5.025908203 290M 0.250000147 68.250072 10.31484995 4.372585297 2.115224609 9.167568359 256B 2.531003 1.741172375 3.05871875 4.3792125	3.203115234 180M 0.249999666 4.250003074 7.690620423 2.714005627 1.057608398 4.597988281 240M 0.250000213 68.24981132 8.382823944 3.618667603 1.476976563 6.390634766 300M 0.250000207 68.25005004 11.03757095 4.52337265 2.115224609 9.184169922
Plush-DRAM	0.24999777 4.250003048 6.344173432 2.412437439 1.057610352 4.595058594 220M 0.250000245 68.24978246 8.168132782 3.317115784 1.068192383 4.645605469 280M 0.249999916 68.24994929 9.708759309 4.221820831 2.115224609 9.113857422 128B 3.648672 1.771669775 3.36415675 7.12537625 7.34719125	0.249999799 4.249998202 7.139011384 2.563224793 1.057609375 4.595058594 230M 0.249999726 68.24991443 8.254638672 3.467903137 1.145938477 5.025908203 290M 0.250000147 68.250072 10.31484985 4.372585297 2.115224609 9.167568359 256B 2.531003 1.741172375 3.05871875 4.50371775 4.3792125	0.249999666 4.250003074 7.690620423 2.714005627 1.057608398 4.597988281 240M 0.250000213 68.24981132 8.382823944 3.618667603 1.476976563 6.390634766 300M 0.250000207 68.25005004 11.03757095 4.52337265 2.115224609 9.184169922
Viper-DRAM	6.344173432 2.412437439 1.057610352 4.595058594 220M 0.250000245 68.24978246 8.168132782 3.317115784 1.068192383 4.645605469 280M 0.249999916 68.24994929 9.708759309 4.221820831 2.115224609 9.113857422 128B 3.648672 1.771669775 3.36415675 7.12537625 7.34719125	7.139011384 2.563224793 1.057609375 4.595058594 230M 0.249999726 68.24991443 8.254638672 3.467903137 1.145938477 5.025908203 290M 0.250000147 68.250072 10.31484985 4.372585297 2.115224609 9.167568359 256B 2.531003 1.741172375 3.05871875 4.50371775 4.3792125	7.690620423 2.714005627 1.057608398 4.597988281 240M 0.250000213 68.24981132 8.382823944 3.618667603 1.476976563 6.390634766 300M 0.250000207 68.25005004 11.03757095 4.52337265 2.115224609 9.184169922
\times_PM	2.412437439 1.057610352 4.595058594 220M 0.250000245 68.24978246 8.168132782 3.317115784 1.068192383 4.645605469 280M 0.249999916 68.24994929 9.708759309 4.221820831 2.115224609 9.113857422 128B 3.648672 1.771669775 3.36415675 7.12537625 7.34719125	2.563224793 1.057609375 4.595058594 230M 0.249999726 68.24991443 8.254638672 3.467903137 1.145938477 5.025908203 290M 0.250000147 68.250072 10.31484985 4.372585297 2.115224609 9.167568359 256B 2.531003 1.741172375 3.05871875 4.50371775 4.3792125	2.714005627 1.057608398 4.597988281 240M 0.250000213 68.24981132 8.382823944 3.618667603 1.476976563 6.390634766 300M 0.250000207 68.25005004 11.03757095 4.52337265 2.115224609 9.184169922
Michash-PM 3 203115224	4.595058594 220M 0.250000245 68.24978246 8.168132782 3.317115784 1.068192383 4.645605469 280M 0.249999916 68.24994929 9.708759309 4.221820831 2.115224609 9.113857422 128B 3.648672 1.771669775 3.36415675 7.12537625 7.34719125	4.595058594 230M 0.249999726 68.24991443 8.254638672 3.467903137 1.145938477 5.025908203 290M 0.250000147 68.250072 10.31484985 4.372585297 2.115224609 9.167568359 256B 2.531003 1.741172375 3.05871875 4.50371775 4.3792125	4.597988281 240M 0.250000213 68.24981132 8.382823944 3.618667603 1.476976563 6.390634766 300M 0.250000207 68.25005004 11.03757095 4.52337265 2.115224609 9.184169922
Plush-DRAM 0 250000195 0 250000172 0 24999976 Plush-PM 4 250001257 4 250002091 88 2499742 Viper-DRAM 7 961681366 8 0.58933259 8 1.05636598 Viper-DRAM 1 0.57608308 1 0.58645438 1 0.5522269 Mol-thash-DRAM 1 0.57608308 1 0.58648438 1 0.55222699 Mol-thash-DRAM 1 0.57608308 1 0.58648438 1 0.55222699 Mol-thash-DRAM 4 5.93105469 4 5.918484766 4 5.95302734 5.900068 270M Plush-DRAM 0 249999607 Plush-DRAM 0 249999607 0 249999887 0 249999907 Plush-DRAM 8 5.573005677 8 8.845458984 9 2.17933855 Viper-DRAM 8 5.573005677 8 8.845458984 9 2.17933855 Viper-DRAM 1 9.74335938 2 1.12382813 2 1.15224009 Mol-tash-DRAM 1 9.74335938 2 1.12382813 2 1.15224009 Mol-tash-DRAM 1 9.74335938 2 1.12382813 2 1.15224009 Mol-tash-DRAM 1 9.743535938 2 1.12382813 2 1.15224009 Mol-tash-DRAM 1 9.0565240234 Mol-tash-DRAM 1 9.056524 Mol-ta	0.250000245 68.24978246 8.168132782 3.317115784 1.068192383 4.645605469 280M 0.249999916 68.24994929 9.708759309 4.221820831 2.115224609 9.113857422 128B 3.648672 1.771669775 3.36415675 7.12537625 7.34719125	0.249999726 68.24991443 8.254638672 3.467903137 1.145938477 5.025908203 290M 0.250000147 68.250072 10.31484985 4.372585297 2.115224609 9.167568359 256B 2.531003 1.741172375 3.05871875 4.50371775 4.3792125	0.250000213 68.24981132 8.382823944 3.618667603 1.476976563 6.390634766 300M 0.2500000207 68.25005004 11.03757095 4.52337265 2.115224609 9.184169922
Plush-PM	68.24978246 8.168132782 3.317115784 1.068192383 4.645605469 280M 0.249999916 68.24994929 9.708759309 4.221820831 2.115224609 9.113857422 128B 3.648672 1.771669775 3.36415675 7.12537625 7.34719125	68.24991443 8.254638672 3.467903137 1.145938477 5.025908203 299M 0.250000147 68.250072 10.31484985 4.372585297 2.115224609 9.167568359 256B 2.531003 1.741172375 3.05871875 4.50371775 4.3792125 50M 82.4597 69.9493 56.7663	68.24981132 8.382823944 3.618667603 1.476976563 6.390634766 300M 0.250000207 68.25005004 11.03757095 4.52337265 2.115224609 9.184169922
Viper-PM	3.317115784 1.068192383 4.645605469 280M 0.249999916 68.24994929 9.708759309 4.221820831 2.115224609 9.113857422 128B 3.648672 1.771669775 3.36415675 7.12537625 7.34719125 40M 66.0554 59.5728 90.8261	3.467903137 1.145938477 5.025908203 290M 0.250000147 68.250072 10.31484985 4.372585297 2.115224609 9.167568359 266B 2.531003 1.741172375 3.05871875 4.50371775 4.3792125 50M 82.4597 69.9493 56.7663	3.618667603 1.476976563 6.390634766 300M 0.250000207 68.25005004 11.03757095 4.52337265 2.115224609 9.184169922
Michash-PM	4.645605469 280M 0.249999916 68.24994929 9.708759309 4.221820831 2.115224609 9.113857422 128B 3.648672 1.771669775 3.36415675 7.12537625 7.34719125 40M 66.0554 59.5728 90.8261	5.025908203 290M 0.250000147 68.250072 10.31484985 4.372585297 2.115224609 9.167568359 256B 2.531003 1.741172375 3.05871875 4.50371775 4.3792125 50M 82.4597 69.9493 56.7663	6.390634766 300M 0.250000207 68.25005004 11.03757095 4.52337265 2.115224609 9.184169922
Space(CB) Number of inserted Items=250M 260M 270M Plush-PRAM 0.24999981 0.24999987 0.24999987 Plush-PRAM 68.25001036 68.25005041 68.25025806 Plush-PRAM 8.573005877 8.845458984 9.217933655 Viper-PRAM 3.750451659 3.920246124 4.071033478 MoHash-DRAM 1.974335938 2.112382813 2.115224609 MoHash-DRAM 8.364619141 8.966396484 9.056240234 Experiment 8	0.249999916 68.24994929 9.708759309 4.221820831 2.115224609 9.113857422 128B 3.648672 1.771669775 3.36415675 7.12537625 7.34719125 40M 66.0554 59.5728 90.8261	290M 0.250000147 68.250072 10.31484985 4.372585297 2.115224609 9.167568359 266B 2.531003 1.741172375 3.05871875 4.50371775 4.3792125 50M 82.4597 69.9493 56.7663	0.250000207 68.25005004 11.03757095 4.52337265 2.115224609 9.184169922
Plush-PM	68.24994929 9.708759309 4.221820831 2.115224609 9.113857422 128B 3.648672 1.771669775 3.36415675 7.12537625 7.34719125 40M 66.0554 59.5728 90.8261	68.250072 10.31484985 4.372585297 2.115224609 9.167568359 256B 2.531003 1.741172375 3.05871875 4.50371775 4.3792125 50M 82.4597 69.9493 56.7663	68.25005004 11.03757095 4.52337265 2.115224609 9.184169922
Viper-PM 3,769481659 3,920246124 4,071033478	4.221820831 2.115224609 9.113857422 1.13857422 1.771669775 3.36415675 7.12537625 7.34719125 40M 66.0554 59.5728 90.8261	4.372585297 2.115224609 9.167568359 256B 2.531003 1.741172375 3.05871875 4.50371775 4.3792125	4.52337265 2.115224609 9.184169922
Michash-DRAM 1.974335938 2.112382813 2.115224609 Michash-PM 8.364619141 8.966396484 9.056240234	2.115224609 9.113857422 128B 3.648672 1.771669775 3.36415675 7.12537625 7.34719125 40M 66.0554 59.5728 90.8261	2.115224609 9.167568359 256B 2.531003 1.741172375 3.05871875 4.50371775 4.3792125 50M 82.4597 69.9493 56.7663	2.115224609 9.184169922
Experiment 8 Variable Size Throughput (Mops/s) Value size=16B 32B 64B DASH	128B 3.648672 1.771669775 3.36415675 7.12537625 7.34719125 40M 66.0554 59.5728 90.8261	256B 2.531003 1.741172375 3.05871875 4.50371775 4.3792125 50M 82.4597 69.9493 56.7663	60M
Variable Size Throughput (Mops/s) Value size=16B 32B 64B ASSH 4.761206 4.370462 4.012544 Clevel 1.75256215 1.7737998 1.7562037 Plush 4.0494265 3.61212125 3.800057 Virper 12.55229975 12.30331375 9.808057 Michash 14.092812 12.9155135 10.503505 Experiment 9 Experiment 9 Colspan="2">Experiment 9 Colspan="2">Colspan="2">Experiment 9 Experiment 9 Colspan="2">Colspan="2">Experiment 9 Experiment 9 Colspan="2">Experiment 9 Colspan="2">Experiment 9 Experiment 9 Colspan="2">Experiment 9 Experiment 9	3.648672 1.771669775 3.36415675 7.12537625 7.34719125 40M 66.0554 59.5728 90.8261	2.531003 1.741172375 3.05871875 4.50371775 4.3792125 50M 82.4597 69.9493 56.7663	
Variable Size Throughput (Mops/s) Value size=16B 32B 64B ASSH 4.761206 4.370462 4.012544 Clevel 1.75256215 1.7737998 1.7562037 Plush 4.0494265 3.61212125 3.800057 Virper 12.55229975 12.30331375 9.808057 Michash 14.092812 12.9155135 10.503505 Experiment 9 Experiment 9 Colspan="2">Experiment 9 Colspan="2">Colspan="2">Experiment 9 Experiment 9 Colspan="2">Colspan="2">Experiment 9 Experiment 9 Colspan="2">Experiment 9 Colspan="2">Experiment 9 Experiment 9 Colspan="2">Experiment 9 Experiment 9	3.648672 1.771669775 3.36415675 7.12537625 7.34719125 40M 66.0554 59.5728 90.8261	2.531003 1.741172375 3.05871875 4.50371775 4.3792125 50M 82.4597 69.9493 56.7663	
Clevel 1,75256215 1,7737998 1,7562037 Plush 4,0494265 3,6121215 3,46075975 Vijer 12,55229975 12,30331375 9,808057 MioHash 14,092812 12,9155135 10,503505 Experiment 9 Load Factor (%) Number of inserted items=10M 20M 30M DASH 66,0554 68,0554 53,2927 CCEH 59,5719 59,5737 47,6062 Level 90,8261 90,8261 68,1196 Clevel 79,4729 34,0598 59,6046 Plush 59,6046 7,01231 10,51855 Vijer 37,7066 37,668 42,8273 MioHash 56,0727 56,0856 61,5157 Load Factor (%) Number of inserted items=70M 80M 90M DASH 57,7984 66,0554 74,3123 CCEH 52,1537 59,5742 66,6419 Level 79,4729 90,8261 51,0897 Clevel 69,5388 34,0598 44,7035 Plush 24,5431 28,0492 31,5554 Vijer 43,2452 37,7426 35,0398 MioHash 49,0834 56,953 63,1072 Load Factor (%) Number of inserted items=130M 140M 150M DASH 53,6829 57,7984 61,9269 CCEH 48,4817 52,1525 55,8725 Level 73,7962 79,4729 85,1495 Clevel 64,5717 69,5388 74,5058 Plush 45,58 49,0862 52,5932 Vijer 43,9789 43,1678 40,6975 MioHash 45,6442 49,0848 52,5908 Load Factor (%) Number of inserted items=190M DASH 78,4342 82,4434 84,9072	1.771669775 3.36415675 7.12537625 7.34719125 40M 66.0554 59.5728 90.8261	1.741172375 3.05871875 4.50371775 4.3792125 50M 82.4597 69.9493 56.7663	
Plush	7.12537625 7.34719125 40M 66.0554 59.5728 90.8261	4.50371775 4.3792125 50M 82.4597 69.9493 56.7663	
Experiment 9	7.34719125 40M 66.0554 59.5728 90.8261	4.3792125 50M 82.4597 69.9493 56.7663	
Load Factor (%) Number of inserted items=10M 20M 30M DASH 66.0554 66.0554 53.2927 CCEH 59.5719 59.5737 47.6062 Level 90.8261 90.8261 68.1196 Clevel 79.4729 34.0598 59.6046 Plush 59.6046 7.01231 10.5185 Viper 37.7066 37.668 42.8273 MioHash 56.0727 56.0856 61.5157 Load Factor (%) Number of inserted items=70M 80M 90M DASH 57.7984 66.0554 74.3123 CCEH 52.1537 59.5742 66.6419 Level 79.4729 90.8261 51.0897 Clevel 69.5388 34.0598 44.7035 Plush 24.5431 28.0492 31.5554 Viper 43.2452 37.7426 35.0398 MioHash 49.0834 56.953 63.1072 Load Factor (%) Number of inserted items=130M 140M 150	66.0554 59.5728 90.8261	82.4597 69.9493 56.7663	
Load Factor (%) Number of inserted items=10M 20M 30M DASH 66.0554 66.0554 53.2927 CCEH 59.5719 59.5737 47.6062 Level 90.8261 90.8261 68.1196 Clevel 79.4729 34.0598 59.6046 Plush 59.6046 7.01231 10.5185 Viper 37.7066 37.668 42.8273 MioHash 56.0727 56.0856 61.5157 Load Factor (%) Number of inserted items=70M 80M 90M DASH 57.7984 66.0554 74.3123 CCEH 52.1537 59.5742 66.6419 Level 79.4729 90.8261 51.0897 Clevel 69.5388 34.0598 44.7035 Plush 24.5431 28.0492 31.5554 Viper 43.2452 37.7426 35.0398 MioHash 49.0834 56.953 63.1072 Load Factor (%) Number of inserted items=130M 140M 150	66.0554 59.5728 90.8261	82.4597 69.9493 56.7663	
DASH 66.0554 66.0554 53.2927 CCEH 59.5719 59.5737 47.6062 Level 90.8261 68.1196 Clevel 79.4729 34.0598 59.6046 Plush 59.6046 7.01231 10.5185 Viper 37.7066 37.668 42.8273 MioHash 56.0727 56.0856 61.5157 Load Factor (%) Number of inserted items=70M 80M 90M DASH 57.7984 66.0554 74.3123 CCEH 52.1537 59.5742 66.6419 Level 79.4729 90.8261 51.0897 Clevel 69.5388 34.0598 44.7035 Plush 24.5431 28.0492 31.5554 Viper 43.2452 37.7426 35.0398 MioHash 49.0834 56.953 63.1072 Load Factor (%) Number of inserted items=130M 140M 150M DASH 53.6829 57.7984 61.9269 CCEH 48.4817 52.1525 55.8725 Level 73.7962<	66.0554 59.5728 90.8261	82.4597 69.9493 56.7663	
Level 90.8261 90.8261 68.196 Clevel 79.4729 34.0598 59.6046 Plush 59.6046 7.01231 10.5185 Viper 37.7066 37.668 42.8273 MioHash 56.0727 56.0856 61.5157 Load Factor (%) Number of inserted items=70M 80M 90M DASH 57.7984 66.0554 74.3123 CCEH 52.1537 59.5742 66.6419 Level 79.4729 90.8261 51.0897 Clevel 69.5388 34.0598 44.7035 Plush 24.5431 28.0492 31.5554 Viper 43.2452 37.7426 35.0398 MioHash 49.0834 56.953 63.1072 Load Factor (%) Number of inserted items=130M 140M 150M DASH 53.6829 57.7984 61.9269 CCEH 48.4817 52.1525 55.8725 Level 73.7962 79.4729 85.1495 Clevel 64.5717 69.5388 74.5058 Plus	90.8261	56.7663	53.3501 47.5765
Plush 59.6046 7.01231 10.5185 Viper 37.7066 37.668 42.8273 MioHash 56.0727 56.0856 61.5157 Load Factor (%) Number of inserted items=70M 80M 90M DASH 57.7984 66.0554 74.3123 CCEH 52.1537 59.5742 66.6419 Level 79.4729 90.8261 51.0897 Clevel 69.5388 34.0598 44.7035 Plush 24.5431 28.0492 31.5554 Viper 43.2452 37.7426 35.0398 MioHash 49.0834 56.953 63.1072 Load Factor (%) Number of inserted items=130M 140M 150M DASH 53.6829 57.7984 61.9269 CCEH 48.4817 52.1525 55.8725 Level 73.7962 79.4729 85.1495 Clevel 64.5717 69.5388 74.5058 Plush 45.58 49.0862 52.5903			68.1196
Viper 37,7066 37,668 42,8273 MioHash 56,0727 56,0856 61,5157 Load Factor (%) Number of inserted items=70M 80M 90M DASH 57,7984 66,0554 74,3123 CCEH 52,1537 59,5742 66,6419 Level 79,4729 90,8261 51,0897 Clevel 69,5388 34,0598 44,7035 Plush 24,5431 28,0492 31,5554 Viper 43,2452 37,7426 35,0398 MioHash 49,0834 56,953 63,1072 Load Factor (%) Number of inserted items=130M 140M 150M DASH 53,6829 57,7984 61,9269 CCEH 48,4817 52,1525 55,8725 Level 73,7962 79,4729 85,1495 Clevel 64,5717 69,5388 74,5058 Plush 45,58 49,0862 52,5923 Viper 43,9789 43,1678 40,6975	79.4729 14.0246	49.6705 17.308	59.6046 21.0369
Load Factor (%) Number of inserted items=70M 80M 90M DASH 57.7984 66.0554 74.3123 CCEH 52.1537 59.5742 66.6419 Level 79.4729 90.8261 51.0897 Clevel 69.5388 34.0598 44.7035 Plush 24.5431 28.0492 31.5554 Viper 43.2452 37.7426 35.0398 MioHash 49.0834 56.953 63.1072 Load Factor (%) Number of inserted items=130M 140M 150M DASH 53.6829 57.7984 61.9269 CCEH 48.4817 52.1525 55.8725 Level 73.7962 79.4729 85.1495 Clevel 64.5717 69.5388 74.5058 Plush 45.58 49.0862 52.5923 Viper 43.9789 43.1678 40.6975 MioHash 45.6442 49.0848 52.5908 Level (%) Number of inserted items=190M 200M 210M <td>37.7237</td> <td>37.1483</td> <td>42.9255</td>	37.7237	37.1483	42.9255
CCEH 52.1537 59.5742 66.6419 Level 79.4729 90.8261 51.0897 Clevel 69.5388 34.0598 44.7035 Plush 24.5431 28.0492 31.5554 Viper 43.2452 37.7426 35.0398 MioHash 49.0834 56.953 63.1072 Load Factor (%) Number of inserted items=130M 140M 150M DASH 53.6829 57.7984 61.9269 CCEH 48.4817 52.1525 55.8725 Level 73.7962 79.4729 85.1495 Clevel 64.5717 69.5388 74.5058 Plush 45.58 49.0862 52.5923 Viper 43.9789 43.1678 40.6975 MioHash 45.6442 49.0848 52.5908 Load Factor (%) Number of inserted items=190M 200M 210M DASH 78.4342 82.4434 84.9072	56.092 100M	70.1151 110M	61.5264 120M
Level 79.4729 90.8261 51.0897 Clevel 69.5388 34.0598 44.7035 Plush 24.5431 28.0492 31.5554 Viper 43.2452 37.7426 35.0398 MioHash 49.0834 56.953 63.1072 Load Factor (%) Number of inserted items=130M 140M 150M DASH 53.6829 57.7984 61.9269 CCEH 48.4817 52.1525 55.8725 Level 73.7962 79.4729 85.1495 Clevel 64.5717 69.5388 74.5058 Plush 45.58 49.0862 52.5923 Viper 43.9789 43.1678 40.6975 MioHash 45.6442 49.0848 52.5908 Load Factor (%) Number of inserted items=190M 200M 210M DASH 78.4342 82.4434 84.9072	82.434 70.1075	79.1072 59.5115	53.3446 47.6101
Plush 24.5431 28.0492 31.5554 Viper 43.2452 37.7426 35.0398 MioHash 49.0834 56.953 63.1072 Load Factor (%) Number of inserted items=130M 140M 150M DASH 53.6829 57.7984 61.9269 CCEH 48.4817 52.1525 55.8725 Level 73.7962 79.4729 85.1495 Clevel 64.5717 69.5388 74.5058 Plush 45.58 49.0862 52.5923 Viper 43.9789 43.1678 40.6975 MioHash 45.6442 49.0848 52.5908 Load Factor (%) Number of inserted items=190M 200M 210M DASH 78.4342 82.4434 84.9072	56.7663	62.443	68.1196
Viper 43.2452 37.7426 35.0398 MioHash 49.0834 56.953 63.1072 Load Factor (%) Number of inserted items=130M 140M 150M DASH 53.6829 57.7984 61.9269 CCEH 48.4817 52.1525 55.8725 Level 73.7962 79.4729 85.1495 Clevel 64.5717 69.5388 74.5058 Plush 45.58 49.0862 52.5923 Viper 43.9789 43.1678 40.6975 MioHash 45.6442 49.0848 52.5908 Load Factor (%) Number of inserted items=190M 200M 210M DASH 78.4342 82.4434 84.9072	49.6705 35.0616	54.6376 38.5677	59.6046 42.0739
Load Factor (%) Number of inserted items=130M 140M 150M DASH 53.6829 57.7984 61.9269 CCEH 48.4817 52.1525 55.8725 Level 73.7962 79.4729 85.1495 Clevel 64.5717 69.5388 74.5058 Plush 45.58 49.0862 52.5923 Viper 43.9789 43.1678 40.6975 MioHash 45.6442 49.0848 52.5908 Load Factor (%) Number of inserted items=190M 200M 210M DASH 78.4342 82.4434 84.9072	37.1422	40.3423	42.8817
CCEH 48.4817 52.1525 55.8725 Level 73.7962 79.4729 85.1495 Clevel 64.5717 69.5388 74.5058 Plush 45.58 49.0862 52.5923 Viper 43.9789 43.1678 40.6975 MioHash 45.6442 49.0848 52.5908 Load Factor (%) Number of inserted items=190M 200M 210M DASH 78.4342 82.4434 84.9072	70.1191 160M	76.5192 170M	61.3701 180M
Level 73.7962 79.4729 85.1495 Clevel 64.5717 69.5388 74.5058 Plush 45.58 49.0862 52.5923 Viper 43.9789 43.1678 40.6975 MioHash 45.6442 49.0848 52.5908 Load Factor (%) Number of inserted items=190M 200M 210M DASH 78.4342 82.4434 84.9072	66.0554	70.1838	74.3117
Plush 45.58 49.0862 52.5923 Viper 43.9789 43.1678 40.6975 MioHash 45.6442 49.0848 52.5908 Load Factor (%) Number of inserted items=190M 200M 210M DASH 78.4342 82.4434 84.9072	59.5756 90.8261	63.2159 48.2514	66.6449 51.0897
Viper 43.9789 43.1678 40.6975 MioHash 45.6442 49.0848 52.5908 Load Factor (%) Number of inserted items=190M 200M 210M DASH 78.4342 82.4434 84.9072	34.0598 56.0985	42.22 59.6046	44.7035 63.1108
Load Factor (%) Number of inserted items=190M 200M 210M DASH 78.4342 82.4434 84.9072	37.7694	35.6577	35.0449
DASH 78.4342 82.4434 84.9072	56.0969 220M	59.6029 230M	63.109 240M
	79.1159	63.3772	53.3364
CCEH 69.3263 70.0462 66.8545 Level 53.928 56.7663 59.6046	59.503 62.443	51.8082 65.2813	47.5918 68.1196
Clevel 47.187 49.6705 52.1541 Plush 66.617 70.1231 4.58497	54.6376 4.8033	57.1211 5.02164	59.6046 5.23997
Viper 35.7313 37.1574 38.7904	40.3647	41.7568	42.9049
MioHash 66.615 70.1168 73.6002	76.5144	74.8935	61.2596
Experiment 10 Recovery Time (s) Number of inserted items=10M 20M 30M	40M	50M	60M
Thread-1 0.560193 1.089347 1.614449 Thread-2 0.331689 0.644957 0.923353	2.549051 1.445274	2.559382 1.507391	3.447411 1.922619
Thread-4 0.235937 0.416497 0.614051	0.916964	0.923644	1.172099
Thread-8 0.159552 0.301159 0.420544 Thread-16 0.154403 0.233623 0.332565	0.64551 0.494526	0.640922 0.502285	0.864405 0.743899
Thread-24 0.122917 0.216846 0.310919	0.471374	0.4684	0.642067
Recovery Time (s) Number of inserted items=70M 80M 90M Thread-1 4.971479 5.305649 5.405138	100M 5.512479		
Thread-2 2.75402 2.958968 2.966657 Thread-4 1.704711 1.787486 1.785323	3.025063 1.811582		
Thread-8 1.248624 1.263118 1.254723	1.289331		
Thread-16 0.968667 1.017342 1.034704 Thread-24 0.881894 0.923817 0.944532	1.021178 0.945199		
Experiment 11	0	40	24
Collecting Table Throughput (Mops/s) Thread=1 2 4 # of CT=4 2.533653 4.293149 7.137802	8 8.904839	16 10.007422	24 8.26563
# of CT=8 2.545541 4.268679 7.45585 # of CT=16 2.526699 4.32143 7.621123	10.502003 10.50557	13.94874 15.644961	14.238366 17.940957
# of CT=64 2.529887 4.301137 7.665617	10.878732	16.60617	19.671948
# of CT=256 2.536601 4.338474 7.88022 # of CT=1024 2.551242 4.373844 7.852751	11.090656 11.811766	16.991854 17.486818	20.213206 20.370545
	11.011700		
Experiment 12	11.011700		
Variable D-Bucket Size Throughput (M Insert Positive Search D-bucket=32B 1.85281225 2.94434275	11.011700		
D-bucket=64B 2.16642825 2.9541595			
D-bucket=128B 2.42965825 2.9828735 D-bucket=256B 2.54010175 2.980101			
D-bucket=512B 2.50579775 3.006221			
Variable P-Bucket Size Throughput (M Insert Positive Search P-bucket=1KB 2.23251575 3.08697575			
P-bucket=2KB 2.410912 3.06805275			
P-bucket=4KB 2.54756875 2.97051575 P-bucket=8KB 2.6717505 2.77006725			
P-bucket=16KB 2.84456175 2.3266485			