

**Data table**

tr-simpleloop .ref						
50						
	Hit Rate	Hit Count	Miss Count	Overall Eviction Count	Clean Eviction Count	Dirty Eviction Count
rand	72.127 5	7784	3008	2958	369	2589
fifo	72.433 3	7817	2975	2925	325	2600
lru	74.166	8004	2788	2738	212	2526
clock	72.535 2	7828	2964	2914	304	2610
opt	75.240 9	8120	2672	2622	112	2510
100						
	Hit Rate	Hit Count	Miss Count	Overall Eviction Count	Clean Eviction Count	Dirty Eviction Count
rand	74.240 1	8012	2780	2680	176	2504
fifo	74.490 4	8039	2753	2653	157	2496
lru	75.166 8	8112	2680	2580	112	2468
clock	74.499 6	8040	2752	2652	149	2503
opt	75.565 2	8155	2637	2537	37	2500
150						
	Hit Rate	Hit Count	Miss Count	Overall Eviction Count	Clean Eviction Count	Dirty Eviction Count
rand	74.777 6	8070	2722	2572	134	2438
fifo	74.851 7	8078	2714	2564	129	2435
lru	75.166 8	8112	2680	2530	112	2418
clock	75.027 8	8097	2695	2545	103	2442
opt	75.565 2	8155	2637	2487	0	2487
200						
	Hit Rate	Hit Count	Miss Count	Overall Eviction Count	Clean Eviction Count	Dirty Eviction Count
rand	74.851	8078	2714	2514	130	2384

	7					
<b>fifo</b>	74.925 9	8086	2706	2506	125	2381
<b>lru</b>	75.166 8	8112	2680	2480	112	2368
<b>clock</b>	74.935 1	8087	2705	2505	113	2392
<b>opt</b>	75.565 2	8155	2637	2437	0	2437

<b>tr-blocked. ref</b>						
<b>50</b>						
	<b>Hit Rate</b>	<b>Hit Count</b>	<b>Miss Count</b>	<b>Overall Eviction Count</b>	<b>Clean Eviction Count</b>	<b>Dirty Eviction Count</b>
<b>rand</b>	99.652 7	241020 0	8400	8350	5949	2401
<b>fifo</b>	99.733	241214 3	6457	6407	4286	2121
<b>lru</b>	99.783 9	241337 4	5226	5176	2945	2231
<b>clock</b>	99.664 2	241047 8	8122	8072	5818	2254
<b>opt</b>	99.845 3	241485 9	3741	3691	2730	961
<b>100</b>						
	<b>Hit Rate</b>	<b>Hit Count</b>	<b>Miss Count</b>	<b>Overall Eviction Count</b>	<b>Clean Eviction Count</b>	<b>Dirty Eviction Count</b>
<b>rand</b>	99.781 8	241332 3	5277	5177	3560	1617
<b>fifo</b>	99.820 1	241425 0	4350	4250	2892	1358
<b>lru</b>	99.841 7	241477 2	3828	3728	2767	961
<b>clock</b>	99.819 1	241422 4	4376	4276	2804	1472
<b>opt</b>	99.874 6	241556 8	3032	2932	1982	950
<b>150</b>						
	<b>Hit Rate</b>	<b>Hit Count</b>	<b>Miss Count</b>	<b>Overall Eviction Count</b>	<b>Clean Eviction Count</b>	<b>Dirty Eviction Count</b>
<b>rand</b>	99.816 3	241415 6	4444	4294	2946	1348
<b>fifo</b>	99.823 9	241434 2	4258	4108	2804	1304
<b>lru</b>	99.841	241477	3823	3673	2732	941

	9	7				
clock	99.834 7	241460 3	3997	3847	2558	1289
opt	99.895 2	241606 5	2535	2385	1426	959
200						
	Hit Rate	Hit Count	Miss Count	Overall Eviction Count	Clean Eviction Count	Dirty Eviction Count
rand	99.840 6	241474 5	3855	3655	2422	1233
fifo	99.868 2	241541 3	3187	2987	2010	977
lru	99.847 1	241490 1	3699	3499	2558	941
clock	99.842	241477 8	3882	3622	2561	1061
opt	99.905 5	241631 5	2285	2085	1137	948

tr-matmul. ref						
50						
	Hit Rate	Hit Count	Miss Count	Overall Eviction Count	Clean Eviction Count	Dirty Eviction Count
rand	65.565 6	189378 5	994599	994549	955843	38706
fifo	60.972 6	176112 2	1127262	1127212	1083355	43857
lru	63.950 9	184714 9	1041235	1041185	1040210	975
clock	64.720 3	186937 1	1019013	1018963	976976	41987
opt	79.661 4	230092 8	587456	587406	586443	963
100						
	Hit Rate	Hit Count	Miss Count	Overall Eviction Count	Clean Eviction Count	Dirty Eviction Count
rand	88.809 2	256515 0	323234	323134	315866	7268
fifo	62.486 2	180484 1	1083543	1083443	1061338	22105
lru	65.155 3	188193 5	1006449	1006349	1005388	961
clock	67.252 5	194251 0	945874	945774	925981	19793
opt	96.787	279559	92794	92694	91732	962

	3	0				
<b>150</b>						
	<b>Hit Rate</b>	<b>Hit Count</b>	<b>Miss Count</b>	<b>Overall Eviction Count</b>	<b>Clean Eviction Count</b>	<b>Dirty Eviction Count</b>
<b>rand</b>	96.662 1	279197 2	96412	96262	94006	2256
<b>fifo</b>	98.808 8	285397 8	34406	34256	33060	1196
<b>lru</b>	98.861 5	285550 1	32883	32733	31772	961
<b>clock</b>	94.027 9	271588 7	172497	172347	168898	3449
<b>opt</b>	99.078 7	286177 3	26611	26461	25501	960
<b>200</b>						
	<b>Hit Rate</b>	<b>Hit Count</b>	<b>Miss Count</b>	<b>Overall Eviction Count</b>	<b>Clean Eviction Count</b>	<b>Dirty Eviction Count</b>
<b>rand</b>	98.038 2	283172 0	56664	56464	54958	1506
<b>fifo</b>	98.826 9	285449 9	33885	33685	32550	1135
<b>lru</b>	98.862	285551 3	32871	32671	31710	961
<b>clock</b>	98.878 2	285598 1	32403	32203	31072	1131
<b>opt</b>	99.333 2	286912 3	19261	19061	18101	960

<b>tr-fib.ref</b>						
<b>50</b>						
	<b>Hit Rate</b>	<b>Hit Count</b>	<b>Miss Count</b>	<b>Overall Eviction Count</b>	<b>Clean Eviction Count</b>	<b>Dirty Eviction Count</b>
<b>rand</b>	96.100 2	6481	263	213	176	37
<b>fifo</b>	96.396 8	6501	243	193	150	43
<b>lru</b>	97.449 6	6572	172	122	110	12
<b>clock</b>	96.055 8	6478	266	216	172	44
<b>opt</b>	98.072 4	6614	130	80	71	9
<b>100</b>						
	<b>Hit</b>	<b>Hit</b>	<b>Miss</b>	<b>Overall Eviction</b>	<b>Clean Eviction</b>	<b>Dirty Eviction</b>

	Rate	Count	Count	Count	Count	Count
rand	98.2355	6625	119	19	17	2
fifo	98.0872	6615	129	29	20	9
lru	98.28	6628	116	16	15	1
clock	98.1762	6621	123	23	20	3
opt	98.28	6628	116	16	15	1
150						
	Hit Rate	Hit Count	Miss Count	Overall Eviction Count	Clean Eviction Count	Dirty Eviction Count
rand	98.28	6628	116	0	0	0
fifo	98.28	6628	116	0	0	0
lru	98.28	6628	116	0	0	0
clock	98.28	6628	116	0	0	0
opt	98.28	6628	116	0	0	0
200						
	Hit Rate	Hit Count	Miss Count	Overall Eviction Count	Clean Eviction Count	Dirty Eviction Count
rand	98.28	6628	116	0	0	0
fifo	98.28	6628	116	0	0	0
lru	98.28	6628	116	0	0	0
clock	98.28	6628	116	0	0	0
opt	98.28	6628	116	0	0	0

### Comparisons of Algorithm

From the data in the tables above, we can make some observations about different algorithms with different memory sizes. In general, all of the algorithms produce a higher hit rate as the memory sizes increase. Also, generally the overall eviction count decreases as memory sizes increase. There are a couple of surprises in matmul however. As memory increased from 50 to 100 in matmul, the rand/opt algos saw a ~20% increase in hit rate. Other algos only saw a ~2% increase in this case. In this same case, rand had 88% hit rate at 100 memory, whereas other algos(fifo/lru/clock) had ~65%, this is surprising because usually rand is seen as the worst page replacement algo. Another interesting observation is that in the 150 and 200 memory sizes for the fib trace file, all hit rates were the same throughout. We also see that the eviction count in higher memory sizes were 0 for the fib trace file. In the blocked trace file, we see that every algo at every memory size was ~99%. Considering it took opt ~3minutes to run and other algos ~2seconds, and that opt was not significantly better than any algo, the clear winner in this case were the algos other than opt(if we care about time). If we don't care about time, then opt is the winner in about every case, and it should be because it's usually used as the high end of the optimal yardstick.

### **LRU Paragraph**

In Simpleloop, as memory increases, we only get a slight increase in hit rate from 50 to 100, hit rates stay consistent from 100 through 200. The overall eviction count does decrease as memory increases however. In Blocked, as memory increases, we again see that we only get a slight increase in hit rates as we go from 50 through 200. Although, overall eviction count dramatically decreases from 50 to 100. In Matmul, as memory increases, we see a dramatic increase in hit rates, especially from 50 through 150. From 100 to 150 we see a 30% increase in hit rates. From 100 through 200 we also see dramatic decreases in overall eviction count. In Fib(our own trace file), as memory increases we see a slight increase in hit rates as memory increases from 50 to 100. From 100 through 200 we see a consistent hit rate and 0 evictions, however this is nothing special as this is the case in all the algorithms.