***Trace file: Simple Loop Mem: 50***

The program was run as shown below with the tracefile name being altered for every tracefile.

./sim -f tr-simpleloop.ref -m 50 -s 1000000 -a program

Constant swapfile size of 1000000 has been picked for all files.

|  |  |
| --- | --- |
| Fifo | Hit count: 7404  Miss count: 3156  Clean evictions: 367  Dirty evictions: 2739  Total references : 10560  Hit rate: 70.1136  Miss rate: 29.8864 |
| LRU | Hit count: 7782  Miss count: 2778  Clean evictions: 91  Dirty evictions: 2637  Total references : 10560  Hit rate: 73.6932  Miss rate: 26.3068 |
| Clock | Hit count: 7773  Miss count: 2787  Clean evictions: 97  Dirty evictions: 2640  Total references : 10560  Hit rate: 73.6080  Miss rate: 26.3920 |
| Opt |  |
| Rand | Hit count: 7583  Miss count: 2977  Clean evictions: 227  Dirty evictions: 2700  Total references : 10560  Hit rate: 71.8087  Miss rate: 28.1913 |

***Trace file: Simple Loop Mem: 100***

|  |  |
| --- | --- |
| Fifo | Hit count: 7776  Miss count: 2784  Clean evictions: 71  Dirty evictions: 2613  Total references : 10560  Hit rate: 73.6364  Miss rate: 26.3636 |
| LRU | Hit count: 7881  Miss count: 2679  Clean evictions: 0  Dirty evictions: 2579  Total references : 10560  Hit rate: 74.6307  Miss rate: 25.3693 |
| Clock | Hit count: 7882  Miss count: 2678  Clean evictions: 0  Dirty evictions: 2578  Total references : 10560  Hit rate: 74.6402  Miss rate: 25.3598 |
| Opt | Hit count: 7923  Miss count: 2637  Clean evictions: 1  Dirty evictions: 2536  Total references : 10560  Hit rate: 75.0284  Miss rate: 24.9716 |
| Rand | Hit count: 7810  Miss count: 2750  Clean evictions: 52  Dirty evictions: 2598  Total references : 10560  Hit rate: 73.9583  Miss rate: 26.0417 |

***Trace file: Simple Loop Mem: 150***

|  |  |
| --- | --- |
| Fifo | Hit count: 7850  Miss count: 2710  Clean evictions: 20  Dirty evictions: 2540  Total references : 10560  Hit rate: 74.3371  Miss rate: 25.6629 |
| LRU | Hit count: 7883  Miss count: 2677  Clean evictions: 0  Dirty evictions: 2527  Total references : 10560  Hit rate: 74.6496  Miss rate: 25.3504 |
| Clock | Hit count: 7883  Miss count: 2677  Clean evictions: 0  Dirty evictions: 2527  Total references : 10560  Hit rate: 74.6496  Miss rate: 25.3504 |
| Opt | Hit count: 7926  Miss count: 2634  Clean evictions: 0  Dirty evictions: 2484  Total references : 10560  Hit rate: 75.0568  Miss rate: 24.9432 |
| Rand | Hit count: 7844  Miss count: 2716  Clean evictions: 21  Dirty evictions: 2545  Total references : 10560  Hit rate: 74.2803  Miss rate: 25.7197 |

***Trace file: Simple Loop Mem: 200***

|  |  |
| --- | --- |
| Fifo | Hit count: 7872  Miss count: 2688  Clean evictions: 13  Dirty evictions: 2475  Total references : 10560  Hit rate: 74.5455  Miss rate: 25.4545 |
| LRU | Hit count: 7883  Miss count: 2677  Clean evictions: 0  Dirty evictions: 2477  Total references : 10560  Hit rate: 74.6496  Miss rate: 25.3504 |
| Clock | Hit count: 7883  Miss count: 2677  Clean evictions: 0  Dirty evictions: 2477  Total references : 10560  Hit rate: 74.6496  Miss rate: 25.3504 |
| Opt | Hit count: 7925  Miss count: 2635  Clean evictions: 0  Dirty evictions: 2435  Total references : 10560  Hit rate: 75.0473  Miss rate: 24.9527 |
| Rand | Hit count: 7863  Miss count: 2697  Clean evictions: 14  Dirty evictions: 2483  Total references : 10560  Hit rate: 74.4602  Miss rate: 25.5398 |

***Trace file: tr-blocked.ref Mem: 50***

|  |  |
| --- | --- |
| Fifo | Hit count: 2511192  Miss count: 13832  Clean evictions: 10490  Dirty evictions: 3292  Total references : 2525024  Hit rate: 99.4522  Miss rate: 0.5478 |
| LRU | Hit count: 2519837  Miss count: 5187  Clean evictions: 2791  Dirty evictions: 2346  Total references : 2525024  Hit rate: 99.7946  Miss rate: 0.2054 |
| Clock | Hit count: 2519288  Miss count: 5736  Clean evictions: 3275  Dirty evictions: 2411  Total references : 2525024  Hit rate: 99.7728  Miss rate: 0.2272 |
| Opt |  |
| Rand | Hit count: 2516621  Miss count: 8403  Clean evictions: 5856  Dirty evictions: 2497  Total references : 2525024  Hit rate: 99.6672  Miss rate: 0.3328 |

***Trace file: tr-blocked.ref Mem: 100***

|  |  |
| --- | --- |
| Fifo | Hit count: 2518660  Miss count: 6364  Clean evictions: 3918  Dirty evictions: 2346  Total references : 2525024  Hit rate: 99.7480  Miss rate: 0.2520 |
| LRU | Hit count: 2521212  Miss count: 3812  Clean evictions: 2632  Dirty evictions: 1080  Total references : 2525024  Hit rate: 99.8490  Miss rate: 0.1510 |
| Clock | Hit count: 2520687  Miss count: 4337  Clean evictions: 2639  Dirty evictions: 1598  Total references : 2525024  Hit rate: 99.8282  Miss rate: 0.1718 |
| Opt |  |
| Rand | Hit count: 2519742  Miss count: 5282  Clean evictions: 3411  Dirty evictions: 1771  Total references : 2525024  Hit rate: 99.7908  Miss rate: 0.2092 |

***Trace file: tr-blocked.ref Mem: 150***

|  |  |
| --- | --- |
| Fifo | Hit count: 2519136  Miss count: 5888  Clean evictions: 3980  Dirty evictions: 1758  Total references : 2525024  Hit rate: 99.7668  Miss rate: 0.2332 |
| LRU | Hit count: 2521220  Miss count: 3804  Clean evictions: 2596  Dirty evictions: 1058  Total references : 2525024  Hit rate: 99.8493  Miss rate: 0.1507 |
| Clock | Hit count: 2521214  Miss count: 3810  Clean evictions: 2600  Dirty evictions: 1060  Total references : 2525024  Hit rate: 99.8491  Miss rate: 0.1509 |
| Opt |  |
| Rand | Hit count: 2520584  Miss count: 4440  Clean evictions: 2780  Dirty evictions: 1510  Total references : 2525024  Hit rate: 99.8242  Miss rate: 0.1758 |

***Trace file: tr-blocked.ref Mem: 200***

|  |  |
| --- | --- |
| Fifo | Hit count: 2519332  Miss count: 5692  Clean evictions: 3719  Dirty evictions: 1773  Total references : 2525024  Hit rate: 99.7746  Miss rate: 0.2254 |
| LRU | Hit count: 2521328  Miss count: 3696  Clean evictions: 2438  Dirty evictions: 1058  Total references : 2525024  Hit rate: 99.8536  Miss rate: 0.1464 |
| Clock | Hit count: 2521840  Miss count: 3184  Clean evictions: 1915  Dirty evictions: 1069  Total references : 2525024  Hit rate: 99.8739  Miss rate: 0.1261 |
| Opt |  |
| Rand | Hit count: 2521169  Miss count: 3855  Clean evictions: 2334  Dirty evictions: 1321  Total references : 2525024  Hit rate: 99.8473  Miss rate: 0.1527 |

***Trace file: tr-matmul.ref Mem: 50***

|  |  |
| --- | --- |
| Fifo | Hit count: 1811923  Miss count: 1156229  Clean evictions: 1097647  Dirty evictions: 58532  Total references : 2968152  Hit rate: 61.0455  Miss rate: 38.9545 |
| LRU | Hit count: 1926927  Miss count: 1041225  Clean evictions: 1040073  Dirty evictions: 1102  Total references : 2968152  Hit rate: 64.9201  Miss rate: 35.0799 |
| Clock | Hit count: 1926917  Miss count: 1041235  Clean evictions: 1040079  Dirty evictions: 1106  Total references : 2968152  Hit rate: 64.9198  Miss rate: 35.0802 |
| Opt |  |
| Rand | Hit count: 1973357  Miss count: 994795  Clean evictions: 955639  Dirty evictions: 39106  Total references : 2968152  Hit rate: 66.4844  Miss rate: 33.5156 |

***Trace file: tr-matmul.ref Mem: 100***

|  |  |
| --- | --- |
| Fifo | Hit count: 1865314  Miss count: 1102838  Clean evictions: 1070821  Dirty evictions: 31917  Total references : 2968152  Hit rate: 62.8443  Miss rate: 37.1557 |
| LRU | Hit count: 1961704  Miss count: 1006448  Clean evictions: 1005271  Dirty evictions: 1077  Total references : 2968152  Hit rate: 66.0918  Miss rate: 33.9082 |
| Clock | Hit count: 1966369  Miss count: 1001783  Clean evictions: 1000607  Dirty evictions: 1076  Total references : 2968152  Hit rate: 66.2489  Miss rate: 33.7511 |
| Opt |  |
| Rand | Hit count: 2644977  Miss count: 323175  Clean evictions: 315688  Dirty evictions: 7387  Total references : 2968152  Hit rate: 89.1119  Miss rate: 10.8881 |

***Trace file tr-matmul.ref Mem: 150***

|  |  |
| --- | --- |
| Fifo | Hit count: 2000220  Miss count: 967932  Clean evictions: 948647  Dirty evictions: 19135  Total references : 2968152  Hit rate: 67.3894  Miss rate: 32.6106 |
| LRU | Hit count: 2935272  Miss count: 32880  Clean evictions: 31655  Dirty evictions: 1075  Total references : 2968152  Hit rate: 98.8922  Miss rate: 1.1078 |
| Clock | Hit count: 2933828  Miss count: 34324  Clean evictions: 33098  Dirty evictions: 1076  Total references : 2968152  Hit rate: 98.8436  Miss rate: 1.1564 |
| Opt |  |
| Rand | Hit count: 2871730  Miss count: 96422  Clean evictions: 93946  Dirty evictions: 2326  Total references : 2968152  Hit rate: 96.7514  Miss rate: 3.2486 |

***Trace file tr-matmul.ref Mem: 200***

|  |  |
| --- | --- |
| Fifo | Hit count: 2895551  Miss count: 72601  Clean evictions: 70390  Dirty evictions: 2011  Total references : 2968152  Hit rate: 97.5540  Miss rate: 2.4460 |
| LRU | Hit count: 2935283  Miss count: 32869  Clean evictions: 31594  Dirty evictions: 1075  Total references : 2968152  Hit rate: 98.8926  Miss rate: 1.1074 |
| Clock | Hit count: 2934686  Miss count: 33466  Clean evictions: 32186  Dirty evictions: 1080  Total references : 2968152  Hit rate: 98.8725  Miss rate: 1.1275 |
| Opt |  |
| Rand | Hit count: 2911835  Miss count: 56317  Clean evictions: 54467  Dirty evictions: 1650  Total references : 2968152  Hit rate: 98.1026  Miss rate: 1.8974 |

***Trace file: tr-test.ref Mem: 50***

This is the 4th tracefile and is the Fibonacci algorithm.

|  |  |
| --- | --- |
| Fifo | Hit count: 9652  Miss count: 10660  Clean evictions: 590  Dirty evictions: 10020  Total references : 20312  Hit rate: 47.5187  Miss rate: 52.4813 |
| LRU | Hit count: 10231  Miss count: 10081  Clean evictions: 60  Dirty evictions: 9971  Total references : 20312  Hit rate: 50.3692  Miss rate: 49.6308 |
| Clock | Hit count: 10226  Miss count: 10086  Clean evictions: 57  Dirty evictions: 9979  Total references : 20312  Hit rate: 50.3446  Miss rate: 49.6554 |
| Opt |  |
| Rand | Hit count: 9791  Miss count: 10521  Clean evictions: 478  Dirty evictions: 9993  Total references : 20312  Hit rate: 48.2030  Miss rate: 51.7970 |

***Trace file: tr-test.ref Mem: 100***

|  |  |
| --- | --- |
| Fifo | Hit count: 10096  Miss count: 10216  Clean evictions: 262  Dirty evictions: 9854  Total references : 20312  Hit rate: 49.7046  Miss rate: 50.2954 |
| LRU | Hit count: 10417  Miss count: 9895  Clean evictions: 0  Dirty evictions: 9795  Total references : 20312  Hit rate: 51.2850  Miss rate: 48.7150 |
| Clock | Hit count: 10425  Miss count: 9887  Clean evictions: 0  Dirty evictions: 9787  Total references : 20312  Hit rate: 51.3243  Miss rate: 48.6757 |
| Opt |  |
| Rand | Hit count: 10194  Miss count: 10118  Clean evictions: 209  Dirty evictions: 9809  Total references : 20312  Hit rate: 50.1871  Miss rate: 49.8129 |

***Trace file tr-test.ref Mem: 150***

|  |  |
| --- | --- |
| Fifo | Hit count: 10333  Miss count: 9979  Clean evictions: 152  Dirty evictions: 9677  Total references : 20312  Hit rate: 50.8714  Miss rate: 49.1286 |
| LRU | Hit count: 10554  Miss count: 9758  Clean evictions: 0  Dirty evictions: 9608  Total references : 20312  Hit rate: 51.9594  Miss rate: 48.0406 |
| Clock | Hit count: 10557  Miss count: 9755  Clean evictions: 0  Dirty evictions: 9605  Total references : 20312  Hit rate: 51.9742  Miss rate: 48.0258 |
| Opt |  |
| Rand | Hit count: 10413  Miss count: 9899  Clean evictions: 136  Dirty evictions: 9613  Total references : 20312  Hit rate: 51.2653  Miss rate: 48.7347 |

***Trace file tr-matmul.ref Mem: 200***

|  |  |
| --- | --- |
| Fifo | Hit count: 10526  Miss count: 9786  Clean evictions: 106  Dirty evictions: 9480  Total references : 20312  Hit rate: 51.8216  Miss rate: 48.1784 |
| LRU | Hit count: 10669  Miss count: 9643  Clean evictions: 0  Dirty evictions: 9443  Total references : 20312  Hit rate: 52.5256  Miss rate: 47.4744 |
| Clock | Hit count: 10672  Miss count: 9640  Clean evictions: 0  Dirty evictions: 9440  Total references : 20312  Hit rate: 52.5404  Miss rate: 47.4596 |
| Opt |  |
| Rand | Hit count: 10561  Miss count: 9751  Clean evictions: 91  Dirty evictions: 9460  Total references : 20312  Hit rate: 51.9939  Miss rate: 48.0061 |

***Comparison:***

Through the results, it is visible that FIFO is always terrible. It performs better in simpleloop however terrible in the other files. As size increases, it gets better and the Hit rate increases. As visible, clock is an lru approximation. It is very similar however, it does not carry the overhead. It tends towards the LRU as size increases. Apart from that, Fifo is constantly the worst. LRU is almost as good as optimum but it has a significant overhead.

***LRU:***

It is visible from the results that as memory size increases, LRU starts to demonstrate increasingly stable behavior. Initially the hit rate is not very high. However, as soon as the memory size increases, either between 50 and 100 or 100 and 150 there is a sudden jump after which the remaining increase is very minimal. Eventually as memory is set to 150, hit rate is usually very high and there is only a minor difference between memory size=150 and 200. The reason behind this is LRU learns from previous patterns and evicts the frame that was least recently used. This eventually helps as when frames get used more often it is not evicted and more hits are obtained.