**CSC369 Assignment 3**

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Comparing Algorithms:

page-blocked.ref with memsize of 50

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Algorithm** | **Hit rate** | **Hit count** | **Miss count** | **Overall eviction count** | **Clean eviction count** | **Dirty eviction count** |
| **FIFO** | 99.6911 | 1939658 | 6011 | 5961 | 4946 | 1015 |
| **CLOCK** | 99.6997 | 1939827 | 5842 | 5792 | 4777 | 1015 |
| **LRU** | 99.7477 | 1940760 | 4909 | 4859 | 3875 | 984 |
| **MRU** | 13.1380 | 255622 | 1690047 | 1689997 | 1632627 | 57370 |

page-blocked.ref with memsize of 100

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Algorithm** | **Hit rate** | **Hit count** | **Miss count** | **Overall eviction count** | **Clean eviction count** | **Dirty eviction count** |
| **FIFO** | 99.7881 | 1941547 | 4122 | 4022 | 3025 | 997 |
| **CLOCK** | 99.7882 | 1941549 | 4120 | 4020 | 3024 | 996 |
| **LRU** | 99.8141 | 1942052 | 3617 | 3517 | 2569 | 948 |
| **MRU** | 21.6730 | 421684 | 1523985 | 1523885 | 1471265 | 52620 |

page-matmul.ref with memsize of 50

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Algorithm** | **Hit rate** | **Hit count** | **Miss count** | **Overall eviction count** | **Clean eviction count** | **Dirty eviction count** |
| **FIFO** | 52.4492 | 1217013 | 1103352 | 1103302 | 1102309 | 993 |
| **CLOCK** | 52.4104 | 1216113 | 1104252 | 1104202 | 1103210 | 992 |
| **LRU** | 55.1396 | 1279440 | 1040925 | 1040875 | 1039914 | 961 |
| **MRU** | 15.9283 | 369595 | 1950770 | 1950720 | 1931220 | 19500 |

page-matmul.ref with memsize of 100

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Algorithm** | **Hit rate** | **Hit count** | **Miss count** | **Overall eviction count** | **Clean eviction count** | **Dirty eviction count** |
| **FIFO** | 53.7949 | 1248239 | 1072126 | 1072026 | 1071052 | 974 |
| **CLOCK** | 53.7921 | 1248172 | 1072193 | 1072093 | 1071119 | 974 |
| **LRU** | 56.6329 | 1314090 | 1006275 | 1006175 | 1005215 | 960 |
| **MRU** | 22.3449 | 518483 | 1801882 | 1801782 | 1783832 | 17950 |

page-repeatloop.ref with memsize of 50

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Algorithm** | **Hit rate** | **Hit count** | **Miss count** | **Overall eviction count** | **Clean eviction count** | **Dirty eviction count** |
| **FIFO** | 33.4507 | 190 | 378 | 328 | 241 | 87 |
| **CLOCK** | 48.4155 | 275 | 293 | 243 | 156 | 87 |
| **LRU** | 34.5070 | 196 | 372 | 322 | 236 | 86 |
| **MRU** | 49.2958 | 280 | 288 | 238 | 164 | 74 |

page-repeatloop.ref with memsize of 100

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Algorithm** | **Hit rate** | **Hit count** | **Miss count** | **Overall eviction count** | **Clean eviction count** | **Dirty eviction count** |
| **FIFO** | 82.7465 | 470 | 98 | 0 | 0 | 0 |
| **CLOCK** | 82.7465 | 470 | 98 | 0 | 0 | 0 |
| **LRU** | 82.7465 | 470 | 98 | 0 | 0 | 0 |
| **MRU** | 82.7465 | 470 | 98 | 0 | 0 | 0 |

page-simpleloop.ref with memsize of 50

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Algorithm** | **Hit rate** | **Hit count** | **Miss count** | **Overall eviction count** | **Clean eviction count** | **Dirty eviction count** |
| **FIFO** | 22.7206 | 770 | 2619 | 2569 | 45 | 2524 |
| **CLOCK** | 22.6616 | 768 | 2621 | 2571 | 46 | 2525 |
| **LRU** | 25.4352 | 862 | 2527 | 2477 | 0 | 2477 |
| **MRU** | 1.4163 | 48 | 3341 | 3291 | 410 | 2881 |

page-simpleloop.ref with memsize of 100

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Algorithm** | **Hit rate** | **Hit count** | **Miss count** | **Overall eviction count** | **Clean eviction count** | **Dirty eviction count** |
| **FIFO** | 24.0189 | 814 | 2575 | 2475 | 23 | 2452 |
| **CLOCK** | 23.9894 | 813 | 2576 | 2476 | 24 | 2452 |
| **LRU** | 25.4352 | 862 | 2527 | 2427 | 0 | 2427 |
| **MRU** | 1.9475 | 66 | 3323 | 3223 | 401 | 2822 |

Discussion:

Within the four algorithms we have, LRU has the relatively best hit rate while MRU has the relatively worst hit rate. Further, LRU has the relatively lowest overall eviction count, and MRU has the highest overall eviction count. LRU having the best performance makes sense since it is an improved version of FIFO and CLOCK is designed to approximate it. The performances of CLOCK and FIFO are very similar, since CLOCK is an updated version of FIFO. The hit rates of MRU are significantly lower than those of the other algorithms except for in page-repeatloop.ref, showing that replacing the most recently used page is normally not a good algorithm to apply. As the memory size increases, the hit rates of all four algorithms increases, and the overall eviction counts all decreases.

Custom Traces:

Trace 1

|  |  |  |  |
| --- | --- | --- | --- |
| **Algorithm** | **Hit rate** | **Hit count** | **Miss count** |
| **FIFO** | 60.6061 | 20 | 13 |
| **CLOCK** | 57.5758 | 19 | 14 |
| **LRU** | 63.6364 | 21 | 12 |

Trace 2

|  |  |  |  |
| --- | --- | --- | --- |
| **Algorithm** | **Hit rate** | **Hit count** | **Miss count** |
| **FIFO** | 95.0000 | 38 | 2 |
| **CLOCK** | 95.0000 | 38 | 2 |
| **LRU** | 95.0000 | 38 | 2 |

Trace 3

|  |  |  |  |
| --- | --- | --- | --- |
| **Algorithm** | **Hit rate** | **Hit count** | **Miss count** |
| **FIFO** | 0.0000 | 0 | 39 |
| **CLOCK** | 0.0000 | 0 | 39 |
| **LRU** | 0.0000 | 0 | 39 |