Assignment 3: Virtual Memory (Task 3)

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* Blocked (memory size 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 | 99.7156 | 1940135 | 5534 | 5484 | 4484 | 1000 |
| LRU | 99.7477 | 1940760 | 4909 | 4859 | 3875 | 984 |
| MRU | 13.1380 | 255622 | 1690047 | 1689997 | 1632627 | 57370 |

* Blocked (memory size 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 | 99.7936 | 1941654 | 4015 | 3915 | 2947 | 968 |
| LRU | 99.8141 | 1942052 | 3617 | 3517 | 2569 | 948 |
| MRU | 21.6730 | 421684 | 1523985 | 1523885 | 1471265 | 52620 |

* Matmul (memory size 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 | 55.1397 | 1279442 | 1040923 | 1040873 | 1039911 | 962 |
| LRU | 55.1396 | 1279440 | 1040925 | 1040875 | 1039914 | 961 |
| MRU | 15.9283 | 369595 | 1950770 | 1950720 | 1931220 | 19500 |

* Matmul (memory size 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 | 56.7384 | 1316539 | 1003826 | 1003726 | 1002766 | 960 |
| LRU | 56.6329 | 1314090 | 1006275 | 1006175 | 1005215 | 960 |
| MRU | 22.3449 | 518483 | 1801882 | 1801782 | 1783832 | 17950 |

* Repeatloop (memory size 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 | 35.5634 | 202 | 366 | 316 | 232 | 84 |
| LRU | 34.5070 | 196 | 372 | 322 | 236 | 86 |
| MRU | 49.2958 | 280 | 288 | 238 | 164 | 74 |

* Repeatloop (memory size 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 |

* Simpleloop (memory size 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 | 25.3762 | 860 | 2529 | 2479 | 0 | 2479 |
| LRU | 25.4352 | 862 | 2527 | 2477 | 0 | 2477 |
| MRU | 1.4163 | 48 | 3341 | 3291 | 410 | 2881 |

* Simpleloop (memory size 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 | 25.3762 | 860 | 2529 | 2429 | 0 | 2429 |
| LRU | 25.4352 | 862 | 2527 | 2427 | 0 | 2427 |
| MRU | 1.9475 | 66 | 3323 | 3223 | 401 | 2822 |

Explanation:

According to the tables above, we can clearly see that most of the time, the LRU algorithm will have a higher hit rate than the other 3 algorithms and the MRU algorithm has lower hit rate than the other 3 algorithms. We can also see that the CLOCK algorithm has a higher hit rate than the FIFO algorithm since the CLOCK algorithm is a more efficient version of the FIFO algorithm. And LRU as the near-optimal performance algorithm it’s reasonable that LRU will have the highest hit rate most of the time. The MRU algorithm has the lowest hit rate all the time except in the repeat loop. It shows that the MRU algorithm will not be a good algorithm to use in normal cases. And for the overall eviction count, we can see that the higher the hit rate, the lower the overall eviction count compared to the other algorithms in the table. As we can see in the table, most of the time the LRU algorithm has the lowest overall eviction count in the table, it shows again LRU will be the better algorithm. Also, due to the increase in the memory size, we can clearly see that the hit rate of every algorithm rises, and the overall eviction drops respectively.

* Trace1 (memory size 8)

|  |  |  |  |
| --- | --- | --- | --- |
| Algorithm | Hit rate | Hit count | Miss count |
| FIFO | 46.8750 | 15 | 17 |
| CLOCK | 43.7500 | 14 | 18 |
| LRU | 40.6250 | 13 | 19 |
| OPTIMAL | 56.2500 | 18 | 14 |

* Trace2 (memory size 8)

|  |  |  |  |
| --- | --- | --- | --- |
| Algorithm | Hit rate | Hit count | Miss count |
| FIFO | 75.0000 | 24 | 8 |
| CLOCK | 75.0000 | 24 | 8 |
| LRU | 75.0000 | 24 | 8 |
| OPTIMAL | 75.0000 | 24 | 8 |

* Trace3 (memory size 8)

|  |  |  |  |
| --- | --- | --- | --- |
| Algorithm | Hit rate | Hit count | Miss count |
| FIFO | 0.0000 | 0 | 32 |
| CLOCK | 0.0000 | 0 | 32 |
| LRU | 0.0000 | 0 | 32 |
| MRU | 50.0000 | 16 | 16 |