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ANP147

Project 3

# Part 1 – Graphs

Below are the graphs for all four of my algorithms, one for the GCC trace file and one for the BZIP trace file. I was unable to combine them all into one graph as the project seemed to imply, but I was better able to compare the performance of all the algorithms with these various charts.

# Part 2 – Write Up

## Aging – Refresh Time

As shown by the graph above, the optimal refresh rate I encountered (using GCC data) was 10. A refresh rate of 5 resulted in exponentially higher page faults than refresh rate of 10. Increasing the refresh rate by 5 to 15 added around 40,000 additional page faults. Continuing to increase failed to get the number of page faults anywhere near that of refresh rate 10.

## Working Set – Tau

For my optimal Tau, I chose the value of 5. When increasing Tau from 3 to 5, there was a very minimal increase in page faults. When increasing Tau from 5 to 10, the page faults increased by 250%, thus indicating that 5 was the most appropriate Tau value.

# Part 3 - Comparisons Using BZIP Data

## Opt

|  |  |  |  |
| --- | --- | --- | --- |
| **Frames** | **MemoryAccess** | **PageFaults** | **DiskWrites** |
| 8 | 1000000 | 18251 | 7580 |
| 16 | 1000000 | 2427 | 847 |
| 32 | 1000000 | 1330 | 460 |
| 64 | 1000000 | 821 | 283 |

Using the above chart for reference, we can see that the number of both page faults and disk writes largely decrease as the number of available page frames increases. Additionally, the ratio of page faults to disk writes decrease as the number of available page frames increase. Compared to any of the other three algorithms, the number of page faults and disk writes are extremely low.

Perhaps the most interesting observation is the difference in page faults and disk writes between 8 and 16 page frames. The number of page faults decrease from 18,251 to 2,247 – but doubling the available page frames again does not yield such a dramatic decrease in page faults and disk writes.

## Clock

|  |  |  |  |
| --- | --- | --- | --- |
| **Frames** | **MemoryAccess** | **PageFaults** | **DiskWrites** |
| 8 | 1000000 | 46164 | 17568 |
| 16 | 1000000 | 3468 | 1128 |
| 32 | 1000000 | 2203 | 734 |
| 64 | 1000000 | 1318 | 443 |

Initial comparison of Clock to Opt (using BZIP data) reveals that the number of page faults at 8 page frames for clock (46,164) is much higher than that of opt (18,251). Following the pattern described in opt, as available page frames increase, the number of page faults and disk writes decrease dramatically. Like observed in opt, the most dramatic decrease in page faults and disk writes comes when the available page frames is increased from 8 to 16 – yet doubling the page frames from 16 to 32 do not yield nearly the same drop in page faults and disk writes.

When clock is run with 64 available page frames, the number of page faults and disk writes compared to those of opt at 64 available page frames is a small difference. None of the other algorithms observed in this project provided such a small difference at this level of page frames. **Based on this data, I can conclude that this would be the most appropriate for use within a normal operating system.**

## Aging

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Frames** | **MemoryAccess** | **PageFaults** | **DiskWrites** | **Refresh Time** |
| 8.00 | 1000000.00 | 61440.00 | 11125.00 | 10.00 |
| 16.00 | 1000000.00 | 19794.00 | 7221.00 | 10.00 |
| 32.00 | 1000000.00 | 7225.00 | 1135.00 | 10.00 |
| 64.00 | 1000000.00 | 6372.00 | 1070.00 | 10.00 |

As described in an earlier section, I chose my optimal refresh rate to be the value of 10. Comparing the page faults and disk writes of BZIP data reveals interesting results. Initially, aging observes 61,440 page faults and 11,125 disk writes with 8 available page frames as opposed to opts performance of 18,251 and 7,580, respectively.

Like observed in the other algorithms, a dramatic drop is page faults and disk writes is observed when the available page frames increase from 8 to 16. However, unlike the other algorithms, a large drop in page faults and disk writes is observed when the available page frames are increased from 16 to 32 page frames.

## Working Set

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Frames** | **MemoryAccess** | **PageFaults** | **DiskWrites** | **Refresh Time** | **Tau** |
| 8 | 1000000.00 | 101712.00 | 16791.00 | 10.00 | 5.00 |
| 16 | 1000000.00 | 7878.00 | 1220.00 | 10.00 | 5.00 |
| 32 | 1000000.00 | 4830.00 | 714.00 | 10.00 | 5.00 |
| 64 | 1000000.00 | 2820.00 | 465.00 | 10.00 | 5.00 |

Working set yet again observes the dramatic drop in page faults and disk writes between 8 and 16 page frames like in opt and the other algorithms. Unlike opt, the number of page faults and disk writes at 8 page frames is extremely high. While working set is closer to opt at 8 page frames than aging is, it is still almost double than that of opt.