Course: ECEC-T480

Instructor: Anup Das

TA: Shihao Song

Student: Yiwen Chen ([yc625@drexel.edu](mailto:yc625@drexel.edu) )

Ziyu Li ([zl368@drexel.edu](mailto:zl368@drexel.edu) )

# Project 1 Report

## Testing Result

sample.workload

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | bank2 | bank4 | bank8 | bank16 |
| DRAM | Exe time | 150055192 | 115936976 | 96151062 | 84648590 |
| Avg latency | 249.7879943 | 770.1532593 | 458.0702823 | 276.6407173 |
| Bank Conflict | 2465082 | 1824722 | 1503277 | 1343856 |
| PCM | Exe time | 246183163 | 179056215 | 136282231 | 110038953 |
| Avg latency | 707.4927373 | 707.2105713 | 32.5428543 | 677.1214603 |
| Bank Conflict | 2465082 | 1824722 | 1503277 | 1343856 |
| FR-FCFS | Exe time | 107571409 | 53875843 | 27121072 | 13834286 |
| Avg latency | 638.1937873 | 849.7324223 | 427.5790413 | 217.7569733 |
| Bank Conflict | 2463880 | 1818043 | 1484434 | 1299907 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 508.namd\_r.trace.processed | | |  |  |  |
|  |  | bank2 | bank4 | bank8 | bank16 |
| DRAM | Exe time | 4360781 | 3010056 | 2129959 | 1537676 |
| Avg latency | 2263.389404 | 1562.285889 | 1105.487427 | 798.1071783 |
| Bank Conflict | 61169 | 31511 | 16705 | 8790 |
| PCM | Exe time | 4688337 | 3234580 | 2287303 | 1649824 |
| Avg latency | 2433.403076 | 1678.820068 | 1187.153198 | 856.3175663 |
| Bank Conflict | 61169 | 31511 | 16705 | 8790 |
| FR-FCFS | Exe time | 3268988 | 1636859 | 822163 | 424244 |
| Avg latency | 1696.636719 | 849.4284063 | 426.2506413 | 219.5056303 |
| Bank Conflict | 61156 | 31511 | 16700 | 8694 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 511.povray\_r.trace.processed | | |  |  |  |
|  |  | bank2 | bank4 | bank8 | bank16 |
| DRAM | Exe time | 5155978 | 3337734 | 2287521 | 1604836 |
| Avg latency | 2093.9375 | 1355.464233 | 928.9234013 | 651.6024783 |
| Bank Conflict | 65552 | 29731 | 15138 | 8046 |
| PCM | Exe time | 5542870 | 3585930 | 2455557 | 1720832 |
| Avg latency | 2251.0623 | 1456.258301 | 997.1607063 | 698.7000733 |
| Bank Conflict | 65552 | 29731 | 15138 | 8046 |
| FR-FCFS | Exe time | 4195751 | 2119665 | 1093645 | 575098 |
| Avg latency | 1703.6855 | 860.4969483 | 443.5674443 | 233.0462493 |
| Bank Conflict | 65807 | 29716 | 15090 | 7966 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 523.xalancbmk\_r.trace.processed | | |  |  |  |
|  |  | bank2 | bank4 | bank8 | bank16 |
| DRAM | Exe time | 15347640 | 10139267 | 6954365 | 4922438 |
| Avg latency | 2121.193359 | 1401.32373 | 961.1508183 | 680.3165283 |
| Bank Conflict | 186509 | 91497 | 45478 | 23104 |
| PCM | Exe time | 16500432 | 10894575 | 7466213 | 5279078 |
| Avg latency | 2280.520996 | 1505.713379 | 1031.892822 | 729.6070563 |
| Bank Conflict | 186509 | 91497 | 45478 | 23104 |
| FR-FCFS | Exe time | 12278354 | 6153882 | 3120533 | 1649244 |
| Avg latency | 1696.970581 | 850.4413453 | 430.9826353 | 227.3502963 |
| Bank Conflict | 186780 | 91457 | 45473 | 23053 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 541.leela\_r.trace.processed | | |  |  |  |
|  |  | bank2 | bank4 | bank8 | bank16 |
| DRAM | Exe time | 2994942 | 2442964 | 2314151 | 2302138 |
| Avg latency | 2893.341309 | 2360.123535 | 42634 | 2224.000244 |
| Bank Conflict | 55745 | 45013 | 2235.612061 | 42483 |
| PCM | Exe time | 3220274 | 2625860 | 2487143 | 2474214 |
| Avg latency | 3111.031494 | 2536.820068 | 2402.735352 | 2390.238037 |
| Bank Conflict | 55745 | 45013 | 42634 | 42483 |
| FR-FCFS | Exe time | 1755202 | 880718 | 442508 | 304720 |
| Avg latency | 1695.47644 | 850.5254523 | 426.3184513 | 293.9380493 |
| Bank Conflict | 55744 | 44852 | 42563 | 39457 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 544.nab\_r.trace.processed | | |  |  |  |
|  |  | bank2 | bank4 | bank8 | bank16 |
| DRAM | Exe time | 12114986 | 8677916 | 6450154 | 4939351 |
| Avg latency | 2090.506348 | 1497.385864 | 1112.997437 | 852.3013923 |
| Bank Conflict | 144628 | 88604 | 60334 | 44873 |
| PCM | Exe time | 13024750 | 9326124 | 6927730 | 5301547 |
| Avg latency | 2247.491699 | 1609.235352 | 1195.405273 | 914.7999273 |
| Bank Conflict | 144628 | 88604 | 60334 | 44873 |
| FR-FCFS | Exe time | 9835954 | 4922589 | 2471255 | 1281652 |
| Avg latency | 1697.113525 | 849.2402343 | 426.0264893 | 220.5799263 |
| Bank Conflict | 144602 | 88514 | 60188 | 43932 |

## Discussion

**Does an FR-FCFS scheduler always out-perform an FCFS scheduler?**

The FR-FCFS is utilizing the out of order execution technics and significantly optimizing the performance on execution time by reducing the access latency. This can be verified by 508,511, 521,541,544 workloads.