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CST-307

1 Processor Wave

|  | **2-way** | | | | **4-way** | | | | **8-way** | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | LRU | FIFO | RAND | LFU | LRU | FIFO | RAND | LFU | LRU | FIFO | RAND | LFU |
| **8 blocks** | HITS: %72.71  MISS: %27.29 | HITS: %72.71  MISS: %27.29 | HITS: %72.71  MISS: %27.29 | HITS: %72.71  MISS: %27.29 | HITS: %73.12  MISS: %26.88 | HITS: %72.45  MISS: %27.54 | HITS: %71.28  MISS: %27.72 | HITS: %72.68  MISS: %27.32 | HITS: %73.35  MISS: %26.65 | HITS: %73.06  MISS:%29.94 | HITS: %71.08  MISS: %28.92 | HITS: %73.09  MISS: %26.91 |
| **16 blocks** | HITS: %80.85  MISS: %19.15 | HITS: %80.27  MISS: %19.73 | HITS: %79.66  MISS: %20.33 | HITS: %80.33  MISS: %19.66 | HITS: %81.44  MISS: %18.56 | HITS: %80.74  MISS: %19.26 | HITS: %79.45  MISS: %20.55 | HITS: %80.62  MISS: %19.30 | HITS: %81.76  MISS: %18.24 | HITS: %81.03  MISS: %18.97 | HITS: %79.22  MISS: %20.77 | HITS: %81.15  MISS: %18.85 |
| **32 blocks** | HITS: %85.59  MISS: %14.42 | HITS: %84.89  MISS: %15.12 | HITS: %84.42  MISS: %15.52 | HITS: %85.03  MISS: %14.97 | HITS: %85.70  MISS: %14.30 | HITS: %85.15  MISS: %14.85 | HITS: %83.89  MISS: %16.12 | HITS: %85.31  MISS: %14.62 | HITS: %86.17  MISS: %13.83 | HITS: %85.61  MISS: %13.39 | HITS: %83.51  MISS: %16.49 | HITS: %85.76  MISS: %14.24 |
| **64 blocks** | HITS: %89.52  MISS: %10.48 | HITS: %88.97  MISS: %11.03 | HITS: %88.15  MISS: %11.85 | HITS: %88.88  MISS: %11.12 | HITS: %89.85  MISS: %10.16 | HITS: %89.06  MISS: %10.94 | HITS: %87.07  MISS: %12.93 | HITS: %89.09  MISS: %10.91 | HITS: %90.02  MISS: %9.98 | HITS: %89.35  MISS: %10.65 | HITS: %86.67  MISS: %13.34 | HITS: %89.20  MISS: %10.80 |

Based on the data collected during the experiment conducted to test the efficiency of a 1-processor wave, it was observed that the setup with 64 blocks yielded the highest hit percentage. The set-associative lines, specifically the 2-way, 4-way, and 8-way configurations, demonstrated great effectiveness, with hit percentages exceeding 88%. although all the block replacement algorithms performed well, the LRU (Least Recently Used) and LFU (Least Frequently Used) algorithms performed the best in this test.

1 Processor Wave\_Burst

|  | **2-way** | | | | **4-way** | | | | **8-way** | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | LRU | FIFO | RAND | LFU | LRU | FIFO | RAND | LFU | LRU | FIFO | RAND | LFU |
| **8 blocks** | HITS: %95.44  MISS: %4.56 | HITS: %95.44  MISS: %4.56 | HITS: %95.44  MISS: %4.56 | HITS: %95.44  MISS: %4.56 | HITS: %95.44  MISS: %4.55 | HITS: %95.44  MISS: %4.56 | HITS: %95.44  MISS: %4.56 | HITS: %95.44  MISS: %4.56 | HITS: %95.44  MISS: %4.56 | HITS: %95.44  MISS: %4.56 | HITS: %95.44  MISS: %4.56 | HITS: %95.44  MISS: %4.56 |
| **16 blocks** | HITS: %97.51  MISS: %2.49 | HITS: %97.51  MISS: %2.49 | HITS: %97.51  MISS: %2.49 | HITS: %97.51  MISS: %2.49 | HITS: %97.51  MISS: %2.49 | HITS: %97.51  MISS: %2.49 | HITS: %97.51  MISS: %2.49 | HITS: %97.51  MISS: %2.49 | HITS: %97.51  MISS: %2.49 | HITS: %97.51  MISS: %2.49 | HITS: %97.51  MISS: %2.49 | HITS: %97.51  MISS: %2.49 |
| **32 blocks** | HITS: %98.54  MISS: %1.46 | HITS: %98.54  MISS: %1.46 | HITS: %98.54  MISS: %1.46 | HITS: %98.54  MISS: %1.46 | HITS: %98.54  MISS: %1.46 | HITS: %98.54  MISS: %1.46 | HITS: %98.54  MISS: %1.46 | HITS: %98.54  MISS: %1.46 | HITS: %98.54  MISS: %1.46 | HITS: %98.54  MISS: %1.46 | HITS: %98.54  MISS: %1.46 | HITS: %98.54  MISS: %1.46 |
| **64 blocks** | HITS: %99.06  MISS: %0.94 | HITS: %99.06  MISS: %0.94 | HITS: %99.06  MISS: %0.94 | HITS: %99.06  MISS: %0.94 | HITS: %99.06  MISS: %0.94 | HITS: %99.06  MISS: %0.94 | HITS: %99.06  MISS: %0.94 | HITS: %99.06  MISS: %0.94 | HITS: %99.04  MISS: %0.96 | HITS: %99.03  MISS: %0.97 | Hits:%99.03  MISS: %0.97 | HITS: %99.04  MISS: %0.96 |

According to the 1-processor wave burst test, the results provided exciting results. Across the table, following the rows of 8, 16, 32, and 64 blocks, all of the block hit ratios were equivalent. The hit rations remained the same regardless of the set-associative or block replacement algorithm. In this configuration, the hit ratio and the number of blocks increased. The 64-block test in this setup was the most effective regardless of the set-associative path and algorithm.

2 Processor Wave

|  | **2-way** | | | | **4-way** | | | | **8-way** | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | LRU | FIFO | RAND | LFU | LRU | FIFO | RAND | LFU | LRU | FIFO | RAND | LFU |
| **8 blocks** | HITS:%80.31  MISS: %19.61 | HITS: %79.86  MISS: %20.13 | HITS: %79.28  MISS: %20.72 | HITS: %80.19  MISS: %19.81 | HITS: %80.89  MISS: %19.11 | HITS: %80.92  MISS: %19.08 | HITS: %79.78  MISS: %20.22 | HITS: %81.18  MISS: %18.82 | HITS: %80.48  MISS: %19.52 | HITS: %80.36  MISS: %19.64 | HITS: %79.63  MISS: %20.37 | HITS: %81.18  MISS: %18.82 |
| **16 blocks** | HITS: %74.64  MISS: %25.36 | HITS: %74.38  MISS: %25.62 | HITS: %73.14  MISS: %26.82 | HITS: %74.32  MISS: %25.68 | HITS: %75.17  MISS: %24.83 | HITS: %75.08  MISS: %24.92 | HITS: %72.25  MISS: %27.75 | HITS: %74.38  MISS: %25.62 | HITS: %75.61  MISS: %24.40 | HITS: %75.40  MISS: %24.60 | HITS: %72.19  MISS: %27.81 | HITS: %75.14  MISS: %24.86 |
| **32 blocks** | HITS: %78.90  MISS: %21.10 | HITS: %78.49  MISS: %21.51 | HITS: %78.86  MISS: %23.14 | HITS: %78.20  MISS: %21.80 | HITS: %78.76  MISS: %21.24 | HITS: %78.49  MISS: %21.51 | HITS: %76.31  MISS: %23.69 | HITS: %78.67  MISS: %21.31 | HITS: %79.14  MISS: %20.86 | HITS: %79.08  MISS: %20.92 | HITS: %75.75  MISS: %24.25 | HITS: %78.90  MISS: %21.10 |
| **64 blocks** | HITS: %80.25  MISS: %19.26 | HITS: %79.90  MISS: %20.12 | HITS: %78.09  MISS: %21.91 | HITS: %80.07  MISS: %19.93 | HITS: %80.68  MISS: %19.32 | HITS: %80.54  MISS: %19.46 | HITS: %77.74  MISS: %22.26 | HITS: %79.92  MISS: %20.08 | HITS: %80.71  MISS: %19.29 | HITS: %80.39  MISS: %19.61 | HITS: %75.46  MISS: %24.54 | HITS: %80.54  MISS: %19.46 |

The data collected from the 2-processor wave experiment indicated that the average hit percentages ranged from 75% to 80%. Each block replacement algorithm produced similar results across different cache and memory configurations. However, the random block replacement algorithm observed some low-hit percentage outliers in the 4-way set-associative cache setup. LRU and LFU block replacement algorithms in this particular configuration provided higher hit percentages.

2 Processor Wave\_Burst

|  | **2-way** | | | | **4-way** | | | | **8-way** | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | LRU | FIFO | RAND | LFU | LRU | FIFO | RAND | LFU | LRU | FIFO | RAND | LFU |
| **8 blocks** | HITS: %95.44  MISS: %4.56 | HITS: %95.44  MISS: %4.56 | HITS: %95.44  MISS: %4.56 | HITS: %95.44  MISS: %4.56 | HITS: %95.44  MISS: %4.56 | HITS: %95.44  MISS: %4.56 | HITS: %95.44  MISS: %4.56 | HITS: %95.44  MISS: %4.56 | HITS: %95.44  MISS: %4.56 | HITS: %95.44  MISS: %4.56 | HITS: %95.44  MISS: %4.56 | HITS: %95.44  MISS: %4.56 |
| **16 blocks** | HITS: %97.51  MISS: %2.49 | HITS: %97.51  MISS: %2.49 | HITS: %97.51  MISS: %2.49 | HITS: %97.51  MISS: %2.49 | HITS: %97.51  MISS: %2.49 | HITS: %97.51  MISS: %2.49 | HITS: %97.51  MISS: %2.49 | HITS: %97.51  MISS: %2.49 | HITS: %97.51  MISS: %2.49 | HITS: %97.51  MISS: %2.49 | HITS: %97.51  MISS: %2.49 | HITS: %97.51  MISS: %2.49 |
| **32 blocks** | HITS: %98.54  MISS: %1.46 | HITS: %98.54  MISS: %1.46 | HITS: %98.54  MISS: %1.46 | HITS: %98.54  MISS: %1.46 | HITS: %98.54  MISS: %1.46 | HITS: %98.54  MISS: %1.46 | HITS: %98.54  MISS: %1.46 | HITS: %98.54  MISS: %1.46 | HITS: %98.54  MISS: %1.46 | HITS: %98.54  MISS: %1.46 | HITS: %98.54  MISS: %1.46 | HITS: %98.54  MISS: %1.46 |
| **64 blocks** | HITS: %99.06  MISS: %0.94 | HITS: %99.06  MISS: %0.94 | HITS: %99.06  MISS: %0.94 | HITS: %99.06  MISS: %0.94 | HITS: %99.06  MISS: %0.94 | HITS: %99.06  MISS: %0.94 | HITS: %99.06  MISS: %0.94 | HITS: %99.06  MISS: %0.94 | HITS: %99.06  MISS: %0.94 | HITS: %99.06  MISS: %0.94 | HITS: %99.06  MISS: %0.94 | HITS: %99.06  MISS: %0.94 |

The results shown for the 2-processor wave burst experiment proved identical to the 1-processor wave burst test. Every hit percentage in the 2-processor wave burst test is identical to that of the 1-processor wave burst. With this information, the 64-block test in this setup was the most effective regardless of the set-associative path and algorithm.