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CS350 – HW6

March 31, 2011

Exercise 1

a) (1/T)+(1/5)+(2/7) ≤ 3\*(21/3-1)

(1/T)+(1/5)+(2/7) ≤ 0.77976315

1/T ≤ 0.294048864

**T ≥ 3.40079532 seconds**

b) Assumption/Simplification: T = 3.4 seconds

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| T1 | 1 |  |  | 1 |  |  | 1 |  |  |  | 1 |  |  | 1 |  |  | 1 |  |  |  | 0.6 |
| T2 |  |  | 0.4 |  | 1.6 |  |  |  |  | 0.2 |  | 0.8 |  |  |  | 0.4 |  | 0.6 |  | 0.4 |  |
| T3 |  | 2 |  |  |  |  |  | 2 |  |  |  |  |  |  | 2 |  |  |  |  |  |  |
| idle |  |  |  |  |  | 0.8 |  |  | 0.2 |  |  |  | 1.6 |  |  |  |  |  | 1.4 |  |  |

c) (1/T)+(1/5)+(2/7) ≤ 1

1/T ≤ 0.514285714

**T ≥ 1.94444445 seconds**

d) Assumption/Simplification: T = 1.95 seconds

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| T1 | 1 |  | 1 |  |  | 1 |  | 1 |  | 1 |  |  | 1 |  | 1 |  |  | 1 |  | 1 |  |  | 1 |  | 1 |
| T2 |  | 0.95 |  | 0.05 |  |  |  |  | 0.8 |  | 0.2 |  |  |  |  |  | 1 |  | 0.6 |  | 0.4 |  |  |  |  |
| T3 |  |  |  |  | 0.9 |  | 1.1 |  |  |  |  | 0.75 |  | 0.95 |  | 0.3 |  |  |  |  |  | 0.55 |  | 1.45 |  |

Exercise 2

a) Starvation is possible in the following situation:

The cache has file 0. A request for file 0 comes in and gets put into Q1. A request for file 1 gets put into Q2. Infinitely many requests for file 0 continue to come in. Because Q1 is the priority queue that gets selected over Q2 no matter what, the request for file 1 will never be served.

b) My friend was thinking of N-batched SCAN.

c) As N increases, the cache efficiency increases. This is because no new requests are admitted to a batch, and so the 2 queues are static, which means cache hits should be as high as they can be (i.e. there’s less chance of cache thrashing).

d) As N increases, fairness decreases. Said a different way, as N decreases, fairness increases. This is because at N = 1, this scheduling reduces to FIFO.

Exercise 3

My expectations:

|  |  |  |
| --- | --- | --- |
| **Scheduler** | **Total Head Movement** | **Average Response Time** |
| RANDOM | Highest | Middle |
| FCFS | Middle | Lowest |
| SCAN | Lowest | Highest |

I ran the simulator with each scheduler 5 times and plotted the empirical data in Excel.

My expectations were off with regards to RANDOM and FCFS. Overall, I thought FCFS would perform “better” than RANDOM, but it turned out to be the opposite.