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CSS 430 Operating Systems

Assignment 3 Report

Part 1

Part 1 required changes to Kernel.java to use queues to handle process synchronization. Now each parent thread is assigned a QueueNode that contains the child thread IDs in a vector.

The tests described in the assignment requirements were all successful.

Figure 1: Test 2

```
C:\Users\Colton\OneDrive\Education\CSS 430 Operating Systems\Assignments\assignment3\ThreadOS>java Boot
threadOS ver 1.0:
threadOS: DISK created
Type ? for help
threadOS: a new thread (thread=Thread[Thread-3,2,main] tid=0 pid=-1)
-->l Shell
l Shell
threadOS: a new thread (thread=Thread[Thread-5,2,main] tid=1 pid=0)
shell[1]% Test2
Test2
threadOS: a new thread (thread=Thread[Thread-7,2,main] tid=2 pid=1)
threadOS: a new thread (thread=Thread[Thread-9,2,main] tid=3 pid=2)
threadOS: a new thread (thread=Thread[Thread-11,2,main] tid=4 pid=2)
threadOS: a new thread (thread=Thread[Thread-13,2,main] tid=5 pid=2)
threadOS: a new thread (thread=Thread[Thread-15,2,main] tid=6 pid=2)
threadOS: a new thread (thread=Thread[Thread-17,2,main] tid=7 pid=2)
Thread[b]: response time = 3999 turnaround time = 5003 execution time = 1004
Thread[e]: response time = 6996 turnaround time = 7499 execution time = 503
Thread[c]: response time = 4998 turnaround time = 8014 execution time = 3016
Thread[a]: response time = 2999 turnaround time = 8020 execution time = 5021
Thread[d]: response time = 5997 turnaround time = 12030 execution time = 6033
shell[2]%
```

Part 2

This part required another update to the kernel so that Disk I/O is assigned to another queue. This alleviates the current situation in which the threads were using a spin lock, just waiting to work. In this new implementation the threads were able to be entered into a queue to wait for notification instead of continuously checking.

Figure 2.1: Test 3 Kernel Old

```
coltonrs@uw1-320-10:~/U/OperatingSystems/assignment3/ThreadOS$ java Boot
threadOS ver 1.0:
Type ? for help
threadOS: a new thread (thread=Thread[Thread-3,2,main] tid=0 pid=-1)
-->1 Test3 3
1 Test3 3
threadOS: a new thread (thread=Thread[Thread-5,2,main] tid=1 pid=0)
threadOS: a new thread (thread=Thread[Thread-7,2,main] tid=2 pid=1)
threadOS: a new thread (thread=Thread[Thread-9,2,main] tid=3 pid=1)
threadOS: a new thread (thread=Thread[Thread-11,2,main] tid=4 pid=1)
threadOS: a new thread (thread=Thread[Thread-13,2,main] tid=5 pid=1)
threadOS: a new thread (thread=Thread[Thread-15,2,main] tid=6 pid=1)
threadOS: a new thread (thread=Thread[Thread-17,2,main] tid=7 pid=1)
comp finished...
comp finished...
comp finished...
disk finished...
disk finished...
disk finished...
Total time elapse: 179951ms
-->
```

Figure 2.2 Test 3 Kernel New

```
coltonrs@uw1-320-10:~/U/OperatingSystems/assignment3/ThreadOS$ java Boot
threadOS ver 1.0:
Type ? for help
threadOS: a new thread (thread=Thread[Thread-3,2,main] tid=0 pid=-1)
-->1 Test3 3
1 Test3 3
threadOS: a new thread (thread=Thread[Thread-5,2,main] tid=1 pid=0)
threadOS: a new thread (thread=Thread[Thread-7,2,main] tid=2 pid=1)
threadOS: a new thread (thread=Thread[Thread-9,2,main] tid=3 pid=1)
threadOS: a new thread (thread=Thread[Thread-11,2,main] tid=4 pid=1)
threadOS: a new thread (thread=Thread[Thread-13,2,main] tid=5 pid=1)
threadOS: a new thread (thread=Thread[Thread-15,2,main] tid=6 pid=1)
threadOS: a new thread (thread=Thread[Thread-17,2,main] tid=7 pid=1)
comp finished...
comp finished...
comp finished...
disk finished...
disk finished...
disk finished...
Total time elapse: 140853ms
-->
```