

Discussion 06 Activity:

Lab 2 Prep Solution

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1 Part One

1.1 Semaphores and Queues

Semaphores keep a queue of processes in order to mitigate the busy waiting which occurs when all units of resource are in use. Because of this busy waiting, queues are used to as a smarter approach. Processes are able to block themselves. The block operation places a process into a waiting queue associated with the semaphore, and the state of the process is switched to the waiting state. A process which is sitting in the waiting queue is unblocked once some other process executes a `signal()` operation.

1.2 The Pthread Library and Thread Creation

The function used to create a thread in the Pthread library is `pthread_create()`. The `pthread_create()` function is used with attributes specified by `attr` (of type `pthread_attr_t`), within a process. If `attr` is `NULL`, the default attributes are used. If the attributes specified by `attr` are modified later, the thread's attributes are not affected. Upon successful completion, `pthread_create()` will store the ID of the created thread in the location specified by `thread`. `pthread_mutex_lock()` is used to perform waits on a thread while another thread completes.

2 Part Two

See attached Round Robin scheduler implementation.

2.1 Output

```
/Library/Java/JavaVirtualMachines/jdk1.8.0_51.jdk/Contents/Home/bin/java -
Didea.launcher.port=7532
Starting RRScheduler...
```

```
Jobs on waiting queue: 3
Job A [arrival time, 0] [length, 10]
Job B [arrival time, 4] [length, 8]
```

Job C [arrival time, 7] [length, 3]

Added to ready queue: Job A
Remaining length of Job A: 9
Time elapsed: 1
Added to waiting queue: Job A
Added to ready queue: Job B
Remaining length of Job B: 7
Time elapsed: 2
Added to waiting queue: Job B
Added to ready queue: Job C
Remaining length of Job C: 2
Time elapsed: 3
Added to waiting queue: Job C
Added to ready queue: Job A
Remaining length of Job A: 8
Time elapsed: 4
Added to waiting queue: Job A
Added to ready queue: Job B
Remaining length of Job B: 6
Time elapsed: 5
Added to waiting queue: Job B
Added to ready queue: Job C
Remaining length of Job C: 1
Time elapsed: 6
Added to waiting queue: Job C
Added to ready queue: Job A
Remaining length of Job A: 7
Time elapsed: 7
Added to waiting queue: Job A
Added to ready queue: Job B
Remaining length of Job B: 5
Time elapsed: 8
Added to waiting queue: Job B
Added to ready queue: Job C
Remaining length of Job C: 0
Time elapsed: 9
Added to waiting queue: Job C
Added to ready queue: Job A
Remaining length of Job A: 6
Time elapsed: 10
Added to waiting queue: Job A
Added to ready queue: Job B
Remaining length of Job B: 4
Time elapsed: 11
Added to waiting queue: Job B
Added to ready queue: Job C
Remaining length of Job C: 0
Time elapsed: 11
Added to waiting queue: Job C

Added to ready queue: Job A
Remaining length of Job A: 5
Time elapsed: 12
Added to waiting queue: Job A
Added to ready queue: Job B
Remaining length of Job B: 3
Time elapsed: 13
Added to waiting queue: Job B

[Job C has finished]

Added to ready queue: Job A
Remaining length of Job A: 4
Time elapsed: 14
Added to waiting queue: Job A
Added to ready queue: Job B
Remaining length of Job B: 2
Time elapsed: 15
Added to waiting queue: Job B
Added to ready queue: Job A
Remaining length of Job A: 3
Time elapsed: 16
Added to waiting queue: Job A
Added to ready queue: Job B
Remaining length of Job B: 1
Time elapsed: 17
Added to waiting queue: Job B
Added to ready queue: Job A
Remaining length of Job A: 2
Time elapsed: 18
Added to waiting queue: Job A
Added to ready queue: Job B
Remaining length of Job B: 0
Time elapsed: 19
Added to waiting queue: Job B
Added to ready queue: Job A
Remaining length of Job A: 1
Time elapsed: 20
Added to waiting queue: Job A
Added to ready queue: Job B
Remaining length of Job B: 0
Time elapsed: 20
Added to waiting queue: Job B
Added to ready queue: Job A
Remaining length of Job A: 0
Time elapsed: 21
Added to waiting queue: Job A

[Job B has finished]

Added to ready queue: Job A
Remaining length of Job A: 0
Time elapsed: 21

[Job A has finished]