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1.

* 1. P1: x = x – 1 => x = 9

P2: x = x – 1 => x = 8

P1: x = x + 1 => x = 9

P1: if statement

P2: x = x + 1 => x = 10

P1: “x is 10”

* 1. P1: LD R0, X => x = 10

P1: DEC R0 => x = 9

P2: LD R0, X => x = 9

P2: DEC R0 => x = 8

P1: into if statement

P1: “x is 8”

2. Binary semaphore is a semaphore with the integer value ranges over 0 and 1 whereas the counting semaphore's integer value ranges over unrestricted domain. Binary semaphores are easier to implement comparing with the counting semaphore.

Binary semaphore allows only one thread to access the resource at a time. But counting semaphore allows N accesses at a time.

The 2 operations that are defined for binary semaphores are take and release.

The 2 operations that are defined for counting semaphores are wait and signal.

3. A monitor is a synchronization construct that allows threads to have both mutual exclusion and the ability to wait (block) for a certain condition to become true. Monitors also have a mechanism for signaling other threads that their condition has been met. A monitor consists of a mutex (lock) object and condition variables. A condition variable is basically a container of threads that are waiting on a certain condition. Monitors provide a mechanism for threads to temporarily give up exclusive access in order to wait for some condition to be met, before regaining exclusive access and resuming their task.

4. A semaphore can only be accessed using the following operations: wait() and signal(). wait() is called when a process wants access to a resource. This would be equivalent to the arriving customer trying to get an open table. If there is an open table, or the semaphore is greater than zero, then he can take that resource and sit at the table. If there is no open table and the semaphore is zero, that process must wait until it becomes available. signal() is called when a process is done using a resource, or when the patron is finished with his meal. The following is an implementation of this counting semaphore (where the value can be greater than 1).