

Assignment No. 4

Thread Synchronization

Aim : Thread synchronization using counting semaphores and mutual exclusion using mutex. Application to demonstrate producer consumer problems with counting semaphores and mutex.

OBJECTIVES : To study

- Semaphores
- Mutex
- Producer Consumer problem

THEORY

Semaphores :

Semaphores is an integer's value used for signaling among processes. Only three operations may be performed on a semaphore all of which are atomic: initialise, decrement, & increment. The decrement operation may result in the blocking of a process, & the increment operation may result in the unblocking of a process. It is known as a counting semaphore or a general semaphore. Semaphores are the OS tools for synchronization.

Two types :

1. Binary Semaphore
2. Counting Semaphore

Binary semaphore :- Semaphore which are restricted to the values 0 and 1 (or locked / unlocked, unavailable / available) are called binary semaphores & are used to implement locks.

It is a means of suspending active processes which are later to be reactivated at such time conditions are right for it to continue.

A binary semaphore is a pointer which when held by a process grants them exclusive use to their critical section. It is a (sort of) integer variable which can take the value 0 or 1 and be operated upon only by two commands termed in English wait & signal.

A counting semaphore can be implemented as follows :-

- * Initialize - initialize to non negative integer
- * Decrement (sem wait)
- * process executes this to receive a single via semaphore
- * If single are not transmitted, process is suspended.

- * Decrements semaphore value
 - * If value becomes negative, process is blocked
 - * otherwise it continues execution
- * Increment (sem signal)

- * process executive it to transmit a signal via semaphore
- * increments semaphore value
- * If value is less than or equal to zero, process blocked by sem wait is unblocked

Conclusion :-

Thus, we have implemented producer consumer problem using 'C' in Linux