* System Programming and Operating System (SPOS) - Test Case Study - 5

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Concurrency Mechanism : Linux / Unix / Windows

* Concurrency in OS -

It is execution of the multiple instruction sequences of the same time. It happens in the operating system where there are several process threads running in Parallel.

The running process threads always communicate with each other through shared memory or message private passing.

Concurrency result is sharing of resources result in problem like deadlock and resources starvation.

* Concurrency Mechanism in Linux -

There are numerous sources of concurrency and therefore possible race conditions. Multiple user-space processes are running and they can access your code in suprising combination of ways. SMP systems can be executing your code simultaneously on different processors. Device interrupts are asynchronous events that can cause concurrent execution of code. The kernel also provides various mechanism for delayed code execution, such as workqueues, tasks and timers.

* UNIX Concurrency Mechanism -

• Pipes : Pipes is a FIFO queue, written by one and read by another process. Pipe are unidirectional circular buffers allowing two processes to communicate on the producer-consumer models.

• Messages : Message passing like functionality by msgsnd and msgrcv mailbox. Like structure called message queue. Process blocks if sending to full or reading from empty queue.

• Shared Memory : Processes sharing common block of virtual memory. Normal memory read/write instruction can be used to communicate prone to error.

• Semaphores : Generalization of Signal and Sen Wait. Kernal provides atomicity : no other user process may access them concurrency.

System calls semctl ; allowes creation and configuration of a set of semaphores.

System calls semaphores performs an operation on a set of semaphores.

• Signal : Inform processes of occurrences of asychronous events. All signal are occuring at the same time delivered at once. Processes or kernal can send processes signals.

* Concurrency Mechanism in Windows -

The central - concurrency mechanism in the windows API is the thread. You typically use the create thread function to create thread. Although they are easy to use, the OS allocates a significant amount of time and other resources to manage them.

The concurrency runtime implement a work-stealing algorithm to extend the FIFO scheduling mechanism.