

**Binary Semaphore** A semaphore that takes on only the values 0 and 1. A binary semaphore allows only one process or thread to have access to a shared critical resource at a time.

**Busy Waiting** The repeated execution of a loop of code while waiting for an event to occur.

**CPU** That portion of a computer that fetches and executes instructions. It consists of an Arithmetic and Logic Unit (ALU), a control unit, and registers. Often simply referred to as a processor.

**Critical Section** In an asynchronous procedure of a computer program, a part that cannot be executed simultaneously with an associated critical section of another asynchronous procedure. See mutual exclusion.

**Deadlock** (1) An impasse that occurs when multiple processes are waiting for the availability of a resource that will not become available because it is being held by another process that is in a similar wait state. (2) An impasse that occurs when multiple processes are waiting for an action by or a response from another process that is in a similar wait state.

**Deadlock Avoidance** A dynamic technique that examines each new resource request for deadlock. If the new request could lead to a deadlock, then the request is denied.

**Deadlock Detection** A technique in which requested resources are always granted when available. Periodically, the operating system tests for deadlock.

**Deadlock Prevention** A technique that guarantees that a deadlock will not occur. Prevention is achieved by assuring that one of the necessary conditions for deadlock is not met.

**Demand Paging** The transfer of a page from secondary memory to main memory storage at the moment of need.

**DMA** A form of I/O in which a special module, called a DMA module, controls the exchange of data between main memory and an I/O device. The processor sends a request for the transfer of a block of data to the DMA module and is interrupted only after the entire block has been transferred.

**Dispatch** To allocate time on a processor to jobs or tasks that are ready for execution

**Interrupt** A suspension of a process, such as the execution of a computer program, caused by an event external to that process and performed in such a way that the process can be resumed.

**Kernel** A portion of the operating system that includes the most heavily used portions of software. Generally, the kernel is maintained permanently in main memory. The kernel runs in a privileged mode and responds to calls from processes and interrupts from devices. kernel mode A privileged mode of execution reserved for the kernel of the operating system. Typically, kernel mode allows access to regions of main memory that are unavailable to processes executing in a less-privileged mode, and also enables execution of certain machine instructions that are restricted to the kernel mode. Also referred to as system mode or privileged mode .

**Multiprocessing** A mode of operation that provides for parallel processing by two or more processors of a multiprocessor.

**Multiprogramming** A mode of operation that provides for the interleaved execution of two or more computer programs by a single processor. The same as multitasking, using different terminology.

**Mutex** Similar to a binary semaphore. A key difference between the two is that the process that locks the mutex (sets the value to zero) must be the one to unlock it (sets the value to 1). In contrast, it is possible for one process to lock a binary semaphore and for another to unlock it.

**Mutual Exclusion** A condition in which there is a set of processes, only one of which is able to access a given resource or perform a given function at any time. See critical section .

**Preemption** Reclaiming a resource from a process before the process has finished using it.

**Process Control Block (PBC)** The manifestation of a process in an operating system. It is a data structure containing information about the characteristics and state of the process.

**Race Condition** Situation in which multiple processes access and manipulate shared data with the outcome dependent on the relative timing of the processes.

**Scheduling** To select jobs or tasks that are to be dispatched. In some operating systems, other units of work, such as input/output operations, may also be scheduled.

**Semaphore** An integer value used for signaling among processes. Only three operations may be performed on a semaphore, all of which are atomic: initialize, decrement, and increment. Depending on the exact definition of the semaphore, the decrement operation may result in the blocking of a process, and the increment operation may result in the unblocking of a process. Also known as a counting semaphore.

**Spin Lock** Mutual exclusion mechanism in which a process executes in an infinite loop waiting for the value of a lock variable to indicate availability.

**Spooling** The use of secondary memory as buffer storage to reduce processing delays when transferring data between peripheral equipment and the processors of a computer.

**Starvation** A condition in which a process is indefinitely delayed because other processes are always given preference.

**Swapping** A process that interchanges the contents of an area of main storage with the contents of an area in secondary memory.

**Thrashing** A phenomenon in virtual memory schemes, in which the processor spends most of its time swapping pieces rather than executing instructions.

**Trap** An unprogrammed conditional jump to a specified address that is automatically activated by hardware; the location from which the jump was made is recorded.