12.1 Inter-process Commuication-Reading

Notebook:	How Computers Work [CM1030]	
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Cornell Notes	**Topic:** 12.1 Inter-process Communication	Course: BSc Computer Science
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Essential Question:

What happens when multiples processes share or attempt to access the same resources?

Questions/Cues:

- What is a flag?
- What is an interrupt disable/enable?

- What is a test-and-set instruction and what is a semaphore?
- What is a critical region?
- What is mutual exclusion?
- What is Deadlock?
- What are the conditions for Deadlock to occur?
- What is Spooling?

Notes

> The file manager allocates access to files as well and allocates mass storage space for the construction of new files; the memory manager allocates memory space; the scheduler allocates space in the process table; and the dispatcher allocates time slices.

- Flag = In the context of control access, refers to a bit in memory whose states are often referred to as set and clear, rather than 1 and 0.
- Interrupt disable = instruction causes future interrupts to be blocked
- Interrupt enable = instruction that causes CPU to resume responding to interrupt signals
    - If OS starts the flag-testing routine with a disable interrupt instruction and ends it with an enable interrupt instruction, no other activity can interrupt the routine once it starts.
- Test-and-set instruction = directs CPU to retrieve the value of a flag, note the value received, and then set the flag--all within a single machine instruction.
    - Advantage here is that because CPU always completes an instruction before recognizing an interrupt, the task of testing and setting the flag cannot be split when it is implemented as a single instruction.
        - A properly implemented flag as described above is called a semaphore

- Critical Region = Sequence of instructions that should be executed by only one process at a time.
- Mutual Exclusion = Requirement that only one process at a time be allowed to execute a critical region
    - Common way of obtaining mutual exclusion to a critical region is to guard critical region with a semaphore.
    - To enter critical region, a process must find the semaphore clear and then set semaphore before entering critical region; then upon exiting critical region, the process must clear semaphore. If semaphore is found in its set state, the process trying to enter critical region must wait until semaphore has been cleared
- Deadlock = condition in which two or more processes are blocked from progressing because each is waiting for a resource that is allocated to another.

Analysis of deadlock has revealed that it cannot occur unless all three of the following conditions are satisfied:

1. There is competition for nonsharable resources.
2. The resources are requested on a partial basis; that is, having received some resources, a process will return later to request more.
3. Once a resource has been allocated, it cannot be forcibly retrieved.

- Spooling = technique of holding data for output at a later but more convenient time

Summary

In this week, we learned about the Deadlock, the locking of a resource and the remedy to Deadlock, the concept of a Semaphore and the technique called spooling.