



# Process Synchronization

## Cooperating process

- Logical address space is share (code & data)
- Data is share (files or messages)



# Software Based Approaches

- **Critical Section Problem**
- **Peterson's Solution**



# Hardware Based Approaches

- Ranging technique to solve Critical Section Problem
  - Locking (complicated)
  - Mutex Locks (simple)
  - Semaphore (almost similar to Mutex Locks, robust)



# Semaphores

- `wait ()`, `signal ()` – only one process is allowed to modify same semaphore
- Counting semaphore value is ranged over unrestricted domain – used to control access
- Binary semaphore value is only 0 and 1
- Includes integer value and processes list
- To solve various synchronization problems
- Implication – deadlocks & starvation, priority inversion
- Timing Error



# Issues

- **Bounded Buffer Problem**
- **Readers – Writers Problem**
- **Dining Philosophers Problem**