

# How to avoid deadlocks

**Avoiding deadlock** using primitive synchronization mechanisms (locks and semaphores) **is hard** (cf chapter 32)

# Implementing synchronization constructs

Two approaches :

- Either implement locks first (Linux approach)  
and build semaphores and condition variable on the top
  - ➡ Linux has two versions
    - Spinlock (non-blocking)
    - Mutex (blocking)
- Or implement semaphores first (Pintos approach)  
and build locks and condition variable on top
  - ➡ Pintos approach